ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED AFFORDABLE HOUSING APARTMENTS DEVELOPMENT ON PLOT L.R. 34 IN JUNDA, KISAUNI SUB-COUNTY, MOMBASA COUNTY

Gps Coordinates Latitude-4.01939, Longitude 39.66596 Altitude 12m

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APRIL 2021

DECLARATION

In undertaking this task, the ESIA Study Report the expert endeavor to comply with the legal requirements provided for and to guide the practices, activities and conduct of environmental impact assessment, as contained in the National Environmental Management and Coordination Act (EMCA) 1999 and (Amendment) 2018, and the Environmental (Impact Assessment and/ Audit) Regulations, 2003 and other subsequent legislations relating to the environment.

I/We, the undersigned, wish to certify that the particulars in this report are correct and a truthful representation of all the findings relating to the proposed project. Plot No 34, Junda,Kisauni Sub-County, Mombasa County.

Certification by the Lead Expert

Environmental Expert	**Reg. No.**	**Signature**	**Date**
Otieno.H.Nelson	Lead Expert No. 2052		

Certification by the Proponent

On behalf of **Mshomoroni Estates Ltd**, I hereby confirm that the contents of this report are a true reflection of the proposed project works. We shall endeavour to implement the mitigation measures proposed in the report to ensure the project complies with applicable environmental regulations.

Project Proponent	**Designation**	**Telephone Number**	**Signature**	**Date**
Mshomoroni Estates Ltd	Project Manager Mr Adam Tuller	0714011896 0714840031		

LIST OF ABBREVIATIONS

AoI	Project Area of Influence
CCTV	Closed Circuit Television
EARS	Earthquake Alert and Report System
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMMP	Environmental Management and Monitoring Plan
EHS	Environmental Health and Safety
IUCN	International Union for Conservation of Nature
GHG	Green House Gases
GSHAP	Global Seismic Hazard Assessment Program
GOK	Government of Kenya
GPS	Global Positioning System
HVAC	Heating, Ventilation and Air Conditioning
HSE	Health Safety and Environment
IFC	International Finance Corporation
IFC PS	IFC Performance Standards
ILP	International Lithosphere Program
MDCA	Mombasa Development Control Authority
KMD	Kenya Meteorological Department
KPLC	Kenya Power and Lighting Company
KRA	Kenya Revenue Authority
KSHS	Kenya shilling
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
LR No	Land Registration Number
MMI	Modified Mercalli Intensity
MMP	Mombasa Marine Park
MPA	Marine Protected Areas
MSDS	Material Safety Datasheets
MTP	Medium Term Plan
NEMA	National Environment Management Authority
NEAP	National Environmental Action Plan.

MOWASCO	Mombasa Water and Sewerage Company Limited
NEP	National Environment Policy
NGO	Non-Governmental Organization
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
PRSP	Poverty Reduction Strategy Paper
PEC	Poverty Eradication Commission
PPE	Personal Protective Equipment
RTA	Road Traffic Accident
RWM	Raw Water Main
STI	Sexually Transmitted Infection
SWM	Solid Waste Management
TOR	Terms of Reference
TMP	Traffic Management Plan
TWM	Treated Water Main
WIO	Western Indian Ocean
WHO	World Health Organization
WRA	Water Resources Authority
WSP	Water Service Provider
WMP	Waste Management Plan
WIBA	Work Injury Benefits Act
UNESCO	United Nation Educational, Scientific and Cultural Organization
UN/IDNDR	United Nations International Decade for Natural Disaster Reduction
UPS	Uninterrupted Power Supply

mm	Millimetre
m	Metre
km -	Kilometre
m3-	Cubic metre
m3/hr-	Cubic metre per hour
m/hr-	Metre per hour
m3/day-	Cubic metre per day
l	Litre
m. sq	Metre square
Sq. km	Square Kilometre

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ACKNOWLEDGMENT

The Mshomoroni Estates Ltd ESIA team wishes to express its gratitude and acknowledges all the respondents who availed information sought by the team. We wish to acknowledge the support accorded by key stakeholders including the local administration, the local residents of Junda and neighboring areas, political leaders and all the community leaders who played a key role in mobilizing people for public participation. Of critical importance was the information availed from the enthusiastic community members and key informants and stakeholders who took part in the environmental examination process.

We would also like to thank the Mshomoroni Estates Ltd for availing the necessary documentation for the study, assisting in organizing the site visits and public forums and answering the numerous requests for information on the proposed project.

Project Manager	Mr Adam Tuller	
Lead Expert	Mr Otieno.H.Nelson	
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EXECUTIVE SUMMARY

Introduction

The Proponent, Mshomoroni Estates Ltd, has proposed to put up a state-of-the-art Low cost affordable Housing Project in Junda,Kisauni sub-county, Mombasa County. The proposed development will consist of a 1001 Apartments inclusive of 9 Spacious Commercial Area and will be located on LR No 34 off Kengelani Road off Mombasa-Kilifi Highway in Junda Area. The development will occupy 10 Acres with a total plinth area of 45,972 sqm.

Other components of the proposed project include

- Nine shops
- Parking and utility area
- A waste water treatment plant
- 1 borehole – subject to a different EIA study
- Underground water reservoirs
- Boundary wall, drainage works and associated facilities to enable the project to operate optimally
- Green lawns and spaces

The Environmental Impact Assessment Study Report

Under the Environmental Management and Coordination Act (EMCA) Cap 387 and (Amendment) 2018, and the Environmental (Impact Assessment and Audit) Regulations, 2003, it is a requirement that all major projects undergo an Environmental Impact Assessment (EIA) process to evaluate the existing and potential positive and negative impacts of the proposed project so as to ensure the project is aligned to sustainability requirements. It is in this respect that this ESIA report has been prepared.

Methodology Outline

The general steps followed during the assessment were as follows:-

- Site reconnaissance and surveys to determine the baseline information of the project area
- 1 public meeting were held with residents of the Area
- Desk studies and research.

The Study Area

Administratively the study area is located in Mshomoroni Kisauni Sub-County. The site is approximately 4.2 km northeast of the city of Mombasa and approximately 4.6 km from the coast line of Mombasa on the southern side.

Mombasa County formerly Mombasa "town" has been in existence for many centuries. A prosperous trading town in the 12th century and was key node in the complex Indian Ocean trading networks.In 16th century its significance in the world trade was recognized by some European powers hence construction of Fort Jesus by the Portuguese. Historical profile of Mombasa County shows that has played an important part in the development of not only Kenya but East Africa.

The Land area is 229.9 Km2and 65 Km2of water mass (200 nautical miles into the Indian Ocean) and Lies between latitudes 3056' and 4010' South of the Equator and between longitudes 39034'and 39046'east of Greenwich Meridian.

At 60% the formal sector provides majority of employment. These formal employment opportunities are found in Mvita and Changamwe and Jomvu Sub- counties. Major employers include the hotel industry, shipping industry, Government of Kenya and various private institutions. The County has over 38 banks and host several microfinance institutions. Despite high population density compared to other sub-counties Nyali and Likoni Sub-counties do not host any meaningful industry. This may explain the relative high prevalence of crime rate, youth radicalization and apparent support to secessionist groups in Likoni and Kisauni areas.

Mombasa city being an ancient town hosts several tourist attractions including world heritage sites among them Fort Jesus Museum (a UNESCO World Heritage site).There are over 201 registered hotels and lodges with a total bed capacity of about 8,000 beds and average annually bed occupancy of 64 per cent. There is enormous potential in the tourism and hospitality sectors which is yet to optimally tapped.

The county has 65 Km2 water mass and an Exclusive Economic Zone extending 200 nautical miles into the Indian Ocean. There are 14 fish landing sites and one fish processing plant. The county's fisheries potential of 994,718 metric tonnes has not been utilized at all. There are several manufacturing enterprises in the county which include manufacturing

industries (export processing, oil refineries, glassware, flour mills and car assembly plants). These industries offer the much needed employment opportunities to the local residents as well as other expatriates especially in the shipping sub-sector. However, Nyali and Likoni Sub-counties do not host any meaningful industry and the residents have to access employment opportunities in Mvita, and Changamwe sub-counties where the majority of these industries are located. Despite high youth population compared to other sub-counties, Nyali and Likoni sub-counties do not host any meaningful industry. This situation may pose aserious threat to county's social and political fabric (GoK, 2013).

Mining activities in the County are minimal. The only notable mining activity that is ongoing is limestone mining by Bamburi Cement factory in Kisauni Sub-county. There is minimal scale extraction of coral blocks in some parts of the county. Apart from offering prospects for sea bed mining, a number of companies are now undertaking seismic survey within the county's off shore prospecting oil, gas and coal deposits.

The county has the only port the main entry point for almost all imported materials and exit for exports from a hinter-land which is made who has a combined population of over 150 million people. Significant proportion of the service industryis related to serving the import and export business through Mombasa port.
Therefore, county's economy is very critical for the growth of the national andregional economy.

Policy, Legal and Institutional Framework

The Constitution of Kenya, 2010 and the National Environment Policy (NEP) underscores the linkages between the environment and natural resources and the local and national economy people's livelihoods and the provision of environmental services. They both advocate for a balanced development while protecting the environment i.e. sustainable development.

The Environmental Management and Co-ordination Act (EMCA), 1999 and (Amendment) 2018 provide a legal and institutional framework for the protection and conservation of the environment, Environmental and Social Impact Assessment (ESIA), environmental auditing and monitoring. This requires major development projects to undergo an ESIA study.

EMCA (Environmental Impact Assessment and audit) regulations 2003, among others, reiterate the need for a full ESIA study. Other laws contain provisions for the health,safety, and welfare of persons employed as well as the general public.

Anticipated Project Impacts

The proposed project is envisaged to lead to positive and negative environmental and social which could be direct or indirect.

The process of determining the various impacts was done through site visits, discussions with the Proponent's technical team, review of the available documentation and stakeholder engagement and public participation as well as from professional judgment.

Anticipated positive impacts

- Creation of employment opportunities
- Affordable yet decent living
- Exposure to new skills and technical applications
- Increase in property values
- The growth of local businesses and improved livelihoods
- Local revenue generation and associated economic growth

Anticipated negative impacts

- Loss of vegetation cover
- Air degradation from construction activities
- An increase in solid waste generation
- Increased pressure on the available infrastructure and social services
- Environmental and health safety concerns during construction
- The potential impact on sea animals and the Junda Creek
- Alteration of natural drainage systems
- Risk of fire and disasters
- Impacts on occupational health and safety
- Interference with social-cultural set up of families
- Changing demographics and related concerns

For air, water and noise pollution, the Proponent will be required to strictly adhere to the EMCA regulations on air quality, water, and noise regulations to prevent pollution. This can be achieved in various ways as outlined in the Environmental Management and Monitoring Plan (EMMP).The EMMP is developed to ensure the sustainability of the

project, from construction through to operation and decommissioning phases. The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitoring indicators. Implementation timeframes and responsibilities are also defined.

The County Government of Mombasa and the National Government are responsible for the provision of services such as Solid Waste Management (SWM), electricity supply, major public facilities, water provision, security services, transport infrastructure, etc. To mitigate against pressure on social services and infrastructure, the Proponent will work in close collaboration with the state machinery and government agencies to ensure minimal disruption of services in Junda Area and all the surrounding environs. This may involve working in collaboration to upgrade the local infrastructure where needed. The Proponent will engage with the relevant government authorities in the areas of water provision, road infrastructure, power provision, security services, and fire-fighting services. This is so as to ensure that the proposed development bears minimal pressure on the existing facilities and infrastructure in the area.

Stakeholder Engagement and Public Participation

The aim of public participation is to disseminate information to interested and affected parties, consult and solicit comments in order to incorporate their views in the project design considerations.

Methods used in public participation exercise include the following:

- Direct interviews where necessary, to get responses from the proponent, project contractor and project engineers
- Public meetings were held in in Junda shopping Centre. In the various platforms, community Members raised concerns about the impact of the proposed project including matters of air pollution, traffic congestion during project construction and operation, vegetation clearance and the disruption of the social life setting. However, they also noted that the project has numerous positive impacts particularly noting the creation of job and business opportunities, world-class tourist destination, increased employment and trading opportunities, land value appreciation and improved infrastructural development triggered by the proposed development
- Questionnaire administration, Over 16 open-ended questionnaires were administered during the public meetings. This was so as to sensitize the community about the project and draw local knowledge in the identification of the various impacts relating to the project.

Table 0-1: Schedule of Meetings with Key Stakeholders and Public forums

Date	Venue	Time Held	Number of participants
March 15, 2021	Junda Shopping Centre	08;00am to 04:30pm	18

Project Alternatives

A no construction/project alternative would imply that the situation on the proposed site would be left in its present state. While this ensures non-interference and preservation of the status environment and social conditions, without the proposed project, the anticipated benefits as outlined would not be achieved.

The "No Action Alternative" should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the environmental and social management plan developed in this report, all the relevant mitigation measures advised by the relevant government agencies and good management practices.

Comparing various options, the current location for the proposed project was chosen due to the potential of the area as a world-class tourism destination and the reduction in land acquisition needs.

Environmental Social Management and Monitoring Plan (ESMMP)

In terms of mitigating the environmental impacts, the proponent and the contractor will be required to implement comprehensive environmental management programmes.

The ESMMP is developed to ensure the sustainability of the project, from construction through to operation.The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitoring indicators. Implementation timeframes and responsibilities are also defined.

The ESMMP also outlines social mitigation measures. The most crucial and urgent is the need for comprehensive mitigation measures against pressure on services and social amenities. The County Government of Mombasa and the National Government are responsible for the provision of services such as Solid Waste Management (SWM), electricity supply, major public facilities, water provision, security services, transport infrastructure,etc.The Proponent will work in close collaboration with the state machinery and government agencies to ensure minimal disruption of services in Junda and all the surrounding environs. This may involve working on upgrading the local infrastructure where needed.

The primary responsibility for the integration of the mitigation measures for the proposed development lies with the project proponent and by extension the contractor during the construction stage, while the proponent takes over the duty upon commissioning of the project. At every stage, the objective should be to ensure that the specified mitigation measures are implemented.

Conclusion and Recommendation

No detrimental environmental factors were reported and all the required studies as pertaining to the proposed development have been conducted and approvals necessary acquired. These include:

- The ESIA Scoping Report;
- Geotechnical and Topography Survey of the site;
- Traffic Impact Analysis;
- Marine Studies;
- Hydrogeological Survey for the One boreholes on site- subject to a different EIAstudy;
- Approval of project architectural and structural drawings

As per the analysis of the aspects of both positive and negative environmental impacts of the project's development, The Expert found no significant negative impacts that could pose adverse effects to the extent that the proposed project should not be implemented. The local community has overwhelming support for the project and theyare very well informed having conducted the public meetings and several stakeholder engagements with the different stakeholders.

There is a high expectation of employment for the youths and improvement in the household incomes, infrastructure and general delivery of social services. It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental,safety,health and social impacts associated with the life cycle of the project.

It is therefore recommended that the proposed project be approved subject to the following recommendations:-

- Proponent to ensure implementation of the proposed mitigation measures and compliance with ESMP during construction, commissioning and operational

phases.

- The Proponent to implement all relevant permit conditions as required.
- Annual Audit from the start of operations of the resort consistent with NEMA requirements.
- Continuous Stakeholder engagement throughout construction and operational phases. This will help establish and maintain a productive relationship between the Project and stakeholders.

1 INTRODUCTION

1.1 Project Brief

Mshomoroni Estate Ltd, has proposed to put up a total of 1001 state-of-the art low cost affordable houses inclusive of 9 Shops of on plot Lr No. 34 in Junda,Mshomoroni off Mombasa-Mtawapa Highway,a few metres away from kengelani Road, Mombasa North,Kisauni Sub-County,Mombasa County.

The proposed project is envisaged to showcase a modern development in the Junda area of Mshomoroni while making use of the geographical environment and the local culture of the Coastal people of Kenya. Once complete, the project will offer state of the art affordable houses to the locals and emmigrants at a relatively affordable cost.

The proposed project design will be executed in Four (4) Phases, all the 1,001 Apartments will be of Four (4) Storeys each storey comprising in it 8 units, and will comprise of the following details

1.2 The Proposed Project Design

The proposed Mshomoroni Estates development will comprise the following:

Phase 1: Two Bedrooms Apartments, 130 in total, shops, 9 in total

Interior components for 1st 2nd, 3rd and 4th floor details of Two Bedrooms Apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- Master Bedroom and standard bedroom
- General design of the 9 spacious shops

A studio size commercial room fitted with electricity supply, water supply and a metallic rolling door

Phase 2: One Bedrooms Apartments 163 in Total and Two Bedrooms Apartments 287 in total

Interior components for 1st 2nd, 3rd and 4th floor details of two bedroom apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- Master Bedroom and standard bedroom

Interior components for 1st 2nd, 3rd and 4th floor details of one bedroom apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- A standard bedroom

Phase 3: Two Bedroom Apartments 70 in Total and 100 Three Bedrooms

Interior components for 1st 2nd, 3rd and 4th floor details of two bedroom apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- Master Bedroom and standard bedroom(s)

Phase 4: Two Bedrooms Apartments 88 in Total and One Bedrooms 163 in total

Interior components for 1st 2nd, 3rd and 4th floor details of two bedroom apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- Master Bedroom and standard bedroom

Interior components for 1st 2nd, 3rd and 4th floor details of one bedroom apartments

- A Spacious Lounge
- A State-of-The-Art Kitchenette
- Water closet Area/Sanitation unit
- A standard bedroom

Each Two-Bedroom Apartments will occupy a space area of 60m3 .While One Bedroom Apartments will each sit in a square meter of 40m2 .Thus the total units will be 1001 inclusive of 9 shops. The total plinth area will be 45,972 Sqmt equivalent to 10 Acres. The proposed project will take approximately One Year to complete.

1.3 Key Findings

The property where the proposed development is to be located is under the residential as per the zoning regulations. The proposed development has been authorized under these laws.

The area economy remains under-developed and based primarily on medium trade of goods and services tourism and fishing activities. The residents in Junda mostly depend on daily manual jobs depended upon by new activity upcoming in the area. Once the proposed project has been actualized, residents of the Area will be able to seek manual Jobs provided during the construction activities thus alleviating themselves from constant Hunger for Money.

All studies as pertaining to the project have been conducted and the anticipated adverse effects such as effect on marine life; increased solid waste generation, traffic congestion and effect on the flight path fully addressed ensuring the highest environmental compliance measures shall be met.

1.4 Project Objective

The overall project objective is to put up affordable housing project with high end exterior and interior designs to be later sold out at an affordable rates to the residents on Plot LR No. 34 off Kengelani Road Junda,Mombasa North in Kisauni sub-county,Mombasa County, consisting of 1,001 affordable houses Apartments, with 9 Shops.

In so doing, the Proponent seeks to:

- To promote social and economic development in Kisauni sub-county,Junda and improve the living standards of residents along the project area and the East African regionby availing decent livings to her citizens
- The project will optimize land use and its utility; in line with the local physical planning.
- It will also provide employment especially during construction phase.
- It will create a market for goods and services (construction inputs) which include raw materials, construction machinery and labour.
- Many secondary businesses are also likely to spring up during the construction phase; especially those providing foods and beverages to the construction workers.

The purpose of this ESIA report is first to ensure adequate identification of potential negative environmental and social impacts. Secondly, to propose workable mitigation measures and thirdly to formulate the ESMMP articulating the anticipated impacts, mitigation measures, responsible persons, required resources and time frame. The overall objective of the study is to ensure that all environmental concerns are integrated with all the development activities throughout the project cycle i.e. the construction, operation

TERMS OF REFERENCE (TOR)

The TOR for this ESIA study is based on EMCA 1999 and (Amendment) 2018 and the Environmental (Impact Assessment and Audit) Regulations, 2003. According to the Regulations, the ESIA report should contain a description of the following:

- Nature and the design of the proposed project;
- The location of the project including the physical area that may be affected by the Project's activities;
- The activities that shall be undertaken during the project construction, operation and decommissioning phases;
- The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
- The projects potential social and environmental impacts, and the impact area within which impacts are likely to be felt;
- The recommended mitigation measures to minimize the anticipated adverse impacts and quantify associated costs prepare guidelines for avoiding and/or, reducing as far as possible, adverse impacts due to proposed usage of the site and utilization of existing environmental and social attributes for optimum development.
- The action plan for the prevention and management of possible accidents during the project cycle and plan to ensure the health and safety of the workers and neighboring communities;
- The environmental and social policies, legislation and regulations relevant to the project;
- The analysis of project feasible alternatives;
- Stakeholder engagement and public participation;
- To provide any other information required by the authorities.

1.5 Study Methodology

The ESIA study was carried out based on the desk review, field assessments and public consultations with the community who are likely to benefit from the project**.**

1.6.1 Desk review

A desktop study was conducted to review available published information, development plans and maps in order to compile relevant baseline biophysical and socio-economic information about the study area. The biophysical information was compiled on environmental aspects such as topography, climate, soils, water resources, land use, and flora and fauna. On the socio-economic environment, the study compiled information on aspects such as demographics and the socio-economic profile.

The team also reviewed all the available and relevant national and international legal environmental documents, standards and guidelines, national and county level (planning) documents (such as Vision 2030, the Second Medium Term Plan, County Integrated Development Plan) and other relevant to the project area were reviewed.

1.6.2 Field Study

Field visits were conducted in the study area in order to collect site-specific information on the biophysical and socio-economic environment and to crosscheck the secondary data. In addition, the environmental data was recorded and the potential impacts identified. In addition, environmental features relevant to the study were noted and photographs were taken as a record of key features. Additional input was sought from the Project Manager and Mshomoroni Estate Ltd team of engineers and architects.

1.6.3 Impact Assessment and Analysis

The assessment and analyses methodologies for ESIA studies are based on multidisciplinary approaches and structured to allow for holistic study and assessment of the following key components of the environment in relation to the proposed Project:

- Physical/chemical component;
- Biological/ecological component;
- Sociological/cultural component; and
- Economic/operational component.

1.6.4 Public Consultations and Stakeholder Engagement

The stakeholder engagement and public participation were meant to draw local knowledge in the process of identifying environmental and social impacts and provide both the interested and affected parties an opportunity to provide input and suggestions on the proposed development.

In undertaking the study, the ESIA team employed a participatory approach that entailed the following:

- ***Public Forums***: Public meeting was held in Junda Shopping Centre. The meeting was attended by immediate Neighbourhood,local administration, religious representative, community representative; government Lead agencies and Members of the *Nyumba Kumi Initiative* and youth groups.
- ***Questionnaire administration*:** More than 15 open-ended questionnaires were administered in the public meetings to collect written views of various stakeholders
- ***Settlement (village/ community) meetings:*** These were carried out with immediate neighbors to the project as well as those households within direct impacted area that will be physically and / or economically impacted by the Project. These meetings included women and vulnerable groups like the elders who may have difficulty in engaging with the stakeholder consultation process and thus may not be able to fully express their concerns regarding the Project in the public meetings.
- ***One-to-one/ Key informant interviews-*** This targeted engagement with professionals or key informant regarding specific related issues.

2 PROJECT DESCRIPTION

2.1 Project Location and Area Overview

Administratively the study area is located in Junda,Mshomoroni Kisauni Sub-County. The site is approximately 6.4 km northeast of the city of Mombasa and approximately 3OO Metres km from the cost line of Jundah creek on the southern eastern side side.
The Land area is 229.9 Km2and 65 Km2of water mass (200 nautical miles into the Indian Ocean) and Lies between latitudes 3056’ and 4010’ South of the Equator and between longitudes 39034’and 39046’east of Greenwich Meridian.

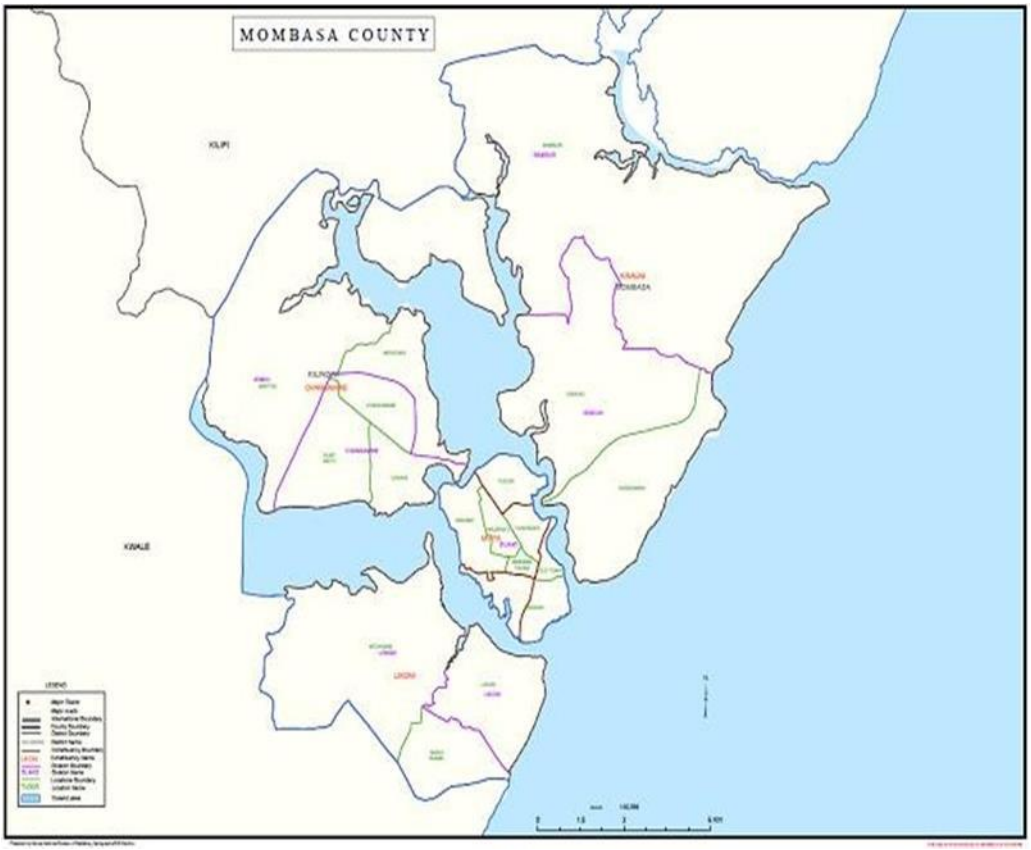


Figure 2-1: Location and Administrative Boundaries of Mombasa County

The project site is located approximately 6.4 km northeast of the city of Mombasa and approximately 300 Metres from Mombasa Jundah Creek.
The site is specifically located on the Global Positioning System (GPS) Coordinates ofLatitude and longitude: **Gps Coordinates Latitude-4.01939, Longitude 39.66596 Altitude 12m**

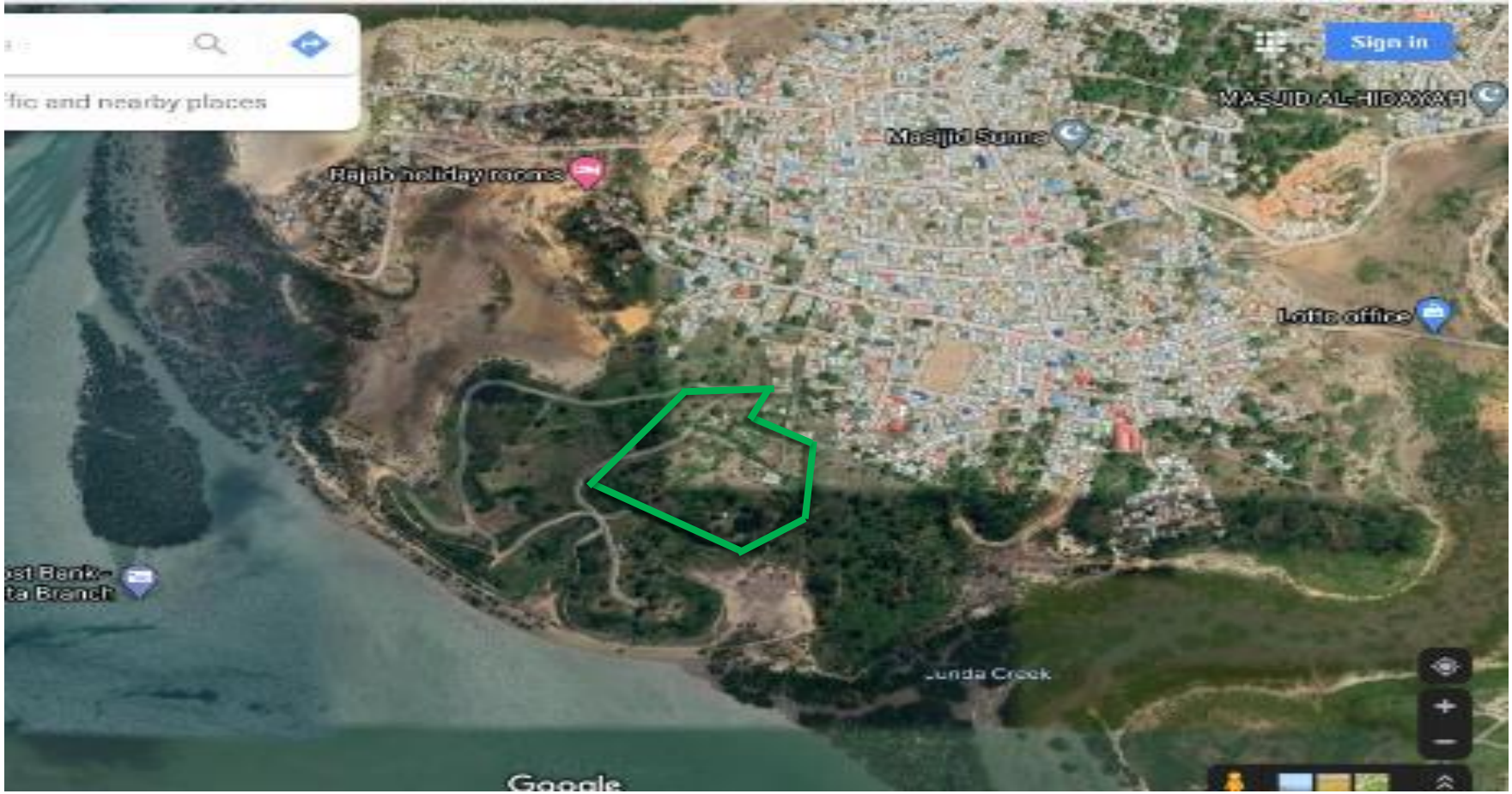


Figure 2-2: The Geographical location of the proposed project using Land Sat Imagery. Courtesy of NASA

2.2 General Site Analysis

From the initial analysis of the site, the site was found to be suitable for the proposed development after the preliminary geotechnical investigation. The site is largely unoccupied and indirectly fronts the Kengelani Road from the Northern side which is the Main Access route to the site.

The area where the proposed development is to be located is under residential use as per the zoning regulations. However, the Physical Planning Act; Cap 286, section 29-41.Junda is connected to the national electric grid and MOWASCO water supply systems.

INSET: A Three Phase Power Line Accessible Near The Site Installed By KPLC.

Hydrogeological studies have shown potential ground water that can be utilized to supplement water supplied from MOWASCO.Two (1) borehole have been suggested to be drilled on site, with their actual locations already established. The ESIAfor the boreholes is part of a separate ESIA.

Figure 2-3: The proposed site in its current non-developed state

The site is currently covered with a dotted mature trees such as *Mangifera Indica (Mango Tree), hyophorbe lagenicaulis (locally known as Mnazi,Palm Tree)* and other shrubs and undergrowths *as shown below among others.*

2.3 General Infrastructure and designs of the Proposed Project

2.3.1 Four Storeys of 1,001 Apartments

The proposed Project will involve the development of a state-of-the-art affordable houses building and will consist of Three Bedrooms, two bedrooms and one bedrooms. The apartments will be fitted with high end auxiliaries to complement what a comfortable life really is.

2.3.2 Auxiliary Facilities

The other components will include, storm water drainage system, wastewater treatment area,fibre optic cable network, electricity connections, and water supply. Full details of the proposed design can be obtained from the building plans appended.

2.3.3 Visual Façade

The façade design for the proposed project is as follow:

- The building techniquewill use special low-pressure sodium-vapor lighting -rather than the normal lights which is less intrusive to the residents depending on it for night vision. Other measures will also be employed to ensure minimal impact on human Eye damage as outlined in the ESMMP.
- Solar water system to supply residents with hot water while cutting massively on electricity Bills
- Solar security lightings will also be installed for guaranteed 24/7 security alongside security Guards to Man the Gate.

2.3.4 Open spaces

Ornamental trees and flowers will also be introduced in concrete unoccupied spaces improving and supplementing fresh Air to the residents.

2.3.5 Natural Ventilation and lighting

Natural ventilation has been incorporated into the project design as much as possible. The project design aims to maximize the use of natural ventilation and lighting, especially during the day by providing a comfortable working environment (for commercial Shops) and living conditions throughoutthe year. Energy efficient air condition systems shall be installed. Other elements of the project the façade design to achieve natural ventilation will include glass performance, glazing proportion, external shading components and geometry, size and position of ventilation openings.

2.4 Project cost

The project cost is estimated at One Billion Kenya shillings (Kshs1,000,000,000)

2.5 Project Activities

The project activities will be carried out simultaneously. The phases in the implementation of a development project include project planning; site preparation and clearing; construction; operation and project decommissioning.

2.5.1 Planning and design activity phase

During this phase, the project proponent obtains all necessary permits, licenses, approvals and other relevant documents from the respective authorities. Other activities include site clearance and preparation, taking into consideration the type and nature of materials to be used, the physical conditions of the site in line with total costs and the economic value of the project.

2.5.2 Construction phase

This phase will involve ground excavation, setting the foundation and backfilling and actual construction works (civil, plumbing, electrical, roofing, and other related works). Landscaping and drainage work, clearing the site of construction debris; and construction of septic tanks will also be carried out.

2.5.3 Operational phase

Upon completion and inspection, the project management will commence the use of the facilities. The proponent shall also ensure the hygiene of the facilities and common areas such as parking and sanitary areas. The management shall also ensure regular maintenance work at the building.

Solid and liquid waste generated and accidental fire Incidents comprise the main environmental challenges at the operational phase and effective mitigation measures have been spelt out in the ESMMP.

2.5.4 Project's decommissioning phase

In the event that the facilities will be decommissioned, activities in this phase shall involve demolitions of all structures on site and clearing the debris.Electrical installations and piping shall also be safely disconnected. The activities in this phase shall be done carefully so as to cause a minimal hazardous environmental impact. Excavations shall also be done to restore the original landscape and the impact will be short term.

2.6 Project inputs

The project will basically handle input materials of various nature:

- **Non-hazardous materials**: The store for non-hazardous materials will be accommodated within the site area. Materials to be stored shall include samples for review/testing by consultants and or inspectors

- **Hazardous materials**: Hazardous materials shall include paints, oil, grease, fuel, etc. The store to keep these materials shall have iron a waterproof concrete bunding and a roof to contain spills. Storage and handling of all hazardous chemicals shall be in accordance with manufacturer's instructions as outlined on the Material Safety Data Sheets

- **Bulk construction materials**: The bulk materials to be stored on site include: sand, ballast, stones, cement, quarry chips, steel, etc. It is recommended that the project proponent should plan for material to be delivered in manageable quantities in order to avoid any form of deposit, which will impede site activities, induce safety hazards and create a nuisance to the neighborhood.

Other inputs include:

- **Water**: The project will require significant volumes of water for various activities including spraying dusty sections, concrete-making, optimum compacting of different layers of materials, cleaning operations in worksite camps. Borehole water will supplement water needs during construction and operation phases. The main water supply for the project is MOWASCO.The proponent will ensure the installation of adequate underground water storage reservoirs for construction and operation phases.
- **Labour**: The contractor will hire skilled, semi-skilled and unskilled workers. In terms of numbers to be mobilized, this has not yet been established.

2.7 Site office

The contractor shall construct a temporary site office to run and manage all activities at different phases. This will also include securing of the utility services such as water and electricity which will be crucial for the construction activities.

2.8 Site Management

Clearly visible signage on the adjacent road will be erected. Sufficient and quality diversions will be created. Safety provision and maintenance of access to all properties and project neighbors' facilities will be mandatory.

2.9 Foreseen Works

- Site clearing and excavation: This will involve the removal of topsoil and vegetation, excavation and laying of the foundation, erection of construction site notice and appropriate site hoarding. Structure excavation will include drain excavation and piling. The bulk of the excavated material will be used for landfilling while the rest will be carried away from the site by the contractor to approved dumpsite(s) in accordance with the EMCA (waste management) regulations, 2006.

- Construction activities. These range from piling and foundation, plumbing, utility

service connections, infrastructure set up, earthworks, drainage establishment, pavements structure construction etc.

- Afforestation/Reforestation and Landscaping: After construction, it is expected that the contractor will rehabilitate and replant trees cut down during site clearance. Landscaping on site will be carried out accordingly.

2.10 Material input, products, by-products and waste

2.10.1 Material Inputs& Sources

Material inputs to be used in the construction of the proposed project are listed below.

I. Shell & Core

a. Ballast - Jaribuni Area in Kilifi County.
b. Sand - Mjana Heri (Past Malindi)
c. Machine Cut Stones - Mombasa County
d. Cement - Bamburi Cement & Mombasa Cement factories
e. Reinforcement Steel- Apex steel, Prime steel, Athi Steel &Tononoka Steel factories.
f. Structural Steel -Imported (To be imported because they are of special sizes.

II. Facade

a. Glass and accessories: - Mombasa Kenya

b. Aluminum and accessories: - Mombasa Kenya

III. Finishes – Most finishes, fit-out works, equipment and furniture will be sourced locally while a number of them may be imported if not traced locally.

2.10.2 Utilities

- Water
- Electricity

2.10.3 Tools and Machinery

The following tools and machinery are to be used:

- Cranes
- Hoist and lifts
- Excavators
- Wheel loaders
- Welding machines and transportation vehicles
- Hammers and mattocks

- Wheelbarrows and concrete mixers
- Spades, trowels and other masonry tools
- Electrical and plumbing equipment etc

2.10.4 Outputs

The outputs of this proposed development will be a total of 1001Apartments and 9 Commercial Shops with all the associated facilities.

2.10.5 Waste and By-products

The waste and by-products arising from this project include:-

- Construction debris (from concrete and broken stones)
- Excavated soil
- Steel off cuts
- Wooden pieces, timber cut-offs and left-over timber
- Construction debris
- Wastewater
- Waste metal cuttings from wires, rods and metal sheet.

3 BASELINE INFORMATION

3.1 Baseline Info on Biodiversity within Junda,Mshomoroni Kisauni Sub-County

It is envisioned that the proposed project will impact on the little biodiversity of flora found within the proposed project site as it will include bringing down trees already at the site. The project proponent is expected to rehabilitate the lost vegetation as much as possible by planting ornamental trees and flowers

The proponent has reserved ample space for tree planting and landscaping to compensate for affected vegetation and further improve the environment. Adequate measures will be taken to conserve and preserve the ecosystem. In the event vegetation or any type of flora is lost during project creation, the proponent shall rehabilitate by planting ornamental flowers and trees as green spaces where residents can breath take.

3.2.1 Flora:

The site is generally characterized by spots of shrubs and trees. The rest of the area is generally bear with one old building. Some of the vegetation will be cleared to pave way for the proposed development and measures will be taken to replant observing the necessary relevant policies.

3.2.2 Fauna:

There are different species of birds and animals such as *superb starlin,Columba livia,Columba delegorguei"* e.tc.The deliberate preservation of the trees will not interfere with the ecosystem.

3.1 Biodiversity within MNP

A survey by Cowburn et al. (2018) reported fish were the richest tax on in the park with 407 species observed from 62 families and178 genera overall. Forty-four species (11%) were endemic to the WIO region; 10 of the fish species were elasmobranch, six of which are considered threatened (table 3-1).

Further, the reef had highest richness for fish observed of all the habitats (table 3-1). Most coral genera were also found on the reef, but 13 genera were observed in the rocky intertidal (tide pool) zone, with 2 of these (*Anomastrea* and *Alveopora*) only seen in this habitat.

Other biodiversity groups per habitat, outlined in the Cowburn et al. (2018) survey are summarized in table 3-1.

Table 3-1: Biodiversity richness of fish, echinoderms, molluscs, crustacean and seagrass, and genus richness for corals from quantitative and incidental data collection in different habitat

zones

Taxon		*Zone*			*Total Richness*
		Reef	**Intertidal**	**Subtidal**	
Fish	Quantitative	146	38	71	**407**
	Incidental	*266*	*89*	*157*	
Echinoderms	Quantitative	13	11	n.d.	**34**
	Incidental	*22*	*23*	*9*	
Molluscs	Quantitative	17	32	n.d.	**60**
	Incidental	*26*	*39*	*8*	
Crustacea	*Incidental*	*10*	*15*	*1*	**23**
Seagrass	*Incidental*	*n.d.*	*n.d.*	*11*	**11**
Coral (genus)	*Incidental*	*41*	*13*	*n.d.*	**43**

(Adopted from Cowburn et al., 2018)

3.2.1 Sea grass and Corals within Junda Creek

A study on the biodiversity and distribution of seagrass by Dorothea Kohlmeier, a PhD student affiliated with Arocha, found that 11 of the 12 species of seagrass species known to occur in the western Indian Ocean (WIO) region are present in the park. The species include: *Cymodocearotundata, Cymodocea serrulate, Enhalusacoroides, Halophila minor, Halophila ovalis, Halophila stipulaceae, Haloduleuninervis, Syringodiumisoetifolium,Thalassodendronciliatum,Thalassiahemprichii, Zosteracapensins (Nanozosteracapensis).*

As outlined, these species occurred in various habitats such as intertidal rock pools, sandy areas near the beach and in some subtidal areas near the reef. This research also has shown that there are many species of macro algae, invertebrates and fish that use the seagrass as habitats. Turtles, and in other areas of Kenya dugongs, are known to graze directly on seagrass further emphasizing the importance of sea grass habitats.

A detailed coral study by Nijmegen University in 1982, compiled a species list of corals (Scleractinia) found in the wider JC, including 113 species from 45 genera (Lemmens, 1993) (table 2).

Subtidal sea grass is the most dominant component of the park covering nearly 40% of the benthos found in calm sheltered waters <3m deep. On shallow reef crest higher wave energy has created a mixed habitat of seagrass, rubble and occasional coral colonies (14% of area) and in deeper channels (3-10m) sandy carbonate deposits dominant the benthos (26%). Coral reef was the smallest habitat covering an estimated 1%. Hard substrata (either rock or coral) cover just 5.3% of intertidal and subtidal areas. Lines of exposed Pleistocene limestone run parallel to the shore, along the beach edge forming the numerous tide-pool patches and along the reef crest and through the lagoon forming subtidal rocky reefs (Figure 3-1). Other areas are characterized by sandy and rubble substrata with extensive seagrass growth in shallower (<4m) depths.

At the southern end of Junda Creek creates a deeper channel and break in the reef-crest. The project will not encroach on the said Junda Creek thus no hurting of the recipient Biodiversity

3.2.1 Conservation status of Biodiversity in Junda Creek

Collective data from past surveys indicate there are 23 species sited within the WMNP which have an IUCN Red List status other than least concern (LC) or data deficient (DD), with five near threatened (NT) species, 11 vulnerable (VU) species and two endangered (EN) species. Six of these species were elasmobranchs, five turtles, six were bony fish (Teleosts), four sea cucumbers (Holothuroidea), one seagrass and one coral species (table 3-2).

Table 3-2: List of Coral families within the JC per habitat zone

Family	Genus	Reef	Intertidal
Acroporidae	Acropora	x	x
Alveopora	x		
Astreopora	x	x	
Montipora	x		
Agarciidae	Gardineroseris	x	
Leptoseris	x		
Pavona	x	x	
Coscinaraeaidae	Anomastrea	x	
Coscinaraea	x	x	
Dendrophyllidae	Turbinaria	x	
Euphyllidae	Plerogyra	x	
Faviidae	Cyphastrea	x	
Echinopora	x		
Favia	x	x	
Favites	x	x	
Goniastrea	x	x	
Leptastrea	x	x	
Leptoria	x		
Montastrea	x		
Oulophyllia	x		
Platygyra	x	x	
Plesiastrea	x		
Fungiidae	Ctenactis	x	
Fungia	x		
Herpolitha	x		

Podabacia	x		
Merulinidae	Hydnophora	x	x
Merulina	x		
Mussidae	Acanthastrea	x	
Blastomussa	x		
Lobophyllia	x		
Symphyllia	x		
Oculinidae	Galaxea	x	
Pectiniidae	Echinophyllia	x	
Mycedium	x		
Pectinia	x		
Pocilloporidae	Pocillopora	x	
Poritidae	Goniopora	x	
Porites	x	x	
Siderastreidae	Psammocora	x	

(Adopted from Cowburn et al. 2018 ; Lemmens, 1993)

Table 3-3: Conservation status of 23 species listed in the IUCN Redlist

IUCN Red list status	Common name	Scientific Name
Nearly Threatened	Black-tip reef shark	*Carcharhinus melanopterus*
	White-tip reef shark	*Triaenodonobesus*
	Blue-spotted stingray	*Taeniuralymma*
	Brown-marbled grouper	*Epinephelusfuscoguttatus*
	Malabar grouper	*Epinephelusmalabaricus*
Vulnerable	Sharp-nose stingray	*Himanturagerrardi*
	Honeycomb stingray	*Himanturauarnak*
	Alfred's manta ray	*Manta alfredi*
	Giant grouper	*Epinepheluslanceolatus*
	Saddle-back coral grouper	*Plectropomuslaevis*
	Thorny seahorse	*Hippocampus hystrix*
	Hedgehog sea cucumber	*Actinopygaechinites*
	White-belly sea cucumber	*Actinopygamauritiana*
	Military sea cucumber	*Actinopyga miliaris*
	South African eelgrass	*Zosteracapensis*
	Crisp pillow coral	*Anomastraeairregularis*
	Olive Ridley turtle	*Lepidochelys olivacea*
	Leatherback turtle	*Dermochelys coriacea*

Endangered	Humphead wrasse Edible sea cucumber Green turtle Loggerhead turtle	*Cheilinus undulates* *Holothuriascabra* *Chelonia mydas* *Caretta caretta*
Critically endangered	Hawksbill turtle	*Eretmochelys imbricata*

3.2 The Junda Creek

Tudor Creek is a unique ecosystem which was designated as a marine reserve in 1968 alongside the neighbouring Tudor Creek. The creek covers an area of 31.6 km^2, with the main channel 11 km long, with a narrow entrance of 0.5 km, widening to 1.5 km in the center and 2.6 km to north. Maximum depth at the front end of creek is 7 m, 11 m in the central region and 4 m in the shallow northern basin (Mwatha et al, 1998).

The creek is fed by ocean water up-welling at the mouth, exchanging at each tide with fresh groundwater seepage, unusually there is no overland fresh water input. Local coastal waters are subject to mixed semi-diurnal tides, with a spring tidal range of 3.2 m in Junda Creek. Partially submerged sills near the entrance, the narrow inlet and the shallow wide backwater areas limit water in and outflow, with only around 58% of water exchanged. In the creek neck the water is exchanged on average every 7 hours, but at the top of the creek it can take more than 17 days to exchange (Mwatha et al, 1998).

Junda Creek has a unique allay of habitats including mangrove forests, sea grass beds (11 species), sand flats, rocky outcrops and sub tidal habitats.The nutrient rich waters support large populations of phytoplankton and zooplankton, a wide variety of macro algae and sea grasses, lower invertebrates, molluscs, crustaceans, fish, birds and turtles. In addition, the Creek is an important breeding and developmental site for a variety of marine species (Gajdzik et al., 2014).

3.2.1 Mangroves in Junda Creek

There are seven mangrove species found in Tudor creek out of the nine species found inthe WIO region

Table 3-4: List of mangroves in Junda Creek, Kenya

English names	Botanic names
The black mangrove	*Rhizophora mucronata*
The tagal mangrove	*Ceriopstagal*
The black mangrove	*Bruguieragymnorrhiza*
The evening bloom mangrove	*Sonneratia alba*
The White mangrove	*Avicennia marina*
Ribbon root mangrove	*Xylocarpusgranatum*
The clove flower mangrove	*Lumnitzeraracemosa*

In Tudor Creek, mangrove stands exhibit a conventional zonation, with *Sonneratia*alba and *Avicennia marina* occuring at the seaward forest margin, followed by mixed stands of *Rhizophora mucronata*and *Ceriopstagal*, then followed by mixed stands of *Ceriopstagal*, *Xylocarpusgranatum* and *Bruguieragymnorhiza* and the higher*Avicennia marina* band follows. *Lumnitzeraracemosa*occurs usually as a small, interrupted fringe, beyond the higher *Avicennia marina* zone.

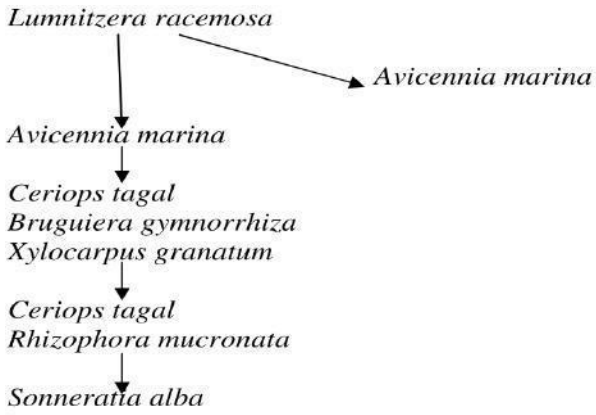


Figure 3-3: Successional and zonational trend in the mangrove swamp at Junda Creek North Coast of Kenya (Adopted from Manohar, 2002)

Mangroves are vital to many vertebrates including birds, fish, mammals, reptiles and amphibians. Many bird species use the mangroves as roosting and feeding sites during northern winters. 500-800 individuals of the rare Crab Plover *Dromasardeola* with only 50,000 – 10,000 individuals remaining world-wide, winter in the mangroves of Junda

Creek, Kenya (Seys*et al.*, 1995). Moreover, some species are highly associated with the mangroves, such as the Mangrove Kingfisher, *Halcyon senegaloides*(Zimmerman *et al.*, 1996).Fish also show unique adaptations to the intertidal ecosystem, such as the Gobidae mudskippers common to mangroves (Macnae, 1968).

Further, mangroves are nursery grounds for many commercially important fish species and positive correlations have been drawn between fish population abundance and mangroves (Gilbert and Janssen, 1998). Mammals present in the mangroves include monkeys, of which some are almost entirely restricted to the mangroves (*Presbytis cristatus*(Raffles) and *Nasalislarvatus* flying foxes (*Pteropus*spp.), wild pigs (*Sus* spp.) (Macnae, 1968). Reptiles that inhabit the mangroves include snakes and lizards and some penetrate deep into mangroves.

3.3 Area Geology

The site is geographically positioned in the Coastal region of Kenya Mombasa North, within Mozambican rock systems majorly composed of limestone and silty sand soil. The siteis located on a plain topography.

3.4 Seismic Zone of the site

The Kenyan Seismic Code, issued in 1973 by the Ministry of Works, uses the Modified Mercalli Intensity (MMI) scale to map the seismic hazard of the country. As the figure below shows, the map divides the country in four seismic zones: Zone V, VI, VII and VIII-IX, where the Roman numbers are in accordance with the MMI scale. The adopted return period of design earthquakes even though not stated is inferred to be not more than 100 years.

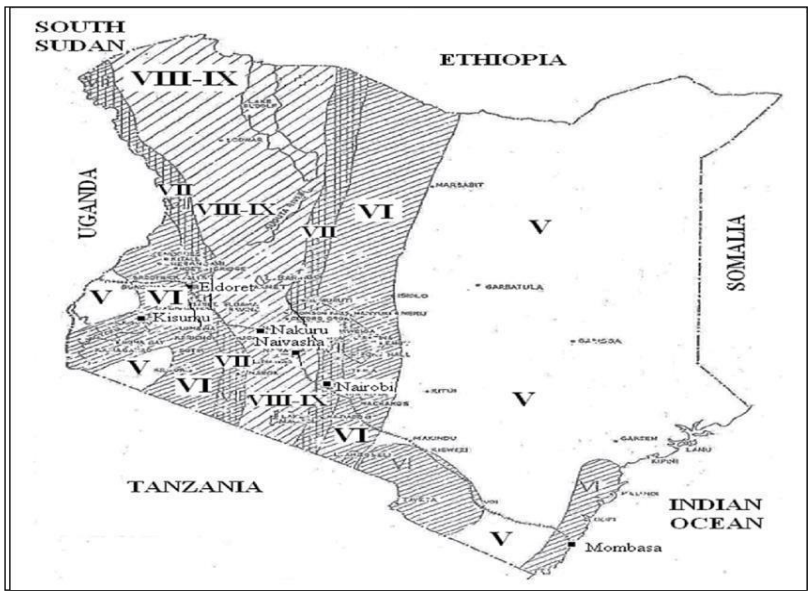


Figure 3-4: Seismic zoning of Kenya,Source: MWK 1973 as shown in Worku 2014

The project is located in Mombasa,Kisauni,Mshomoroni,Junda in Zone VI. Reference to a Catalogue of Felt Earthquakes in Kenya (1892-1969), for the seismic fortification intensity division diagram, the Projectis set according to the intensity VI. Kisauni has a low likelihood of an earthquake hazard. In Kenya, earthquake hazard and intensity is prominent along the Great Rift and the Western regions.

However Work in 2014, highlighted that although the Kenyan code was the pioneering seismic code in Africa, it has not been updated. Given, the county is located well within the Eastern branch of the active seismic region of the Earthquake Alert and Report System (EARS) which is prone to strong earthquakes, he suggests that there is need for updates. One such initiative as part of the Global Seismic Hazard Assessment Program (GSHAP), launched by the International Lithosphere Program (ILP) and endorsed as a demonstration programme in the framework of the United Nations International Decade for Natural Disaster Reduction (UN/IDNDR).

3.5 Land scape

Current land use of the project site and adjacent properties

The proposed site within which the project is to be undertaken in line with the county zonings where the area is zoned as residential therefore complying adequately with the neighbourhood which is majorly residential with dotted commercial areas and Shanties are also mushrooming. Therefore the project is not out of the character with the surrounding.

Soils and Soil Resources

The soil type in area is composed of well drained, very deep, yellowish red, very friable, Fine sandy loam to fine sandy clay loam.

3.6 Bioclimatic Conditions

3.6.1 Temperatures

Mombasa has a monsoon type of climate with hot and humid conditions all year round. It is hot and dry from January to April while June to August is the coolest period. Average annual temperatures range from 22.3ºC to 26.6ºC in the coastal lowlands,while the hinterland temperatures range from 30ºC to 34ºC. Average temperature ranges from 21ºC in July to 24ºC in August.

Hottest periods are usually during January, February, September and October with temperatures getting as high as 32^0 C while the coolest periods are between June-July and December with temperatures as low as 20^0

3.6.2 Rainfall

Rainfall is influenced by monsoon winds with the rainfall pattern being characterized into long rains (April – June with an average of 1,040 mm) and short rains (end of October - December with an average of 240mm.

It has real and prolonged summer. For the greater part of year the days are sunny and nights warm and pleasant. The conventional rainfall prerequisite to monsoon winds occur in April to June while the short rains from the end of October to the mid December. However due to climate change the pattern has severely been altered with the County going annually with little or no rainfall at all. Floods have also become a common phenomenon due to Indian Ocean dipole effect.

3.6.3 Geology

The coastal belt of Kenya comprises of the following main topographical features which are closely related to the geological characteristics of the area: the Coastal Plain, the Foot Plateau, the Coastal Range and the Nyika.

The altitude of the Coastal Plain is generally less than 45 m above sea level. Different geologic features form the coastal belt. Geomorphologically, the Kenyan coastal zone is an emergent coastline. It has thus been subjected to marine regression since the Jurassic period. During the Pleistocene, sea-level fluctuations associated with glacial / interglacial phases left well developed raised platforms and beaches. The north coast is also characterized by a predominance of sand dunes and tombolos, exemplified at Ras Ngomeni, in addition to recognized higher land uplift and arching (Abuotha, 2020).Vegetation types in the project area

The proposed site is infested with a variety of Biodiversity which include large trees with an approximated life span of 80 Years and above; apart from that, there are a number of notable shrubs and grass lawns.

Current land use of the project site and adjacent properties

The proposed site within which the project is to be undertaken in line with the county zonings where the area is zoned as residential therefore complying adequately with the neighbourhood which is majorly residential with dotted commercial areas. Therefore the project is not out of the character with the surrounding.

1.1.1Demography and Socio- Economic Situation

In 2009 total population of the county was 939,370 persons comprising 486,924 males and 452,446 and females. In 2019 as per the population census the population of Mombasa County was 1,208,333 where females were 598.046 and males, 610,257. Looking at the Mombasa County population, its settlement patterns and growth trends, several issues emerge. These issues include:

- Population is increasing rapidly in the unplanned areas where land and housing is relatively cheap infrastructure such as good
- The population is rapidly increasing in areas that have a deteriorated, inadequate or outright non-existent sanitation infrastructure.
- There is a large proportion of the County population using pit latrines and soak away pits for sewage system
- Given that many of the household depend on shallow well and boreholes there is Increasing risk of cross contamination, prevalence of water borne diseases and malaria
- There is increasing densification in areas that are relatively well served with infrastructure.
- Densification and increasing dependence on shallow wells and boreholes increases the risk of land subsidence.

Age Cohort	2009 (Census)			2012(Projections)			2015(Projections)			2017(Projections)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	64,318	63,002	127,320	72,085	70,610	142,694	80,789	79,136	159,925	87,168	85,385	172,553
5-9	49,835	50,081	99,916	55,853	56,128	111,981	62,597	62,906	125,503	67,540	67,873	135,413
10-14	40,660	42,221	82,881	45,570	47,319	92,889	51,072	53,033	104,106	55,105	57,221	112,326
15-19	40,095	46,640	86,735	44,937	52,272	97,208	50,363	58,584	108,947	54,340	63,210	117,549
20-24	57,004	69,257	126,26	63,887	77,620	141,50	71,602	86,993	158,59	77,256	93,862	171,118
25-29	63,689	60,776	124,465	71,380	68,115	139,494	79,999	76,340	156,339	86,316	82,368	168,684
30-34	52,178	39,132	91,310	58,479	43,857	102,336	65,540	49,153	114,693	70,715	53,034	123,750
35-39	39,968	26,889	66,857	44,794	30,136	74,930	50,203	33,775	83,978	54,167	36,442	90,609
40-44	25,837	16,200	42,037	28,957	18,156	47,113	32,453	20,349	52,802	35,016	21,955	56,971
45-49	19,271	12,090	31,361	21,598	13,550	35,148	24,206	15,186	39,392	26,117	16,385	42,503
50-54	12,816	8,389	21,205	14,364	9,402	23,766	16,098	10,537	26,635	17,369	11,369	28,738
55-59	8,053	5,301	13,354	9,025	5,941	14,967	10,115	6,659	16,774	10,914	7,184	18,098
60-64	5,103	4,124	9,227	5,719	4,622	10,341	6,410	5,180	11,590	6,916	5,589	12,505
65-69	2,801	2,561	5,362	3,139	2,870	6,009	3,518	3,217	6,735	3,796	3,471	7,267
70-74	2,099	2,077	4,176	2,352	2,328	4,680	2,637	2,609	5,245	2,845	2,815	5,660
75-79	1,220	1,211	2,431	1,367	1,357	2,725	1,532	1,521	3,054	1,653	1,641	3,295

80+	1,444	2,158	3,602	1,618	2,419	4,037	1,814	2,711	4,524	1,957	2,925	4,882
TOTAL	486,924	452,446	939,370	545,124	506,702	1,043,368	610,948	567,889	1,158,880	659,190	612,729	1,242,908

1.1.2 Neighborhood and the area land use

The immediate north of the site is bordered by a small residential area and the Junda shopping Centre. To the south east of the site is Kengelani Road that provides access to the proposed development. Beyond Kengelani Road are the first row of small hotels, with direct access to the Kengelani Road. To the south and the west of the subject site are residential areas, the Tudor creek is Located on the southern side. The immediate south and west of the site are bordered by Shanties and dotted decent residential Houses.

The proposed development is expected to create massive Job opportunities to the area residents directly or indirectly.

Land tenure

Land tenure regimes in Mombasa County are public, private and community owned. Within the private ownership a tenure regime namely tenancy-at-will is found. The county‘s rapid population growth has resulted in high urbanization and mushrooming of informal settlements like Bangladesh, Magongo, Likoni, Longo, Kisauni and Bamburi. In many instances the way land is owned has made it difficult to undertake county physical planning. Among the key challenges is the provision of housing units to meet the ever increasing need for accommodation.

The area in which the proposed project is supposed to be undertaken plot no 34,Junda has no historical land conflicts as the area residents owns the property through lease, sub lease or freehold. The proposed affordable housing project site is within the county government zoning and therefore it is not conflicting with the set guidelines.

1.1.3 Economic Profile and Poverty Levels

1.1.3.1 Fishing practices

Although it is now believed that fish catches are in decline (Oluoch et al. 2008), fishing remains one of the few feasible economic activities for the local inhabitants. (Hoorweg et al, 2003) argue that as fishers are faced with reduced catches and competition, a possible solution lies in diversification. One way that local coastal populations could diversify their income is through the tourism industry. Tourism dominates the services sector in Kenya, and in the1990s the number of arrivals were over 800,000 per annum producing revenue in excess of 10 billion ksh ($110 million) per annum (Government of the Republic of Kenya (GOK) 2007).

Fishing in Tudor Creek are conducted for purposes of subsistence, commercial, sporting

and bait harvesting.

1.1.3.2 Artisanal Fisheries in Junda Creek Kisauni sub-county

The 2012 fisheries frame survey estimates between 250 and 500 registered fishermen, dependent on the Mida creek ecosystem (Frame survey, 2014).

The Mijikenda (Kauma, Giriama, Chonyi, Jibao, Kambe, Ribe, Rabai, Duruma and Digo) and Bajuni dominate the fisher Community (Hoorweg et al., 2009). Additionally, migrant seasonal fishermen from Pemba (Tanzania) also participate in fisheries at Mida,during the Northeast monsoon period (October to January)(Kihia et al., 2015).

The Bajuni in the area predominantly resided in Watamu village (just over 100 households in total), whereas the Giriama are spread out over 11 creek villages containing approximately 1000 households in total. The Bajuni people, with a long history of involvement in fishing, dominate fishing at sea, owning most of the principal fishing gears (boats, nets and traps).

2 CONDITION OF EXISTING FACILITIES AND PROVISION OF SERVICES

4.1 Water Services

The estimated daily water demand for the project during the operation phase is $300m^{3.}$ Portable water for consumption will be sourced mainly from Mombasa Water and Sewerage Company Ltd (MOWASCO) where the management has confirmed that there is adequate supply to meet project demand. Water will be stored in an underground water tank capacity of 3 million litres. During construction, water will be supplied by MOWASCO and stored into a reservoir on site. Due to the vital nature of reliable water supply to the development of this class and scale, there shall be site- generated water as below:

4.1.1 Borehole/Well

A hydrogeological survey has been conducted and One (1) borehole shall be sunk on site. the total estimated yield for the borehole would be 4.5m3/hr; which translates to 108m3 per day. The borehole water would almost certainly require treatment before it can be used for domestic purposes. Consequently, this shall reduce the effective rate of potable water supply production by up to 20%. In effect, the borehole will have a net yield of approximately 86m3 per day. Although the borehole may be effectively used as a tertiary source of water, it cannot be expected to provide sufficient water for the entire building – especially in the event of a county water supply interruption.

Additionally, due to site constraints, it may not be possible to simply sink more boreholes in order to gain a higher effective flow rate. Secondly, and more importantly, in sinking a borehole close to the sea, one runs the risk of boring too deep and penetrating the barrier between fresh, aquifer water and seawater. For this reason, boreholes sunk within 5 kilometres of the beachfront should be limited in depth. As a result, other additional sources of water have been proposed.

- ***Rainwater harvesting-*** Considerations for rainwater harvesting were based on the prevalent climatic conditions of Kisauni sub-county the potential rainwater collections areas in the development, as well as the cost of an underground rainwater storage tank versusthe benefit to be had.
  The 30-year average total annual rainfall in Kisauni sub-county has been recorded as being 1083mm. Over 63% of this rainfall falls within the months of April through July, where an average of 172.5mm of rainfall is received per month. The rest of the year,the average monthly rainfall is 49.1mm.

Table 4-1: Rainwater collection zones

Rainwater Collection Zone	Area (sq. m)	
Parking Silo Roof	850	
Service Building Roof	264	
Total Area (sq. m)	1114	

Table 4-2: The anticipated rainwater collection in the wet and dry months

Item	Figure
Total Collection Area (sq. m)	1114
Wet Months Average Rainfall (mm)	172.5
Wet Months Monthly Anticipated Collection (L)	**192,165**
Dry Months Average Rainfall (mm)	49.1
Dry Months Monthly Anticipated Collection (L)	**54,697**
Total Annual Rainwater Collection (L)	**246,862**

Based on the above, the undertaking of rainwater harvesting was found to be advantageous. The harvested rainwater is proposed to be filtered, treated and dosed, via the same desalination plant, used throughout the building.

All the potable water will in bulk underground water reservoirs located within the constructed from lined reinforced concrete. The connections from these tanks will to serve potable water outlets throughout the building including the kitchen, hotel rooms, residential suites, wash hand basins, washrooms, etc.

4.2 Waste Management

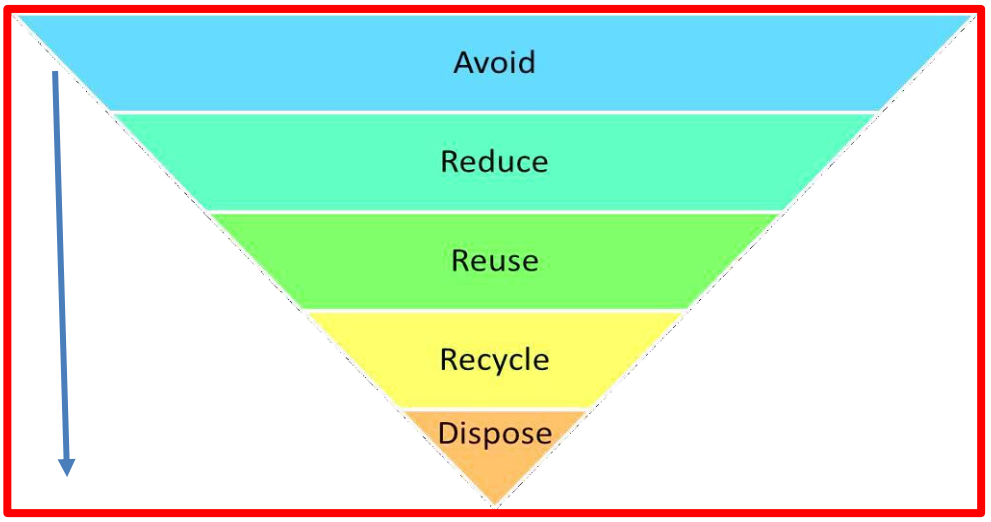
The different activities and processes during the construction and operational phase of the proposed Low Cost Affordable Housing Project is expected to generate various types and quantities of wastes. The generation, storage, transport, handling, management and disposal of this waste has the potential to result in negative environmental and social impacts.

This requires sound waste management measures/ framework in line with regulatory requirements and good international practice as "*Every person in Kenya is entitled to a Clean and healthy environment and has the duty to safeguard and enhance the environment.*"

4.2.1 Waste Management Hierarchy

Waste management during both the construction and the operation phase shall be in accordance with the waste hierarchy, in order of preference: where waste cannot be avoided or minimized, recover/reuse waste, where it cannot be recovered/reused, waste to be treated, destroyed or disposed of in an environmentally sound manner as shown below;

Table 4-3: Solid Waste Management Hierarchy



4.2.2 Waste Management during the Project Construction phase

Waste will be segregated on site at the source. Different waste receptacles/skips and collection areas will be provided and labelled for the different types of site waste.

- **Responsibility-** The contractor shall appoint a competent EHS employee with overall responsibility for the implementation of the on-site waste management plan. The responsible person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, nominated representatives from different sections together with their supervisors shall be assigned the direct responsibility to ensure that the discrete operations stated in the Waste Management Plan (WMP) for the different waste and housekeeping are performed on an on-going basis.
- **Training & Competency-** A basic awareness course will be held for selected departmental representatives to outline the WMP and to detail the segregation of waste at source. This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A subsection on hazardous wastes such as used oil will also be incorporated and the particular dangers of hazardous waste explained. Sensitization of all other site personnel shall be incorporated with other training needs (e.g. general site induction, safety training, toolbox talks, etc.).

- **Monitoring-** The contractor shall monitor and measure the EHS performance on a regular basis to assess whether the operations are complying with the Waste Regulations Requirements and conforming to the requirements of the WMP and associated procedures. This shall be conducted through the establishment of a monitoring programme, internal audits, and a process to implement corrective action to address non-conformances.Also,annual Environmental Audits shall be undertaken as required by EMCA 1999.
- **Reporting-** Constant reporting by the site contractor to the proponent shall be required to ensure the project is executed as per the plan. Environmental health and safety performance reports shall be submitted to the client on a monthly basis (as defined in ESMMP).The project safety manager and Resident engineer shall be expected to remain on site to report and address any environmental and social concerns for urgent mitigation. The contractor shall be expected to consult the proponent so as to maintain a clear understanding of all the aspects of the project.

4.2.2.1 Potential Impacts

Wastes generated during the project construction phase shall include scrap metal and plastic, steel offcuts, wood and wood pallets, waste tyres and oil filters, cardboard and timber offcuts, strapping rolls and cables, packaging materials, broken concrete blocks, small quantities of hazardous wastes such as used waste oils, solvents and paints.

Potential risks associated with generating, storing, handling, transporting, treating and disposing of these wastes include:

- Environmental and health impacts associated with ***on-site burning of site waste which is prohibited;***
- Inappropriate transport and disposal of waste (i.e. not compliant with NEMA Waste Management Regulations);
- Poor housekeeping on site causing accumulation of waste materials leading to the risk of ground/water pollution;
- Environmental impacts on site associated with poor handling and storage of wastes on site (for example dust, used oil percolation on the ground surface and effluent water pollution);
- Impacts to workers' health and safety associated with handling and storage of wastes, particularly hazardous wastes e.g. used oil;
- Impacts associated with poor use of resources (for example broken concrete blocks from construction activities;
- Impacts on local people associated with increased traffic to transport waste and
- Environmental/health and safety impacts should waste be dumped in transit.

The contractor shall engage different waste handlers registered by NEMA for the different categories of wastes. The appointed waste contractors will collect and transfer the

recyclable wastes as receptacles are filled. All waste generated on site shall be accounted for on a monthly basis. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility.

- **Construction spoil:** This shall be from excavation of foundations. Spoil will be managed according to the following hierarchy:
  - Minimization of spoil generation through design
  - Reuse of spoil within the project as far as feasible
  - Beneficial reuse of spoil outside the project for environmental and community work
  - Properly dispose off the spoil in the areas identified by the design team and approved by the confirmed land owners. *Care shall be taken to avoid spoil location in land that could otherwise be used for productive purposes.*
- **Scrap Metal:** Steel is a highly recyclable material and there are numerous companies that will accept waste steel and other scrap metals. A segregated skip will be available for steel/metal storage on-site pending recycling. All scrap shall be properly monitored.
- **Used Oil and other Hazardous waste**: On-site storage of any hazardous wastes produced will be minimized with off-site removal organized on a regular basis. Appropriate storage of all hazardous wastes on-site will be undertaken including bunding of fuels and used oil storage areas so as to prevent ground and soil contamination as a result of spills and exposure to on-site personnel.

  Roofing shall be provided at the storage areas to avoid rain ingress and overflows. NEMA licensed hazardous waste handlers shall be engaged for offsite disposal. All trucks for waste transportation shall be covered to prevent spills releases and exposures to employees and the public. All waste shall be accompanied by shipping paper (manifest) thatdescribes its load and its associated hazards.
- **Timber:** Timber waste generated from the construction work as off-cuts or damaged pieces of timber that is uncontaminated i.e. free from paints, preservatives, glues, etc., will all be recycled. It will be collected on-site in a designated area and collected by a timber recycling company. Such companies shred the timber and use it in energy recovery or for the manufacture of wood products or for landscaping woodchips etc.
- **Waste tyres:** Waste tires shall be collected in a designated area for temporal storage away from operational areas as tires provide perfect breeding grounds for mosquitoes, vermin, and snakes. Also, accidental fires caused in tire dumps can be detrimental and result in the release of toxic fumes.

  The waste tires collected on site shall be kept at a minimum and the contractor shall engage waste recycling companies and licensed waste handlers for offsite disposal.
- **Packaging bags and General Waste:** Planned procurement to be adopted whereby, packaging materials to be kept at a minimum and preferably avoided on site so as to avoid additional costs required for their disposal. Also, opportunities for bulk handling and returnable containers/reuse packaging should be maximized. A central collection point for cement bags, other similar packaging bags and site office waste shall be designated and a licensed waste handler engaged for disposal, as opposed to on-site

burning of waste which is prohibited. Disposal should be on a frequent basis as per the rate at which the waste is churned on site to avoid waste build up.

4.3 Liquid Water Management

4.3.1 During the Construction Phase

During the construction phase, liquid waste will include sewage, waste oils, chemicals and solvents, lubricants, etc.

The sewage sludge will be managed through a Mini-Bioliff wastewater treatment system. The Bioliff wastewater treatment technology is enlisted with NEMA water quality section. Waste oil shall be recycled where feasible while the rest will be disposed through licensed hazardous waste handlers together with other hazardous chemicals according to EMCA Waste Management Regulations, 2006 and EMCA, Draft Chemical Regulations of 2018.

4.3.2 During the Operation Phase

During the operation phase, significant quantities of liquid waste shall arise from laundry, kitchen wash wastes after effective removal of fats, oil and grease, grey water from guest and staff washing facilities and black water from toilets.

All wastewater- both black and gray shall be managed via a fully automated wastewater treatment plant Bioliff Waste Water Treatment System- where the final product is clear and odourless water.

The end product will be sterilized to make sure there are no pathogens and thereafter shall be recycled for use in the ablutions (WC and urinals) only and activities like gardening. The water quality shall be continuously tested and monitored and benchmarked against WHO water quality standards.

Fats, oils and grease cause major problems to drains and sewers. When they are disposed of down kitchen sinks or drains they cause blockages; when they enter rainwater pipes or gullies they cause pollution in water bodies. Drain pipes shall be fitted with grease traps to separate the fat, oil and grease from the rest of the wastewater. The wastewater will then continue to flow to the sewage works for treatment while the grease is retained in the traps to be collected by a licensed collector at regular intervals. The grease traps shall be frequently serviced and maintained and written records of maintenance kept

Waste oil coming from deep fat fryers, woks, frying pans and baking trays shall be collected in air-tight containers secured to prevent spills and disposed of by NEMA licensed waste handlers. All waste transfer records shall be maintained. All employees to be trained on the above guidelines

The waste from the **desalination plant** – which comes in the form of a high-concentrate salt water solution known as brine – will be discharged through a bored hole drilled down below

the water aquifers, in the prevalent seawater layer mentioned under the borehole section. Here it will be diluted in the sea water and attain the nominal seawater salinity. The hole to be bored for discharge will be encased so as to avoid any seepage of brine into the water aquifers, hence ensuring no effect on existing and future boreholes in the area.

4.3.3 Solid Waste Management during the Project Operational Phase

The mean per-capita waste generation rate Junda Area,Mshomoroni were found to be 1.90kg per person per day. *(Muthini et al 2008*) .

Relative proportions by weight of the respective waste categories were found to be as follows:

- Residual waste – 83.1%
- Paper - 3.4%
- Glass – 4.5%
- Plastics - 3.3%
- Tins - 1.7%
- Cartons and wrapping materials - 2.0%
- Office waste – 2.0%

Assuming an estimated 1,500 residents will be added into Junda area during occupation phase during approximately over 2,350 tonnes of solid waste material is expected from Low cost affordable housing Project development annually.

4.3.3.1 Proposed Waste Management Practices

4.3.3.1.1 Organic Waste

Organic waste shall mainly come from food market centers and food waste *(post-consumer).* Generally, hotels/Shops within Junda mainly dispose of inorganic and organic waste by collection through Mombasa County Council.

The Project proponent is encouraged to consider composting organic waste. Key products of composting include manure which shall be used in landscaping and surplus sold off, whereas, biogas can be used for energy generation. All relevant permits and licenses required for composting, operation of a waste disposal facility, licensing of waste transportation of vehicles and other relevant licenses will be obtained from the relevant authorities before commencement of any waste management practices.

The proponent is also considering the acquisition of trucks which shall be registered with NEMA for waste transportation.

4.3.3.1.2 Non-compostable waste

Non- compostable waste will mainly compose of plastic waste,bottles, papers, wrapping materials, cartons,Paint Cans,metal bars,wood curvings,iron sheets off cuts,broken glass,Gypsum etc

According to the Global Methane Initiative (September 2012), volumes of waste generated in Mombasa and its environs (covering the former Mombasa Municipal Council) outstrips

the council's ability to collect and dispose of in a safe and efficient manner – (30-50% is uncollected). The waste collection areas for Mshomoroni and Junda shopping centre among other areas.

Due to the large quantities of waste expected from the proposed development, the project proponent will contract licensed waste collectors to regularly collect waste and dispose in an environmentally friendly manner.

The Proponent also intends to acquire trucks dedicated to the project that will be used to transport the non-recyclable waste to the identified dumping sites. The Proponent will work in collaboration with the Environmental Department of Mombasa County so as to ensure the appropriate collection, transportation and disposal of the waste to the disposal site.

In addition, the Proponent will make use of reusable water bottles (made of glass or aluminum) and make water stations readily available to guests. This is meant to reduce the use of plastic water bottles.

The recommended waste management practices for project construction and operational phase

- Treat and dispose of waste in a way to avoid potential impacts to human health and the environment.
- Characterize wastes according to type, composition and source and manage accordingly.
- Assess environmental, health and safety risks of each waste stream and manage wastes accordingly.
- Design and procure to minimize waste quantities and the hazardousness of waste, for example through substituting raw materials for less hazardous materials, returning reusable materials such as containers and developing procurement policy avoiding packaging materials where possible.
- Construct and operate to minimize wastes, for example using inventory control and good housekeeping to reduce waste from materials that are out of date, off-specification, damaged, excess to needs, etc.

On recycling, treatment and disposal:

- Identify local markets for recyclable materials where possible;
- Establish recycling objectives, track waste generation and recycling rates;
- Ensure that contractors handling, treating and disposing of waste are reputable and legitimate enterprises, licensed by NEMA and following good international industry practice.

On waste storage:

- Store waste to prevent accidental releases to air, soil and water resources;
- Store waste in a way that prevents commingling/contact between incompatible wastes;
- Store waste in a way that allows inspection between containers;
- Store waste away from direct sunlight, wind and rain and
- Minimize excess waste storage/ accumulation on site.

On transportation:

- Transport waste in a way to prevent spills, releases and exposures to employees and the public;
- Secure and label containers according to the contents and
- Ensure loads are accompanied by shipping paper (manifest) that describes its load and its associated hazards.

On treatment and disposal:

- Manage the waste in a way that reduces the immediate and future impact on the environment;
- Ensure that the company has all required permits, certifications, approvals and
- Secure services of treatment/disposal facilities through formal procurement agreements.

On hazardous wastes:

- Segregate hazardous and non-hazardous waste;
- Manage hazardous waste in a way to prevent harm to health, safety and environment;
- Demarcate the hazardous waste storage area and
- Restrict access to waste storage areas to those who are competent.

On monitoring:

- Undertake regular visual monitoring/inspection of waste management practices on site;
- Undertake INTERNAL audits of waste segregation, tracking waste, characterization and disposal methods.
- Engage NEMA registered auditor for Annual External Environmental Audits
- Continuous update of the Waste Management Plan (WMP) - WMP Plan seeks to provide a systematic way of identifying opportunities for waste reduction, maximizing reuse and recycling and encouraging the participation of all on sound waste management activities. The WMP to be continuously revised and integrated into changing project/ site operations. It is expected that these measures will go a long way in ensuring the best possible waste management compliance and performance standards.

Assessment & Audits

To meet the project commitment to compliance, both the contractor and proponent shall evaluate the compliance status of its activities/operations against the applicable occupational health and safety legal requirements. For the waste management plan, audit requirements are as summarized in Table 4-4 below.

Table 4-4: Audit Requirements for Waste Management

Audit/Inspection	Type	Frequency
Visual Site Inspection	Check good waste management practice (waste storage, waste segregation, waste disposal mechanisms condition of containers, leakage, spillage, cracks, safety devices inline with this WMP, legislation and good practice)	Daily during construction Monthly during operation Daily during decommissioning
Site documentation	Waste characterization, risk assessment, hazardous waste documentation, waste manifests, tracking. Cross check quantities of waste dispatched have been received by the facility	Monthly

Waste carriers/transporters	Check compliance with national legislation, permits/licenses, good practice	Prior to engagement with the carrier Monthly thereafter
Recycling/treatment/ disposal facility	Site visit to check compliance with national legislation, permits/licenses, whether the facility is designed and operated in line with national legislation and good practice	Prior to engagement with the facility Monthly thereafter

Table 4-5: Roles and Responsibility of Waste Management during the Project Operational Phase

Title	Accountable	Responsible	Consulted	Informed	Comments
Project Manager through EHS Officer	√				Accountable for the overall implementation of the Waste Management Plan
Department/Section Manager		√			Responsible for ensuring the consistent implementation of the WMP in all activities in their departments.
Project Contractor		√			Responsible for ensuring the procedure is implemented across all sites. Communicate waste management plan to personnel and contractors. Audit plan implementation. Update plan as required. Develop a waste minimization programme to reduce and recycle waste where practicable. Input to design and procurement decisions to Minimize waste and make good use of resources.
All workers and associated personnel		√			Ensure waste is properly disposed of in accordance with this plan. Depositing waste into correct the appropriate receptacles. Notifying line managers of any problems with how wastes are managed. Suggesting ways to minimize waste
Contractors		√			Responsible to ensure that their staff take measures where relevant to their work.

Responsible – Those who do the work to achieve all or a part of the task. Others can be delegated to assist.

Accountable – The person ultimately answerable for the deliverable. There can only be one accountable person

Consulted – Those who's input or opinion is sought to achieve the task, typically subject matter experts through two-way communication,

Informed – Those kept up to date on key decisions, progress, or the outcome through one-way communication.

Competency & Training:

The HSE Manager shall ensure that all persons performing waste management tasks are competent on the basis of appropriate education, training and/or experience and shall retain associated training records. The training for all employees will cover:

- Rules regarding minimization of waste generation;
- Waste different hazard classes;
- Labelling of waste storage containers;
- Waste segregation procedures;
- Waste handling (storage, loading/unloading, transportation);
- Waste monitoring, recording and tracking procedures and
- Recycling and reuse.

Training for section managers(s) will cover:

- This procedure;
- Regulatory requirements and applicable standards;
- Good waste management practice;
- Auditing waste transporters and disposal sites; and
- Classifying waste types and selecting the most appropriate disposal route. All training received to be recorded in the *training register.*

Personal Protective Equipment (PPE): All workers who handle any type of waste are required to use appropriate Personal Protective Equipment (PPE) for the type of waste involved as per the risk assessment for each waste type and any MSDS. PPE shall include asa minimum:

- Coveralls;
- Safety glasses or chemical splash goggles;
- Gloves;
- Safety boots (chemical-resistant with steel toe and sole); and
- Hard hats.

Certain types of hazardous waste will require additional specialty PPE such as respirators or face shields. This should be selected in accordance with the MSDS and risk assessment.

Monitoring: The EHS Manager shall monitor and measure the EHS performance of on a

regular basis to assess whether the operation is complying with legal requirements, meeting company policy commitments, achieving established objectives and targets and conforming to the requirements of the adopted WMP and procedures

This shall be conducted through the establishment of a monitoring programme, internal audits and annual environmental audits. Information on auditing and inspection is provided in the table below.

Table 4-6: Audit and inspection schedule

Indicator	**Frequency**
The total quantity of waste, by type	Monthly
Recycling rate	Monthly
Spills (spills to be reported to regulatorwithin 24 hours)	Quarterly
Appropriate corrective action was takenin case of releases of waste or non- compliances	Quarterly

Waste management record keeping:

The following documentation will be recorded and kept:

- Completed risk assessments for each waste type;
- Completed waste manifest (shipment) documents;
- Completed waste transfer log (the type of materials, physical state solid/liquid/gas, quantity, date dispatched, date received, and repacking, treatment/disposal details);
- Details of quantities of waste generated and sent for recycling/disposal;
- Details of environmental inspections/audits; and
- Incident records and associated investigation reports (e.g. spill reports).

A comprehensive waste management table for **both the construction and operational phase** is as table 4-7 below.

Table 4-7: Summary of Waste Management Measures during Construction and Operational Phase

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
1.	Impacts of waste Management on the environment, health and safety	Understand waste types and risks associated with their management and plan accordingly	• Characterize waste types • Undertake an environmental, health and safety risk assessment for each waste stream • Plan storage, handling, transport and treatment/disposal for each waste stream in line with good international industry practice • Design project to minimize waste and hazardousness of waste materials on site (e.g. substituting inputs which are less hazardous or which lead to lower waste volumes) • Procure goods to minimize waste (e.g. reduce packaging/select returnable packaging, procure lower hazard materials, select reusable materials) • Construct to minimize waste (e.g. require good inventory control to minimize wastage/breakage, limit off-specification materials, limit orders in excess of needs, employ good housekeeping to avoid hazardous/non-hazardous waste-mixing)	Throughout the operations	Waste Inventory EHS Assessment for waste streams Procurement policy

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
2	Impacts associated with poor use of resources	Manage wastes in Accordance with the waste hierarchy	• Plan for and manage waste in Accordance with waste hierarchy: give priority to avoidance and minimization of waste, followed by recovery, reuse and recycling. Least preferred option is disposal (landfill or incineration)	Throughout the operations	
3	Hazardous waste Poor management of hazardous waste may have impacts on health and safety and the environment	Store, handle, transport and dispose of hazardous wastes in line with Waste Management Regulations and good international industry practice	• Avoid generating hazardous waste where possible (e.g. through design and procurement decisions) • Segregate hazardous from non-hazardous waste. Avoid mixing hazardous and non-hazardous waste to limit the total volume of hazardous waste • Use waste containers that are compatible with hazardous waste types and in line with national regulations and good practice. Containers to be sealed and kept in good condition • Label hazardous waste containers in accordance with national regulations and good practice • Prevent a mixture of incompatible waste that could result in chemical reactions • Provide a dedicated hazardous waste	Throughout the operations	Visual inspection of waste storage facilities on site regarding adequate storage and segregation Availability of MSDS on site Visual inspection of the secondary containment system Provision of PPE and regular Inspection thereof Review of waste carriers 'legal authorization Review of waste facilities for

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
			storage area. Locate storage in a safe area with a limited change of exposure to hazards and accidents (e.g. away from main construction). Cover to prevent rain ingress (could lead to groundwater contamination) and wind (could lead to odor and dust). Seal area off and operate with limited access. Use safety signs to indicate hazard and restricted access. Design with sufficient capacity for anticipated types/volumes of waste. Separate containers to allow for inspection of leaks and spills. Restrict access to the hazardous waste storage area to those that have had training. • Use a secondary containment system for liquid volumes greater than 220 liters, in line with national regulations and good international industry practice • Effluent will be treated as hazardous waste • Provide information on characteristics of each hazardous waste type (using Material Safety Data Sheets (MSDSs)) and compatibility of wastes to staff		Licensing approval Incident report as applicable

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
			/contractors handling waste • Provide personal protective equipment (PPE) suitable for handling each waste type, in line with waste characteristics • Use legitimate, legally authorized waste carriers to transport Hazardous waste. Engage waste carriers through a formal contract/procurement process. • Monitor and document wastes until each load is safely disposed of • Arrange to treat/dispose of hazardous waste at licensed facilities that are properly designed and operated in line with national regulations and good international industry practice.		
4	Waste storage Inadequate waste storage may result in a release to air, water, soil,groundwater, litter and to safeguard health and safety of staff and local people	Store waste in a way That prevents leakage/emissions to air, water, soil, Groundwater and prevents litter and impacts on health and safety	• Use containers that are compatible with Wastes • Food and perishable wastes to be sealed containers (bags, bins) to reduce odour and restrict access by vermin. • Allow space between containers to allow inspection for leaks and spills. Containers to be kept on pallets to prevent contamination in the event of	Throughout the operations	Visual inspection of Waste storage facilities Training Attendance register and content

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
			a spill • Store wastes away from direct sunlight, wind and rain • Use a secondary containment system for liquid volumes greater than 220 liters, in line with national regulations and good international industry practice • Waste storage to be on a short term basis. Some materials may be stored on a longer-term basis until sufficient volume is accrued to support collection and treatment/disposal • Provide training for workers on handling waste and supply appropriate PPE		
5	Waste transportation Poor management of waste transport to Recyclers/treatment/disposalfacilities and result in accidental/deliberate waste release during transit and knock-on environmental, health and safety impacts	Transport waste in a way that prevents impacts to air, water, soil, groundwater and health and safety	• Use legitimate, legally authorized waste carriers that operate in line with national regulations/good international industry practice. Procure services of waste transporters through proper contracts • Select appropriate waste transport containers and ensure these are properly labelled and secured • Use covers on vehicles to prevent litter/dust	Throughout the operations	Review of waste carriers' legal authorization Review of waste shipment documentation

Item no.	Issue	Objective/Requirements	Action / Mitigation Measure(s)	Timing	Means for Verification
			• Label vehicles with correct signage (e.g. in accordance with hazardous waste) • Ensure each waste shipment is accompanied by shipping paper (manifest) e.g. covering unique consignment number, date of collection, nature and quantity of waste, information on containment, producer of waste, details of the waste carrier, destination, waste producer representative (name)		

4.4 Firefighting Systems

A fire station will be built on the same parcel of land, adjacent to the site development. A state-of-the-art automatic fire detection system shall be provided with an annunciator panel located in the Control Room. The system shall be designed for 100% building coverage via smoke and heat detectors with appropriately located sounders and manual call points. It shall also interface with other firefighting systems and door holders/closets for smoke control and shall be pulsating for effective zoning of areas which would assist in the orderly evacuation.

The system shall be able to initiate the shutdown of the air conditioning and mechanical ventilation in the event of a fire and shall also be integrated with the building's communication systems including security, life safety, monitoring and control systems. It shall also incorporate a digitalized public address system with pre-recorded evacuation warning messages.

All floors will be provided with appropriate firefighting equipment such as portable extinguishers; automatic Gaseous fire suppression system; sprinklers systems and wet risers. Circulation areas and apartments areas will be provided with concealed sprinkler heads for aesthetic value. Basements, machine rooms, workshops, offices and building façade will be covered by non-concealed sprinkler heads fit for purpose.

As a requirement for buildings, the **wet riser** supply system is intended to distribute water to multiple levels or compartments of a building, as a component of its firefighting systems. This is for providing fire responders with a high flow system for firefighting.

In addition, various protection systems leak detection, leak protection, water supply for critical installations shall be provided where required. A fire lane and security checks have also been incorporated in the design to cater for the emergencies around the building. A planned preventive maintenance schedule and maintenance contract proposals shall be required from the installation contractors for proponent consideration.

4.5 The Building Lighting Systems

Corridor and security lighting will be managed by a lighting control system comprising central controllers, area controllers, lighting control modules, occupation sensors, LED Lighting, multi-sensors and software. Lighting will be dimmable and be under daylight and occupancy controls. To save energy, provision is made for lighting controls with; daylight linked dimming, in spaces which are not a car park, controls on external lighting, energy management, lamp management monitoring for failure and integration for control and monitoring of emergency lighting.

The affordable Houses will be fitted with low-pressure sodium-vapor lighting, meant to illuminate the building only. The windows facing the beach will be tinted to prevent light reflection to the beach.

4.6 Energy Supply- Electricity and Back-up Power Supply

The anticipated maximum demand for this development is in the order of 5 MVA.The development's main incoming power supply will be derived from the Power Authority's 33kV line to be established primarily for this development.

An indicative cost has already been sent to the developer by the authority and deliberations are underway to clearly establish all parameters and some of the infrastructure necessary for laying of KPLC cables

In addition, there shall be standby generators to support the electric supply during power blackouts. These will be placed in a properly ventilated area within the service building and bulk fuel storage tank will be provided to support the generators. UPS systems will be provided to protect the buildings operator's essential equipment, including Building Management, Security and associated systems.

4.7 Safety and Security Systems

A fully automatic fire alarm system will be installed incorporating the functions of fire detection and alarm; voice alarm and emergency voice communication. The building will be provided with a distributed type Fire Alarm System comprising multiple alarm collection panels, linked into a reporting to the building Fire Command Centre and repeater panels as agreed with the fire service.

A CCTV system will with dedicated the main access points and final escape exits and additional key internal areas, including the car park, lift lobbies on each floor. The system will incorporate monitoring and recording facilities.

The Proponent will also work in close collaboration with the existing state security machinery, neighborhood security organizations such as Mshomoroni Police Station.

4.8 Project Grievance Mechanism

The Contractor shall establish a specific mechanism for dealing with stakeholder grievances. A grievance is a complaint or concern raised by an individual or organization who judges that they have been adversely affected the project during any stage of its development. Grievances may take the form of specific complaints about actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts.

The process for grievance resolution shall be transparent, in harmony with the local culture and in the appropriate language. All grievances shall be documented and tracked through to

resolution. This shall include documentation on how the grievance has been resolved. It shall essential that the grievances are reviewed regularly to determine whether same or similar grievances are being lodged.

4.9 Traffic Management Plan and accessibility to the site

Accessibility in Junda Site is through the Kengelani Road. It is expected that there shall be increased traffic in the area during the project construction and operation phase. Vehicular movements associated with project activities such as delivery of project materials and equipment, personnel movements or maintenance activities can be a source of increased traffic and increased risk of road accidents or occupational accidents as well as increased emissions of dust and particulate matter and noise generation.

As a result, the project proponent will commission a Traffic Impact Analysis to be conducted for proper traffic management. The purpose of the Traffic Study is to determine the existing traffic conditions on the surrounding road network of the proposed development and propose mitigations if warranted in order to improve traffic flow. The objective of the Traffic Analysis and TMP were as follows:

- Determine the prevailing traffic conditions at critical intersections and road sections;
- Review on-going and planned road improvements within the study area;
- Determine future traffic conditions using analytical methods;
- Reduce traffic congestion as a result of project operations;
- Provide measures and controls for the safe movement of vehicles for the protection of workers and the general public;
- Provide measures and controls for the reduction of emissions of dust and noise and
- Provide measures and controls for the maintenance of equipment and vehicles

During construction phase, an access route shall be created leading to the project site. Where routing traffic shall be required, Formal engagement should be done with key land and other property owners neighboring the project and relevant authorities shall be consulted to agree on specific route to improve on area accessibility and avoid any sensitive residential areas or unsuitable parts of the road network

To improve on accessibility to the site during project operational phase and reduce on road congestion,Kengelani Road shall be rehabilitated providing adequate acceleration and deceleration lanes during project operation phase. All vehicles entering the project site shall undergo security checks at least 10 - 15m into the development to allow for storage of vehicles entering the development.

Table 4-8: Summary of Management actions for Traffic

Item No.	Issue	Requirement/Objective	Action/Mitigation Measure(s)	Timeline	Means of Verification
1	Routing of traffic	Designation of traffic routes to reduce traffic congestion as a result of project activities, avoid safety risks to the community and other sensitive receptors	• Relevant authorities will be consulted to agree on specific routes for project traffic, to prevent road congestion, improve accessibility and avoid any sensitive residential areas or unsuitable parts of the road network • When road closures are required, diversions will be planned and communicated to the affected staff and communities as far in advance as practicable. Any road closures will be properly sign-posted and flag men positions to guide road users. • The drivers will comply with all statutory vehicle limits(width, height, loading, gross weight) in accordance with the National Road Traffic Regulations and any other statutory requirement • Site and off-site access routes to be used by all traffic will be properly	Before and throughout the operations	Authorization of access route by relevant Authority Approved on site traffic routeplan Photographic evidence of signposted routes where applicable

Item No.	Issue	Requirement/Objective	Action/Mitigation Measure(s)	Timeline	Means of Verification
			signposted to prevent vehicles from leaving the designated routes and ensure that the appropriate speed limits are enforced • Access and site roads will be Maintained in good condition.		
2	Traffic control and management	Reduce traffic impacts and reduce the risk of traffic accidents through safe driving behaviors and Education.	• Erection of speed bumps to reduce speed • Speed limits will be established and enforced over all traffic routes. The vehicles of the contractor and his suppliers shall not exceed a speed of 40 km/h on gravel or earth roads on site and within 500m of the site • Supplier/heavy traffic flows will be timed, wherever practicable, to	Throughout the operations.	Photographic evidence of construction signs, presenceof flagmen and signals when applicable Liaison with stakeholders as applicable

			avoid periods of heavy traffic flow along the main roads (e.g. morning and afternoon) • The Company will not commence any work that affects public roads until all agreed traffic safety and management measures essential for the works are accepted and agreed		Safety trainingp contractor anda

ItemNo.	Issue	Requirement/Objective	Action/Mitigation Measure(s)	Timeline	Means of Verification
			with the relevant authorities • Vehicles shall enter and exit the site in a forward direction, as far as possible • Clear signs, flagmen, and signals will be set up where necessary. Where temporary traffic signals are required,the details and locations of the signs shall be agreed to with the relevant authorities • All road signs will be fixed safely and securely to ensure that they do not become detached or dislocated and will be visible and comprehensible by all		
3	Dust and Noise	Reduce emissions of dust and particulate matter to acceptable levels to avoid nuisance to nearby sensitive receptors and ensure safe running of vehicles.	• Routine maintenance shall be to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. In addition, the contractor shall ensure that: o Continuous dust suppression by watering the	Throughout the operations	Provision of maintenance schedule will be the means to verify that management measure is being implemented

ItemNo.	Issue	Requirement/Objective	Action/Mitigation Measure(s)	Timeline	Means of Verification
			roads. o Erection of speed bumps at different areas to reduce speed and emissions of dust o All vehicles shall be maintained so that their noise and emissions do not cause a nuisance to workers or the local community		
4	Driver Training	Ensure drivers are appropriately trained in compliance with applicable laws and international best practice	• The contractor to only engage competent and licensed drivers. In addition, all drivers shall be trained and evaluated in defensive and off-road vehicle operation • No unauthorized passengers shall be carried on project vehicles	Throughout the operations.	This will be verified through documentation and provision of training records

4.10 Green Building Technologies

Green building (also known as green construction or sustainable building) has been incorporated in the design of the structure, using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design,construction,operation, maintenance, renovation, and demolition. The objective here is to establish an Eco-friendly complex and to find the balance between the proposed development and the sustainable environment. Close cooperation of the design team, the architects, the engineers, and the client at all project stages has ensured that most the green building technologies have been considered in the planning and design stage of the proposed development as below:

- **Use of Photovoltaic Cells-** Photovoltaic cells for the generation of electricity are highly inefficient at around 10-16% conversion efficiency. They employ semiconductor technology which is still under development. A typical installation may have a payback of up to 15 years. They are appropriate for small loads remote from the main power source or from the grid

  In developed countries, attractive tariffs have been instituted by governments to encourage their use.
- **Rain Water Harvesting-**The development shall supplement its water supply through rainwater harvesting. Consideration for rainwater harvesting takes into account the prevalent climatic conditions in the project area, the potential rainwater collections areas in the development, as well as the cost of an underground rainwater storage tank which was found to be overall advantageous. The harvested rainwater is proposed to be filtered, treated and dosed, via the same desalination plant, used throughout the building.
- **Effluent and wastewater treatment and recycling-** All wastewater- both black and gray shall be channeled to a fully automated to the wastewater treatment plant where the final product is clear and odourles water that is sterilized to make sure there are no pathogens and which shall be used for gardening.

5 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Every anthropogenic activity has some impact on the environment. More often than not, this impact is harmful. However, mankind cannot live without taking up these activities for his food, security and other needs. Consequently, there is a need to harmonize development activities with environmental concerns. ESIA is a useful tool for the protection of the environment from the negative effects of these development activities.

This section discusses the relevant national and international policies and legislation, safeguards, guidelines, policies and conventions that frame a sustainable approach to eco-development, including the approach towards the environmental and social impacts of the proposed Low Cost Affordable Housing Development, and how they should be mitigated. Relevant legislation needs to be strictly adhered to for the successful implementation of the project, and throughout the project Cycle

In addition, the proponent and the contractor will be required to develop and implement (internal environmental and social policies and plans, including setting up of relevant institutional frameworks to oversee the actualization of the project.

5.1 The Constitution of Kenya, 2010

The Kenyan Constitution is the overarching legal framework for matters on the environment. This is largely because it explicitly recognizes the environment as part of the country's heritage, and which must be safeguarded for future generations for sustainable development. In Article 42, it entrenches environmental protection in the Bill of Rights, providing the right to a clean and healthy environment.

Article 69 imposes on the State, other obligations including, the duty to:

- To ensure sustainable utilization, management and conservation of the environment and natural resources;
- To eliminate processes and activities that are likely to endanger the environment; and
- To utilize the environment and natural resources for the benefit of the people of Kenya.

Article 69 (highlighted above) and article 43 (which provides for economic and social rights) therefore represents a balance between the right to utilize the environment and the duty to protect it and ensuring environmental sustainability.

Article 69 (2) similarly poses a conservation obligation on parties such as companies, associations or another body of persons, whether incorporated or unincorporated, including the proposed Low Cost affordable housing project development and its contractor. The two are obligated to cooperate with State organs and other

persons to protect and conserve the environment during the lifetime of the proposed project. The state is obligated to establish systems to assess and monitor the impacts of various projects. The state has actualized this through the EMCA, 1999 and its subsidiary and EMCA (Amendment) 2015 and the Environmental (Impact Assessment and Audit) Regulations, 2003.

5.2 National Environmental Policy Framework

The Kenya Government's environmental policy is geared towards sound environmental management for sustainable development. This is envisaged in the principle of prudent use, which requires that the present day usage should not "compromise the needs of future generations. The Kenya Government's environmental policy aims at integrating environmental aspects into national development plans. The broad objectives of the national environmental policy include:

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

An Environmental Impacts Assessment (EIA) critically examines the effects of a Project on the environment. An EIA identifies both negative and positive impacts of any development activity or Project, how it affects people, their property and the environment. EIA also identifies measures to mitigate the negative impacts, while maximizing on the positive ones. EIA is basically a preventive process. It seeks to minimize adverse impacts on the environment and reduces risks.

If a proper EIA is carried out and implemented, then the safety of the environment can be properly managed at all stages of a Project-planning, design, construction, operation, monitoring and evaluation as well as decommissioning, as and when required, if at all. The assessment is required at all stages of Project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National Environmental (Impact Assessment/Audit) Regulations, 2003 were issued in accordance with the provisions of the Environmental Management and Coordination Act (EMCA) of 1999. The regulations must be administered, taking into cognizance provisions of EMCA, 1999 and other relevant national laws.

Relevance

The project shall implement the ESMMP to mitigate the impacts resulting during the construction and operational phases of the project. This will ensure that the natural environments are not destabilized by the subsequent project activities.

5.3 National Environment Action Plan Framework (NEAP), 2009 – 2013

The National Environmental Action Plan Framework is the second national environmental policy after the 1994 National Environmental Action Plan (NEAP). The development of NEAP is provided for by EMCA, 1999 which requires preparation of Environmental Action Plan at different levels; district, provincial, and national levels.The framework recognizes the intertwined linkages between economic growth and the environment in Kenya.

It highlights priority themes and activities for the country towards achieving a sustainable environment. The policy framework among others proposes the integration of environmental concerns into regional and local development plans, promotion of appropriate land uses and enforcement of EMCA, 1999 and its subsidiary and other relevant legislation. The policy framework also advocates for efficient water harvesting, storage and usage.

On human settlements and infrastructure, this policy framework recognizes the associated environmental issues. These include waste management, sanitation, diseases, land use changes in conservation areas, demand for water, energy, construction materials, pollution, land degradation, biodiversity loss etc. Multiple stakeholders' involvement inclusive of the private sector is advocated for within theimplementation of this framework towards the achievement of sustainable development goals. Finally, the framework also advocates for monitoring and evaluation to ensure effective and efficient environmental policy implementation.

Relevance

The project is in line with this policy as stakeholder consultations were undertaken during this ESIA phase and that the environmental issues that may be associated with the implementation of this project have been pointed out.

5.4 The National Poverty Eradication Plan (NPEP), 1999

The NPEP has the objective of reducing the incidence of poverty in both rural and urban areas by 50% by the year 2015; as well as strengthening the capabilities of the poor and vulnerable groups to earn income.

Relevance

By providing employment to the residents of Junda and its environs both during the construction and operational phase, the poverty and vulnerability index will be reduced somewhat.

5.5 Vision 2030 and the Second Medium Term Plan

Kenya's Vision 2030 is the country's blueprint print planning strategy, while the Second Medium Term Plan (MTP 11) acts as its accompanying implementation plan, for achieving economic, political and social transformation. The aim is to achieve 10 percent average growth per year to ensure a high-quality life for all citizens by the year 2030.

In this strategy document, political, economic and social transformation is envisaged to be achieved in various ways with special attention being paid to:

- **Scaled up quantity and quality infrastructure**: Kenya's Vision 2030 notes that while significant gains in infrastructure development have been realized over the last decade, Kenya's global competitiveness is still weak. Infrastructure development and improvement fails to keep at par with a growing human and vehicular population. Therefore the strategy sets integrated, cost-effective, safe and efficient world-class infrastructure facilities, networks and services as a necessary foundation and precondition for transforming the economy.

- **The prudent management of the country's natural resources and space**: Under the social pillar, environmental management is one of the key eight sectors (others are Education and Training; Health; Water and Sanitation; Housing and Urbanization; Gender, Youth, Sports and Culture), necessary for the transformation of the economy. Specifically, the strategy recognizes that environmental management is key to other sectors given Kenya's economy is dependent on natural resources. It therefore proposes promoting environmental conservation to better support the economic pillar's aspirations as well as improving pollution and waste management, among others.

Relevance

The proposed Mshomoroni Estate Ltd project will boost economic growth, offer decent yet affordable living and infrastructural development therefore setting a pace for the achievement of the Vision 2030.

5.6 Sessional Paper No. 10 of 2012 on Kenya's Vision 2030

The National Environment Policy (NEP) underscores the linkage between the environment and natural resources and the local and national economy, people's livelihoods, the protection of critical ecosystems and the provision of environmental services. The Sessional Paper promotes

an integrated approach towards the planning and sustainable use and management of Kenya's environment and natural resources for the present and future generations. It reiterates the universal constitutional right to a clean and healthy environment and imposes on the state the duty to safeguard and enhance the environment. However, it balances this with the right to development but with due consideration for sustainability, resource efficiency and economic, social and environmental needs.

Chapter 4 calls for environmental stewardship in the exploitation of the country's natural resources in the quest for economic growth. This recognizes that development projects have various effects on flora and fauna and socio-cultural impacts, especially during the construction phase. Thus, it is mandatory for the proposed project to undergo an EIA. In addition, public participation in the planning and approval of the proposed project must be carried out.

The proposed project will be undertaken in compliance with this. This EIA report acts as a first step in fulfilling these requirements while chapter 6 details the public participation process and results.

5.7 Environmental Management and Co-ordination Act, 1999 and Environment Management and Coordination (Amendment) Act, 2018

EMCA, 1999 is Kenya's first environmental law framework towards the sound management and utilization of natural resources, as well as providing a focal point for the harmonization coordination of protection of environmental rights. The 1999 Act, and its 2018 Amendment provides a legal and institutional framework for the protection and conservation of the environment (in line with Article 42 of the constitution), as well as providing the necessary mechanism to monitor that, which include environmental impact assessment, environmental auditing and monitoring as prescribed by Article 69 of the Constitution.

Relevance

The proposed project will be undertaken in compliance with Section 58.(1) which requires the proponent to undertake an EIA study in the prescribed form, giving all relevant information pertaining to the project and its impacts before it's commencement. Public participation is a mandatory aspect of the EIA study.

Section 60 of EMCA gives power to NEMA to require lead agencies to comment on an EIA Report. Considering the nature of the Project, NEMA may require bodies/agencies such as the Kenya Power and Lighting (KPLC),Kenya Wildlife Services (KWS), Mombasa County Government among others to issue their commentaries.

Amended Section 59 (1) requires NEMA to publish a brief description of the project, its location, anticipated impacts and mitigation measures in the Kenya Gazette, in two newspapers circulating in the project area and over the radio.

5.8 EMCA Related Regulations

To provide guidelines on how to actualize EMCA and its amendment, the government has published regulations on specific requirements related to water, air, waste, biodiversity and noise.

5.8.1 Environmental (Impact Assessment and Audit) Regulations, 2003

These were promulgated as Legal Notice 101 on June 13th, 2003. They reiterate on the need for an environmental impact assessment before undertaking any new project and outline mandatory requirements in undertaking an EIA/EIA. They also highlight the minimum content of the report, information to be made available, parties to be consulted and the due review process to be followed before licensing of a proposed project.

In addition, once the proponent is issued with an EIA license and once the project has commenced, the proponent is required to undertake periodical monitoring and evaluation to ensure that the conditions set in the EIA license are adhered to during the construction phase.

5.8.2 EMCA (Water Quality) Regulations, 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120 of September 4, 2006, and became effective on July 1, 2007. These regulations apply to sustainable water use for various purposes. The regulations protect lakes, rivers, streams, springs, wells and other water sources whereby contravening the regulations is an offense that attracts a fine not exceeding five hundred thousand shillings.

Of immediate relevance to the project is Rule 4-6 as well as Rule 24 as follows:

- Rule 4 outlaws acts which directly or indirectly, immediate or subsequently cause water pollution
- Rule 24 prohibits discharge or application of any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants, into the water meant for fisheries, wildlife, recreational purposes or any other uses.

Relevance

Water abstraction either from the ocean or from the proposed borehole shall be carried out with due regard to the Water Quality Regulations, 2006. Storm water from the construction site and Kengelani Road (often because it is contaminated by oil or petroleum products) shall be

properly channeled to the drainage system to avoid any ground and surface water pollution. During construction, onsite sanitary services for workers shall be provided as required.

5.8.3 EMCA (Waste Management) Regulations, 2006

The Waste Management Regulations (2006) are contained in the Kenya Gazette Supplement No. 69, Legal Notice No. 121. These were promulgated on September 4th, 2006 and came into effect on July 1, 2007. They streamline handling, transportation, and disposal of various types of waste, with the aim of protecting human health and the environment. The regulations advocate for cleaner production principles, waste reduction, and segregation at source.

Since the project will generate various types of waste, several sections are relevant. The contractor can only engage NEMA licensed waste handlers as required by Rules 7 -11. The waste must be transported by a NEMA licensed transporter and disposed of in a waste treatment facility/site that is approved by the authority. Rule 11 provides that operators of a disposal site shall apply the relevant provisions on waste treatment under the local government act and regulations to ensure that such waste does not present an imminent and substantial danger to the public health, the environment and natural resources.

Other relevant sections include:

- Rule 4 (1) prohibits disposal of waste in any other place except designated waste receptacles
- Rule 4(2) and 5 require segregation of hazardous waste and non-hazardous waste, and disposal in facilities provided by the relevant local authority
- Rule 6 advocates for cleaner production as a mechanism to minimize waste generation which can include conserving both raw materials and energy.

Relevance

The contractor and proponent will take the responsibility to ensure that solid waste is properly handled, stored, transported and disposed of as per the procedures provided in these regulations. On-site, materials that have the potential to be recycled should be considered for reuse or recycling prior to disposal.

5.8.4 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

This regulation prohibits any person or activity from making or causing any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether the noise is loud, unreasonable, unnecessary or unusual, factors such as time of the day, the proximity to a

residential area, whether the noise is recurrent, intermittent or constant, level and intensity of the noise, electronic or mechanical means, etc. may be considered.

Several sections are relevant to construction projects:

- In rule 4, the regulation relates noise to vibration effects, which can be harmful to people or the environment. Harmful vibrations are defined as exceeding 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source
- Rule 11 requires any person wishing to operate or repair any machinery, motor vehicle, or construction equipment which is likely to emit noise or excessive vibrations to carry out the activity or activities within the relevant levels provided in the First Schedule to these Regulations
- Rule 14 requires that all motor vehicles operated on site should not produce any loud and unusual sound
- Rule 14 requires that where construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including the machinery that may be used, and the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations. In this case, permissible levels applicable to public utility construction should be in line with Table 5-1 below. I and II are the most relevant.

Table 5-1: Second Schedule– Maximum Permissible Noise Levels for ConstructionSites

Maximum permissible Noise levels for construction sites (measurements taken within the facility)		
Institution/facility	**Day**	**Night**
• Health facilities, educational institutions, homes for the disabled, etc	60	35
• Residential areas	60	35
• Areas other than those prescribed in (i) and (ii	75	65

Time frame: Day: 6.01 a.m. – 6.00 p.m. (Leq, 14h) Night: 6.01 p.m. – 6.00 a.m. (Leq, 14h)

Relevance

Mshomoroni Estate Ltd and the appointed contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the construction and the operation phase. This shall include regular inspection and maintenance of equipment; prohibition of the unnecessary shooting of vehicles and where these may be exceeded, necessary measures must be undertaken to bring the noise levels within the set thresholds.

5.8.5 EMCA (Air Quality) Regulations, 2014

The objective of this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The overall aim is to protect human health and safety.

The general prohibitions, for instance Rule 5, 6, 7 and 8 prohibit any person from causing the emission of air pollutants (such as liquid and gaseous substances) and suspended particulate matter listed under Second Schedule (Priority air pollutants) to exceed the ambient air quality levels as stipulated under the First (Ambient air quality tolerance limits) and Third Schedule (Emission limits for controlled and non-controlled facilities).

Relevance

The contractor is therefore required to employ appropriate measures to keep particulate matter, especially dust, within acceptable limits. Dust suppression shall be continuous throughout the construction phase.

5.8.6 Public Health Act- (Revised 1986)

The public health Act regulates activities detrimental to human health. The owner(s) of the premises is responsible for environmental nuisances such as noise and emissions, at levels that can affect human. Section 115 of this Act state that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to health. Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drains or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Part 9 of the Act deals with sanitation and housing, and it's of most significance for the control of pollutin discharges.

It is accordance with this Act that we have developed an Environmental Management Plan (EMP) to ensure safety of workers, Neighbors and passersby

a) Health

Under health, there should be provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, and maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances

b) Safety

Special precaution against gassing is laid down for work in confined spaces where persons are liable to be overcomed by dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained.

c) Welfare

Section 55 provides for the development and maintenance of an effective programme of collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illnesses including disabling during working hours, are adhered.

To achieve this, systems on the management of both solid and liquid waste (effluent) will be adopted as proposed in the report. In addition, the development has been approved by the public health office in Mombasa.

5.8.7 Sessional Paper No. 10 of 2014 on the National Environment Policy

The Republic of Kenya has a policy, legal and administrative framework for environmental management. The broad objectives of the national environmental policy in Kenya are: -

a) To ensure optimal use of natural resources while improving environmental quality.
b) To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
c) To develop awareness that inculcates environmental stewardship among the citizenship of the country.
d) To integrate environmental conservation and socio-economic aspects in the development process.
e) To ensure that national environmental goals contribute to international obligations on environmental management and social integrity.

Compliance: To achieve this, it is a policy direction that appropriate reviews and evaluations of Proposed Mshomoroni Estate development and operations are checked to ensure compliance with the environmental policy.

implementation of water management legal instruments, create a monitoring and evaluation system for optimal use and conservation of protected water towers, and formulate through public consultation a management strategy for each protected water tower.

5.8.6 Wildlife Conservation and Management (Protection of Endangered and Threatened Ecosystems, Habitats and Species) Regulations, 2017

These Regulations, made under section 116 (2) (f) of the Wildlife Conservation and Management Act, 2013, concern the protection of endangered and threatened ecosystems, habitats and species in Kenya. They, among other things: divide ecosystems, habitats and species into categories (critically endangered, endangered, vulnerable, protected; and threatened); provide for protection of ecosystems that are threatened or endangered so as to maintain their ecological integrity; provide for the protection of species that are threatened, endangered, vulnerable, or protected to ensure their survival in the wild; implement Kenya's obligations under international agreements regulating international trade in endangered species; and (e) ensure sustainable management and utilization of biodiversity.

5.8.7 Wildlife Conservation and Management (Implementation of Treaties) Regulations, 2017

These Regulations, made under section 109 of the Wildlife Conservation and Management Act, 2013, requires the Kenya Wildlife Service, as the lead agency, in consultation with Service to stakeholders administer, to coordinate and implement international treaties regarding wildlife to which Kenya is Party.

The Service shall, among other things, comply with and monitor compliance with international treaties pursuant to sub-regulation (1) meet the requirements of the treaties and the implementation of resolutions and decisions; accomplish the requirements of the treaties and the enforcing resolutions; execute the specific decisions directed to Kenya; budget for and make arrangements for the payment of respective annual convention fees; engage in the negotiation of resolutions and decisions that are beneficial and of interest to Kenya; lobby necessary amendments on treaties, decisions and resolutions in the interest of safeguarding Kenya's wildlife; comply with and monitor compliance with international treaties; implement international treaties; monitor and prevent trade that is inconsistent with international treaties in accordance with the Act and the Regulations made under it; confiscate species traded in contravention with any international treaty that Kenya is party to; and take any other necessary measures for the implementation of and enhancing compliance with international treaties.

The Service shall carry out the implementation of resolutions of the Conference of Parties and may propose to the Cabinet Secretary any relevant Treaties that Kenya should ratify for better wildlife management and conservation.

5.8.8 National environmental sanitation and hygiene policy, 2007

The National Environmental Sanitation and Hygiene Policy is devoted to environmental sanitation and hygiene in Kenya as a major contribution to the dignity, health, welfare, social well-being and prosperity of all Kenyan residents. The policy recognizes that healthy and hygienic behaviour and practices begin with the individual. The Proposed Mshomoroni Estate Development is in line with the implementation of the policy to enhance sanitation, hygiene, food safety, improved housing, use of safe drinking water, waste management, and vector control at the household level. As a basic human right, all Kenyans should be able to live with dignity in a hygienic and sanitary environment.

Compliance: The proposed development should ensure that all sectors understand what constitutes a healthy human environment, and that they adopt attitudes and practices that create and sustain such an environment.

5.8.9The National Housing Policy 2004

The sessional paper no. 3 of 2004 on national housing policy outlines the government of Kenya's commitment in provision of affordable housing. The main goal of the policy is to facilitate the provision of adequate shelter and a healthy living environment at an affordable cost to all socio-economic groups in Kenya in order to foster sustainable human settlements.

This will minimize the number of citizens living in shelters that are below the habitable living conditions. It will also curtail the mushrooming of slums and informal settlements especially in the major towns. Chapter two of the housing policy outlines one of the objectives of the policy as to promote inclusive participation of the private sector, public sector, community-based organisations, Non-Governmental Organisations, co-operatives, communities and other development partners in planning, development and management of housing programmes. The proposed Mshomoroni Estate development provides adequate land for high end residential premises. This provision links very well with the goals and objectives of the national housing policy 2004. Further, in the national housing policy, the government of Kenya commits to facilitate investments in the housing sector. Based on the provisions of the national housing policy 2004,

The proposed Mshomoroni Estate development builds on the government's agenda on housing.

5.9 The Physical Planning Act of 1996 CAP 286, Rev. 2012

This is the main Act that governs land planning and all proposed developments must be approved by the respective local authority and certificate of compliance issued accordingly. Under the Act, the director of physical planning advises the commissioner of lands on land alienation issues that fall under Government Lands Act and Trust Land Act. The director also advises the commissioner of lands and local authorities on land use, sub-division and or amalgamation of land; prepares regional and local physical development plans.

The director is required to publish the regional physical development plan and also notify the local authority within whose jurisdiction the plan is to be affected.

Section 36 states that if in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report.

Section 30(1) requires a developer in any local authority to be granted development permission by the respective local authority, failure to which heavy fines will ensue; and the land registrar shall decline to register such a document. No sub-division of private land shall take place within a local authority unless the sub-division is in accordance with the requirements of an approved local physical development plan.

Relevance

The stipulated procedure laid down by this Act including undertaking any new project as per the required zoning.

5.10 The Work Injury Benefits Act (WIBA), 2007

This Act provides for compensation to employees for work-related injuries and diseases contracted in the course of their employment and for connected purposes.

Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10(1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in section 45(1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of an accident as may be prescribed in any other written law in respect of the trade or business in which the

employer is engaged.

5.11 Occupational Health and Safety Act No.15 of 2007

The Occupational Safety and Health Act No.15 of 2007 and the Subsidiary Legislation makes provisions for the health, safety, and welfare of persons employed. The provision requires that all practical measures are put into place so as to protect persons employed from any injury. The provisions of the Act are also relevant to the management (including handling, transportation, and disposal) of hazardous and non- hazardous wastes, which may arise at the project site.

It is the duty of the proponent and contractor to ensure workers safety is prioritized during the construction phase. This can be achieved in various ways:

- As highlighted in Section 6, by undertaking risk assessments and adopting preventive and protective measures.
- The contractor is required to also develop a health and safety policy and bring this to the notice of all employees as per Section 7
- Formation of the Health and Safety committee at the workplace as stipulated in section 9
- Ensure all dangerous situations and accidents are reported within time and appropriate action is taken
- Similarly, all plants and machinery in use shall be subjected to periodical examinations as provided by law to ensure safety according to Part VII
- Proper handling, labelling and transportation of chemicals and hazardous wastes such as petroleum, fuels, flammable materials, etc. Section 84 requires that material safety data sheets for chemicals and hazardous substances be availed at the workplace.

The general welfare of workers

These are dealt with under Part X.These include the provision of potable water, sanitation facilities, first aid, site office and store. The construction site(s) shall be registered as a workplace with the Directorate of occupational safety and health services under the Ministry of Labour, Social Security and Services as stipulated in Part V. A safety and health audit, fire audit, risk assessment, and safety and health audit has to be conducted for the site at least once every year. Failure to do so attracts a fine not exceeding five hundred thousand shillings or imprisonment for a term not exceeding six months or both.

The proponent will there undertake the necessary registrations, take all measures to ensure the health, safety and welfare of persons employed, as well as undertake the relevant assessments as outlined above.

In addition, several subsidiary legislation that operationalizes the Act include:

5.11.1 Safety and Health Committee Rules of 2004

These rules require the proponent and contractor (once they employ more than twenty persons) to establish a committee to address the health, safety and welfare of workers. The Proponent and by extension the contractor, are required to provide space for meetings for the committee, training of the Health and Safety (H&S) Committee, appoint an H&S management representative, as well as allowing all staff to attend these meetings with no risk of loss of earnings, opportunities for promotion or advancement. They should also make legislation on occupational safety and health available to the Committee.

The proponent and the contractor must also:

- Develop a clearly defined safety and health policy, bring it to the notice of all employees at the workplace, and send a copy of the policy to the director. They are also required to implement and review the policy when the need arises

- Organize annual health and safety audit of all operations related to the project. This should be undertaken by a registered health and safety expert who should forward such a report to the Director of Occupational Health and Safety Services.

5.11.2 Noise Prevention and Control Rules, 2005

These rules have set minimum and maximum noise exposure limits beyond which workers and members of the public should not be exposed to without adequate means of protection. This is set at 90 dB(A) for more than 8 hours within any 24 hours duration and 140 dB(A) peak sound level at any given time.

The rules also have limits for exposure out of workplaces as 55 dB (A) during the day and 45 dB (A) during the night.

The rules have several recommendations on a comprehensive noise control program for workplaces that covers: noise measurement; education and training; engineering noise control; hearing protection; posting of notices in noisy areas; hearing tests; annual programme review

In addition, this should include a requirement for medical examination of workers who are exposed to noise (and compensation for impairment), regular noise monitoring and measurement, Information and training of workers, proper installation and maintenance of machinery to reduce noise emission, provision of hearing protection, or plant, and posting of notices where allowed levels are exceeded.

The rules have also set the minimum noise levels that should emanate from a facility to public/neighbouring areas by day or by night. The proponent should provide functional protective clothing such as earmuffs for those operating noisy equipment/machinery at the construction site. Construction activities should be restricted to day time only.

5.11.3 Medical Examination Rules, 2005

These offer a guide on the need and target of workers who have to undergo a regular medical examination to identify the symptoms of hazardous exposures on the body. This is with the sole purpose of monitoring exposure for remedial action.

5.11.4 Fire Risk Reduction Rules, 2007

These rules were promulgated by the Minister for Labour on April 16th, 2007 and apply to all workplaces. The rules apply to this sector project in several ways as enumerated below:

- Rule 16 requires a proponent to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections
- Rules 29 – 31 refer to the installation and maintenance of firefighting systems in workplaces. Fire extinguishers are to be mounted at least 60cm above ground while a fire hose reel must be located within a radius of 30m.

5.12 14 The Sessional Paper No. 1 of 2017 on National Land Use Policy (NLUP)

The Policy outlines how Land in Kenya should be utilized efficiently, equitably, productively and sustainably for the current and future generations. It provides a framework for adequately addressing the challenges related to the use of land and land-based resources. Implementation of the policy will help in the conservation of water catchment areas, mitigating climate change effects in order to have a reliable and steady rainfall for sustained water supply for human settlement, manufacturing and agriculture. The policy provides a guide for preparation of physical development plans at the county level and provide for renewal and re-development of urban areas.

Compliance: The Proposed development will be subjected to the provisions of this land use policy in order to ensure proper utilization of the available land.

a)Housing Act

The Act established a National Housing Corporation (NHC) to perform the duties conferred on it by this Act. The primary mandate of NHC is to play a principal role in the implementation of the Government's Housing Policies and Programmes. The proposed Mshomoroni Estate development has a housing development sector which is in line with the national housing policy.

b) County Governments Act, 2012

This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for County government's powers, functions and responsibilities to deliver services and for connected purposes. The Act lays emphasis on the need for a consultative and participatory approach where the principles of planning and development facilitation in a county serve as a basis for engagement between the county government and the citizens and other stakeholders. The county government of Mombasa County will play an important role during the execution of the Mshomoroni Estate development

c) Urban Areas and Cities Act No 13 Of 2011

This Act of Parliament gives effect to Article 184 of the Constitution; to provide for the classification, governance and management of urban areas and cities; to provide for the criteria of establishing urban areas, to provide for the principle of governance and participation of residents and for connected purposes.

The proposed Mshomoroni Estate development will incorporate provisions of the Act to ensure that the proposed city is established as per the legislations

5.12The Penal Code CAP 63

Chapter XVII on nuisances and offenses against public health and convenience strictly prohibits pollution of water in public springs or reservoirs, and the pollution of the atmosphere, making it noxious to the health of the public, including those living, passing or doing business in the area.

Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code. It is the responsibility of the contracted licensed waste handler to ensure that all kinds of wastes are disposed of appropriately as per the legal provisions.

5.12 The Standards Act Cap 496

This Act provides for the standardization of commodities and codes of practice to ensure public health and safety. It establishes the Kenya Bureau of Standards (KEBS) and defines its functions as follows:

- To promote standardization in industry and commerce; and

- To make arrangements or provision of facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their degree of accuracy by comparison with standards approved by the Minister on the recommendation of the Council, and for the issue of certificates in regard thereto.

This means that the Proponent and contractor have to ensure that all materials and equipment put to use during construction as well as operation of the facility adheres to the highest standards and do not pose any human health and safety risk.

5.13HIV and AIDS Prevention and Control Act, No 14 of 2006

The Act which fully commenced on 1st December 2010 provides for measures for the prevention, management and control of HIV and AIDS, protection and promotion of public health and for the appropriate treatment, counselling, support and care of persons infected or at risk of HIV and AIDS infection.

It requires the government (and by extension government agencies) to promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS. This can be achieved through a variety of means, including educational and information campaigns that also encourage voluntary testing.

Section 7 specifically requires the government to provide basic information and instruction on HIV and AIDS prevention and control at the workplace. This should apply to all employees of government agencies and as well those of private sectors. The section further requires that such information should cover issues on confidentiality in the work-place and attitudes towards infected employees and workers.

Section 31 deals with matters of discrimination and hereby prohibits any form of discrimination against qualified employees, including at the workplace, on the basis of actual, perceived or suspected HIV status unless the employer can prove to a tribunal that the job requires a particular state of health or medical or clinical condition.

The Act, therefore, requires the proponent and by extension the contractor to practice fair employment practices, as well as undertake HIV/AIDS training including provision of protection against HIV/AIDs for the workers on site.

5.14 Employment Act CAP 226 and the Employment Act Subsidiary Legislation

The Employment Act defines the fundamental rights of employees, provides the basic conditions of employment of employees and regulates the employment of children. The Act prohibits discrimination of any kind and requires promotion of equal opportunity in employment.

Part V and VI define the conditions of employment. For instance, in Part V, Section 32, the proponent and the contractor are required to provide a sufficient supply of wholesome water for

employees on site. Some of these conditions are elaborated on in the subsidiary legislation. Similarly, well-stocked first aid kits should be made available on site.

5.14 National Construction Authority

An Act of Parliament to provide for the establishment powers and functions of the National Construction Authority and for connected purposes. There is hereby established an Authority to be known as the National Construction Authority.

(2) The Authority shall be a body corporate with perpetual succession and a common seal and shall, in its corporate name, be capable of—

(a) Suing and being sued;

(b) Taking, purchasing or otherwise acquiring, holding, charging or disposing of movable and immovable property;

(c) Borrowing and lending money; and

(d) Doing or performing all other things or acts which may be lawfully done or performed by a body corporate for the furtherance of the provisions of this Act.

The proponent will seek approvals from National Construction Authority before construction is inititated.A registered contractor shall be hired to ensure the job is well done.

5.15 International Environmental and Social Impact Provisions, Conventions, Treaties and Agreements

5.15.1 The Rio Declaration and Agenda 21

The Rio Declaration and Agenda 21 are binding instruments adopted by the 1992 United Nations Conference on the Environment and Development (UNCED). While the Rio Declaration contains general principles and objectives, Agenda 21 their practicalimplementation. Principle 4 of the Rio order to achieve sustainable development environmental protection shall constitute an integral part of isolation from it. Principle 25 accentuates this by stating that peace, development and environmental protection are interdependent and indivisible.

5.15.2 The World Commission on Environment and Development (The Brundtland Commission of 1987)

The Commission in its 1987 report dubbed "Our Common Future" focused on the of development, in particular, on sustainable development that produces and to particular ecosystems. Economic and social sustainability. Economic sustainable development is a development for which progress towards environmental within available financial resources. While socially sustainable development is development that maintains the cohesion of a to help its together to achieve common goals, while at the health and well-being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations.

5.15.3 United Nations Framework Convention on Climate Change (UNFCC)

The United Nations Framework Convention on Climate Change provides the basis for concerted international action to mitigate climate change and to adapt to its impacts. Are far-sighted, in the concept of sustainable development. With 189 Parties, the nearly a universal membership. According to Article 2, the objective is "to achieve, in the relevant provisions of the Convention, stabilization of level that would prevent dangerous anthropogenic [human activity] interference with the climate system". This objective is qualified in that it "should be achieved within a time to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner". In stating this objective, the Convention reflects concerns that the earth's climate system is threatened by a rise in atmospheric greenhouse gas (GHG) concentrations, which is caused by increased anthropogenic GHG emissions.

5.15.4 World Bank Performance Standards

The World Bank's environmental and social performance standards are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for Bank and borrower staffs in the identification, preparation, and implementation of programs and projects. In essence, the performance standards ensure that environmental and social issues are evaluated in decision making, help reduces and manage the risks associated with a project or program, and provide a mechanism for consultation and disclosure of information.

Performance Standard 1: (Assessment &Management of Environmental & Social Impacts)
Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management and

involves engagement between the developer/proponent, its workers, local communities directly affected by the project and, where appropriate, other stakeholders. The Standard covers impacts on the natural environment (air, water, and land); human health and safety; physical cultural resources; and trans boundary and global environmental concerns. A range of to conduct Environmental Assessments i.e. EIA, Environmental Audit, risk assessment and Environmental Management Plan (EMP).

The performance standard has the following objectives:

- To identify and evaluate environmental and social risks and impacts of the project
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment
- To promote improved environmental and social performance of project proponent through the effective use of environmental management systems
- Adequate engagement with Affected as the immediate neighbors and project beneficiaries throughout the project affects them to ensure that relevant environmental and social information is disclosed and disseminated.

Performance standard 2 (Labour and Working Conditions)

This standard's provisions have been guided by the International Labor Organization (ILO) and the United Nation and it recognizes that the economic growth should be accompanied by protection of the fundamental1 rights of workers. For any business, the workforce is a valuable asset, sound worker-management relationship sustainability of a company. A sound worker-management relationship can undermine worker commitment and retention and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by them with safe and healthy working conditions, project proponent/developer may create tangible benefits, enhancement of the efficiency and productivity of their operations. Key objectives being the compliance with national employment and labor laws it thus gives provisions in ensuring Occupational Health and Safety of workers for any development projects.

Performance Standard 3 (Resource Efficiency and Pollution Prevention)

This performance standard recognizes that increased economic activity and generate increased pollution to air, water, and land, and resources in a manner that may and the environment at the local, regional, and global levels.A growing global consensus that the concentration of greenhouse gases (GHG) and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG technologies practices have virtually all parts of the world. These are often implemented through

continuous improvement methodologies similar to those or productivity, known to most industrial, agricultural, and service sector companies.

This Performance Standard outlines a project-level approach to resource efficiency line with internationally disseminated technologies and practices. The objectives of this standard are applicable to the

Proposed Mshomoroni Estates Ltd:

- To avoid or minimize adverse impact on the environment by avoiding or minimizing pollution from project activities
- To promote more sustainable use of resources, including energy and water
- To reduce project-related GHG emission such us by the use of Integrated Pest Management Methods (IPM) in agriculture hence reducing the use of aerosols.

Performance Standard 4 (Community Health, Safety, and Security)

Project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to May also experience an acceleration and/or impacts due to project activities. While public authorities promoting the health, safety, and the public, this Performance the developer's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups. and post-conflict areas and impacts described in this Performance Standard may be greater. Local situation and to furtherconflict. The objectives that are in line with the proposed project include:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances
- To ensure that the safeguarding of personnel and property is carried out in accordance with the relevant manner that avoids or minimizes risks to the Affected Communities.

Performance Standard 5 (Land Acquisition and Involuntary Resettlement)

Performance Standard 5 identifies that project-related land acquisition and restrictions on land persons that use this land. To physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of the project-related land acquisition and/on land use. Resettlement is persons or communities do not have the right to refuse land acquisition or restrictions on land use in physical or economic displacement. This occurs in cases of

i. Lawful expropriation or temporary or permanent restrictions in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

Performance Standard 7 (Indigenous People)

Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, among the most marginalized and vulnerable segments of the population. In most cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, restrict their ability to participate in and benefit from development. Indigenous People are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may under threat. As a consequence, indigenous peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities.

Performance Standard 8 (Cultural Heritage)

Performance Standard 8 affirms the importance of cultural heritage for current and future generations. Consistent with the convention concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that developers protect cultural of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

The objectives of the standards are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits arising from a project

5.16 National Institutional Framework

5.16.1 The National Environment and Management Authority (NEMA)

NEMA is the principal institution which exercises general supervision and coordination over all matters relating to the environment. It is also the principal instrument of Government in the implementation of all policies relating to the environment.

In relation to the proposed project, NEMA is charged with the responsibility to:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring sustainable utilization of natural resources;

- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act;

- Monitor and assess activities, including activities being carried out by relevant lead agencies. This is to prevent environmental degradation, adhere to environmental management objectives and provide adequate mitigation measures for any adverse environmental impacts, and to
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.

5.16.2 Other Relevant Institutions

Table 5-2: Institutions with an Environment, Health, and Safety mandate

Institution	Responsibility
The National EnvironmentCouncil	Established under section 4 of EMCA, it is responsible for policy formulation and directions for purposes of this Act, sets national goals and objectives and determine policies and priorities for the protection of the environment; promotes co- operation among public departments, local authorities, private sector, Non-Governmental Organizations and such other organisations engaged in environmental protection programmes
National Environment Tribunal	Its principal function is to receive, hear and determine appeals on environmental matters. These mostly arise from decisions of the National Environment Management Authority (NEMA) on issuance, denial or revocation of environmental impact assessment (EIA) licenses, among other decisions.
Standards and Enforcement Review Committee	Established under section 70 of EMCA, this plays an advisory, research, monitoring, and control of water pollution role.
The County Government of Mombasa	Has a role in controlling air and noise pollution, and otherpublic nuisances from activities within their jurisdiction.
Water Resources Authority(WRA)	Regulates and protects water resources from adverse impacts. It also regulates water infrastructure, use and effluent discharge including abstraction.

Department of Occupational Health and Safety	It oversees provisions of health, safety and welfare of all workers in all workplaces, trains and does awareness on occupational safety and health, investigates occupational accidents at workplaces, does regular inspection and auditing ofworkplaces to promote best practices and ensure compliance with safety and health standards as set out in OSHA, 2007 and its subsidiary legislation and undertakes examination and testing of equipment such as hoists and cranes.

6 PROJECT ALTERNATIVES

This section examines alternatives to the proposed development in terms of site selection, materials and products, technology and waste management. With this information, reviewers have a basis for decision-making.

6.1 No Project Alternative

The No Project Alternative option in respect of the proposed project implies that the *status quo* be maintained. This means the Proponent would leave the parcel of land as it is. Such a scenario has economic implications for the Proponent as the land would not be utilized to its maximum potential in terms of profitability. The no construction option is most applicable in situations where the proposed project area is in ecologically sensitive areas and puts endangered species at risk which is not the case. The land in which the proposed project is to be constructed is on the second row with no direct access to the riparian reserve is in a stable environment. This is supported bythe environmental and social assessment study carried out on site. Similarly, as the impact section details, the impacts of the project can be mitigated. In general, the No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of Kenyans and the local people would remain unchanged.
- Local skills would remain underutilized.
- No employment opportunities would be created for Kenyans who would work in the proposed project area.
- Discouragement for investors.
- Development of support infrastructural facilities (roads, electrical etc.) would not be undertaken.

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the Proponent, the local people and the Government of Kenya. This approach should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the Environmental and Social Management and Monitoring Plan (ESMMP) developed in this report.

6.2 The Proposed Development Alternative

Under the proposed development alternative, the Proponent would commission EIA Consultants to conduct an ESIA study for the proposed project. The ESIA study report would be submitted to NEMA for review and approval. In issuing a license, NEMA would approve the Proponent's proposed commercial development, provided all environmental measures are complied with during the construction period and operation phases. This alternative consists of the applicant's final proposal with the inclusion of mitigation of environmental impacts as stipulated in the ESIA regulations to the maximum extent practicable.

This alternative has the following advantages:-

- Creation of jobs to a proportionately large number of Kenyan citizens.
- Provision for an internationally-recognized hotel school education equipping those who enroll with skills to meet the international demand and competitiveness in the job market
- Optimal use of land which is a highly valuable but scarce resource in Kenya
- Gains in local and national economy
    - Development of associated infrastructural facilities

6.3 Alternative Site/ Location

This would involve relocation of the proposed project to another site other than the present proposed site. Such a move would have several implications both to the Proponent and the recipient environment. The Proponent already owns the proposed site. Change of site would mean the Proponent has to purchase an alternative piece of land. The result would be an increase in time and resources required. Some of the implications may include:-

- Additional cost of purchasing land.
- Destruction of the new environment should the alternative site be pristine.

The current location was chosen due to its suitability of constructing a Low cost affordable housing and thereduction in land acquisition needs.

6.4 Alternative Design

Planning, designing and implementation of the project to fit and suit the site in question requires time, sourcing of various professionals involved and monetary sacrifices to facilitate their progress. The team ranging from the surveyor, architect, environmentalist, project managers among others dedicate their time and resources to ensure that the mutually agreed target is attained within the specified time frame. Changing the design may mean a greater loss in time, money and resources which could have been diverted to develop other sectors for economic development and environmental sustainability.

6.5 Alternative Construction materials and Technology

The construction sector is one of the sectors that contribute to climate change through high levels of greenhouse gas (GHG). This is directly, through fossil energy used in construction-related activities such as mining and transportation. Production of building materials and onsite consumption of electricity contribute to indirect and direct GHG emissions respectively.

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmentally aesthetic requirements. The objective is to establish an Eco-friendly complex by employing ‘green building’ technology

without compromising on cost or availability factors. This shall involve avoidance of ozone-depleting substances, use of energy and water saving technologies, rainwater harvesting, waste water treatment and recycling and use of recyclable materials.

Ballast and sand shall be sourced from registered and approved quarry and sand mining firms whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval, whereas, all other construction material shall be sourced from suppliers with acceptable environmental performance standards. Cement, sand (washed and clean), twisted metal etc shall also meet the Kenya Bureau of Standards requirements There shall be minimal useof timber during construction and where need be, indigenous species would be preferred to exotic species in the construction.

6.6 Solid Waste Management Alternatives

Large quantities of waste will be generated during construction and operation of the proposed project. An integrated solid waste management system is recommended.

During construction, the Proponent will give priority to reduction at the source of solid waste, followed by recycling, reuse, and disposal. This will call for putting in place a separation at source programme. Non- recyclable waste should be disposed of at designated city-county sites.

6.7 Wastewater management alternatives

The area is not served by a public sewer.

Two most suitable technologies are discussed below:-

Alternative one: *Use of septic tanks*

This involves the construction of underground concrete-made tanks with soak pits to store wastewater. They are expensive to construct and require regular emptying.

Alternative two: *Construction of a Bioliff waste water management system*

This will involve a system whereby all wastewater (both black and grey) will be collected into chamber where the solids settle down and get digested aerobically. The liquid effluent filters to an equalization chamber. The end product is reusable clean and odourless water which shall be continuously tested and measured against WHO standards before being released to the environment. The bioliff technology is enlisted with NEMA.

After consideration of the various liquid waste alternatives, the Proponent has settled for the construction of a Bioliff waste water management system.

7 PUBLIC CONSULTATION AND PARTICIPATION

7.1 Introduction

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation plans. Stakeholder engagement provides public information and also enhances collaboration between the project proponent and the public.

Extensive public consultation meetings for the proposed Mshomoroni Estates Ltd took place while undertaking this ESIA study.

7.2 Objectives of Public Consultation and Participation

The main objective of the public consultation process was to involve all stakeholders and community at the very early stages and provide ample opportunity to identify likely negative impacts, consult on sensitive issues and find ways to minimize the negative impacts and enhance the positive impacts of the project.

The specific objectives of the consultation process for this ESIA study are to:

(a) To provide clear, timely and accurate information about the proposed project to the communities- to ensure the community understands the proposed project and the anticipated impacts;

(b) To obtain feedback (the main concerns and perceptions) of the population and their representatives regarding the proposed project- this included impacts, alternatives, and opportunities;

(c) To enable early identification of contentious issues

(d) Improve project design and, thereby, minimize conflicts and delays in implementation and create a sense of self-ownership to the project by the community

(e) To obtain opinions and suggestions directly from the affected communities and interested parties on their preferred mitigation measures- this included ensuring their concerns and priorities were understood and act as input into the decision-making process and inform the solutions

(f) Increase long term project sustainability and ownership;

(g) To enhance institutional co-ordination especially where different organizations and institutions are affected or of interest e.g. utility companies and social amenities

7.3 Project stakeholders

Stakeholders can be defined as persons, groups, or organizations, who may affect or affected by, or perceive itself to be affected by a decision, activity, or outcome resulting from the proposed Low cost affordable housing project. Identification and analysis of stakeholders formed the basis for planning and designing of stakeholder engagement activities.

A database of all individuals, communities, interested parties, organizations, and institutions was generated (and continually updated), and the identification of the stakeholders was based on three different levels (local, county, and national).

Summary of stakeholder categories and basis is as below:

COMMUNITIES AND DIRECTLY AFFECTED INDIVIDUALS	
Affected communities including neighbouring land owners to the Project within the AoI.	Households and communities that may be directly or indirectly affected by the Projectand its activities in the AoI. This includes immediate community neighboring the Project site
Vulnerable groups: Elders and women	Vulnerable groups may be affected by the Project. They may also have difficulty in engaging with the stakeholder consultation process and thus may not be able to fully express their concerns regarding the Project
PRIVATE SECTOR	

RELIGIOUS GROUPS & SOCIAL FACILITIES WITHIN PROJECT AoI	
Churches, Muslim Leaders Security machinery (Govt)and Community Policing systems e.g. *Nyumba Kumi* Schools etc	Organizations with direct interest in the Project, and its social and environmental aspects and that are able to influence the project directly. Such organizations may also have useful data and insight

7.4 Public Information and Consultation Methodology

Table 7-1: Medium of Communication/Consultation Employed

Medium	Description	Objective	Target Group
Questionnaires	○ Open-ended questionnaires	○ To solicit information on project impacts and recommendation	○ Affected groups- local community groups,institutions etc
Settlement (village/ community) meeting	Presentation regarding theProject Description& to solicit information on anticipated impacts and mitigation measures	○ Presentation regarding the Project Description& to solicit information on anticipated impacts and mitigation measures	Affected households within direct impacted area that will be physically and / or economically impacted by the Project. This included of women and vulnerablegroups Location: Accessible location inthe centre of the settlements Timing: Evenings after people

Medium	Description	Objective	Target Group
			have come from work or businesses
Public meetings	○ 1 public meeting at strategic locations with a preference to chief's office and social halls	○ To solicit views, comments, and recommendations from the community	○ The General Public ○ Project interested andaffected persons ○ County Governmentofficials and government institutions ○ Political Unit and community leaders ○ Local conservation groups ○ NGOs

Medium	Description	Objective	Target Group
	who provided their contacts during earlier consultations o Making reminders/follow-ups/ invitations to the public meetings	media of communi cation	

7.4.1 Direct one on one interviews

Direct interviews were used to derive information from the project proponent, project engineers, architects, amongst other project consultants. Discussions were centered around the project designs, site selection, solid and liquid waste management, construction technology and materials and other related project aspects.

Key affected institutions were also interviewed to enlighten the experts about the area and any existing issues that should be put into consideration.

7.4.2 Questionnaire administration

More than 15 open-ended questionnaires were administered to collect the views of various stakeholders. These were administered on March 2021 at the public meetings.

The questionnaires were distributed to capture views from respondents -positive and negative -of the anticipated project impacts and the suggested mitigation measures. They were also requested to provide information about the area, focusing on various aspects such as the provision of various infrastructure, social amenities, socioeconomic conditions as well as the environmental impacts of the project. Appendix 8 contains samples of the questionnaire administered to the residents.

The recommendations from the public consultations are incorporated into the mitigation measures proposed in the report.

7.4.3 Focused Groups and Special Groups Meetings

Consultation meetings that allow for specialized groups to be updated and raise concerns about the project were held. These included:

- Focus groups meetings and workshops with various groups in Junda were held on March 2021. This targeted the local administration, area leaders, women, and youth groups among others. The main objective was to ensure inclusivity in the public consultation exercise.

- Special groups meetings were also held between the Project Proponent, project engineers and representatives of various groups such as KPLC, MOWASCO.

7.4.4 The Public Meetings

Public gatherings open to interested and/or affected stakeholders.

March 2021	Open to the members of the Public	0800 hrs- 1310 hrs	Junda shopping centre	16

7.5 Documentation of Stakeholder engagement and Issues raised

In order to measure success and build efforts for future activities, there was a need to capture the various engagements. Minutes of major meetings as indicated above were done. The summary of the issues highlighted is indicated below.

7.5.1 Public Meeting

The first public meeting was held at December 2020 at Junda shopping centre during the consultative meeting, the following issues and points were highlighted for consideration:

- Solid Waste management- Some of the participants expressed that a concern that the proposed development is likely to overwhelm the existing solid waste management facilities in Junda.

Mitigation measures

  - The Proponent has committed to acquire an off-site piece of land to manage the organic kitchen waste which accounts for approximately 70% of the total waste generated by the development.

- The Proponent is considering purchase of waste trucks (to be duly registered with NEMA) to aid in the collection, transport and disposal of the waste collected especially for the management of the inorganic waste
- The Proponent will partner with the Environmental Department of Mombasa, to ensure sustainable solid waste management practices
- The Mshomoroni Estate development will adopt a glass bottles only policy to discourage the use of plastic bottles especially for drinking water and to encourage re-use
- The management of the development will oversee the use of the 3R's (Reduce, Re-use, Recycle) to reduce solid waste generation for the proposed development among other measures.

- Liquid waste management- One of the expected impacts of the proposed development is an increase in the amount of liquid waste generated during the construction and the operation phases. There is no public sewer serving the area. Establishments generally use septic tanks and soak pits for the management of liquid waste

Mitigation Measures

- There will be an adequate installation of grease traps and regular maintenance during the operation phase
- The development will make use of a mini-Bioliff wastewater treatment system during construction and a Bioliff wastewater treatment system during the operation phase. The waste water technology is enlisted with NEMA Water Quality Department. A detailed description of the system and NEMA authorization is contained in Appendix

- An influx of people and congestion

Mitigation measures

- The contractor shall employ majority of the staff as much as practicable from the local population so as to reduce influx of people in the area.
- The contractor shall be expected to provide proper housing for immigrant staff in appropriate locations away from concentration of human settlements
- Site entry will be restricted to authorized persons only during construction
- All Workers shall be sensitized on the local cultures and beliefs to ensure there is harmony in the project area.
- The contractor has to institute HIV/AIDS awareness and prevention campaigns amongst workers for the duration of the contract
- The influx of people during operation will have a positive impact on the area, as they will boost tourism and economic growth.

- Insecurity, disaster preparedness and emergency preparedness – such as the risk of fire and terrorism

Mitigation measures

- The Proponent will engage a security expert to come up with sustainable security measures for the proposed development
- The Proponent will ensure basic security systems installations into the proposed development such as a secured perimeter wall, CCTV cameras, etc. The building design has been optimized to incorporate emergency evacuation, rescue through the placement of structural designs and redundancy of emergency exits and critical mechanical and electrical systems that would enable reduction of damage in any catastrophic events and eventual safe evacuation
- The Proponent intends to construct a fire station within the proposed development site
- Other measures incorporated in the project design include structural integrity of the tower, an enhanced fire resistant structure, active fire protection systems (sprinklers, hose pipes, fire blankets, fire alarms and smoke management systems etc), regular fire risk assessments and education and training for all workers
- The proponent shall partner and work with the existing security machinery

- Pressure on the available social services and infrastructure

Mitigation measures

The Proponent is working with various providers such as KPLC, MOWASCO, and KURA, County government of Mombasa etc to ensure adequate provision of energy, water and transport services in the most sustainable way while ensuring minimal disruption of important provision of services in the project area and beyond.

The Proponent is in engagements with KPLC to carry out connection with the housing project while ensuring a dedicated supply for the project. Water distribution systems in Junda will be improved to ensure adequate water supply by MAWASCO for all residents. The adjacent roads will be rehabilitated and expanded in collaboration with KURA.

7.5.2 The second public meetings

The second public meeting was held on March 2021, at Junda Saba shopping Centre. During the meeting, the majority of the residents acknowledged that they were aware of the proposed project. Most of the residents pledged their support for the full implementation/construction of the project affirming that the project will indeed have numerous positive impacts, provided that the negative impacts are adequately mitigated. Mitigation measures of all issues negative issues raised and enhancement measures of the positive impacts are outlined in the ESMMP of this report.

(*Minutes of all meetings and all supporting documentation have been attached in the appendices section)*

Table 7-3: Summary of key issues raised on the proposed project (Questionnaire Analysis)

	Key Positive Impacts
i.	Creation of employment opportunities
ii.	Community Development through CSR initiatives
iii.	Upgrade of road infrastructure, water provision services and energy provision services, leading to development in the area and the eventual economic development of the area
vi.	Increase in local property values
vii.	Availability of affordable decent Houses to the (Common Mwananchi)
viii.	Conservation of the environment through adoption of green energy
ix.	Infrastructural development: physical and social. Road expansion, water connections, internet accessibility, and communication networks, among others.

xii.	Putting available land into optimal use

	Key Negative Impacts	
	Impact	**Mitigation measures**
i.	Air degradation from dust and noise during construction activities	Compliance with EMCA regulations, dust suppression measures, use of attenuated equipment and machinery, appropriate site hoarding etc
ii.	Pressure on the existing infrastructure and social facilities	Upgrade of relevant infrastructure, working in close collaboration with relevant government authorities
iii.	Waste management- solid and liquid	Appropriate mechanism to be put in place, comprehensive waste management plan
iv.	An influx of people and overcrowding	Local community prioritized on employment.
v.	Increase in insecurity	The Proponent to engage a security expert, installation of security systems
vi.	Increase in prostitution, societal disruption, socio-cultural impact	HIV/AIDS sensitization and control programmes
vii.	Disaster risk and emergency preparedness	Risk assessments, firefighting facilities etc
viii	Vegetation of clearance	Minimal clearance of vegetation, only on areas to be occupied by the proposed development Working in close collaboration with KWS

8 PROJECT ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

8.1 Introduction

This Chapter identifies and discusses both positive and negative impacts associated with the proposed Low cost Housing Project and their relative significance. The anticipated impacts and corresponding mitigation measures are discussed in Phases namely**:** Pre construction-design, construction, operation and decommissioning Phases.

The study has predicted and evaluated anticipated impacts using acceptable standard methods of impact prediction and evaluation. The process of determining the various impacts was done through stakeholders' participation, discussions with proponent's technical team, site visits, professional studies undertaken and review of the existing information and project documents. The prediction and analysis of the environmental impacts of the proposed project is also based on the professional judgment as well as the compliance with the relevant Kenyan legislation and standards on environment, health and safety and the World Bank Safeguards.

8.2 Positive Impacts during Planning and Design Phase

8.2.1 Employment opportunities

With the planning and design phase of the proposed project, there will be employment opportunities, especially for professionals. Those involved in planning and design include engineers, architects, surveyors, valuers, physical planners, environmentalists and sociologists among others. Those engaged will improve their living standards from the fees they will be paid for their services.

8.2.2 Creation of awareness

During the planning and design phase of the proposed project, the community will be informed of the project and their views sought on the project. In this way, awareness will be created for both the community and the Proponent. The Proponent will also be in a position to draw local knowledge on the various environmental and social considerations and put into practice the useful advice from the community when planning and designing the Project.

8.3 Negative Impacts during Planning and Design Phase

The Consultant will mobilize a large team of skilled and unskilled human resource to undertake the surveys and other studies required to complete the designs. Mobilization of the skilled and non-skilled labor and the process of disclosure and consultations among the residents and other stakeholders shall, however, lead to heightened expectations and speculations.

With the foregoing, it is envisaged that there will be minimal to no negative impacts during the planning and design stage.

Mitigation:

Impacts during this phase of the project are not significant. However, the Design Team shall take necessary measures to document any concerns and address them on as they occur. In that regard, the Design Team shall incorporate an Environmental Expert in the team and take time to sensitize and alert the residents of the ongoing.

8.4 Positive Impacts during Construction Phase

8.4.1 Employment opportunities

With the construction of the proposed project, there will be employment opportunities for both skilled and unskilled workers. This will be beneficial both from the economic and social point of view. Economically, it means abundant unskilled labor will be used in production. Socially these people will be engaged in productive employment and minimize social ills like drug abuse and other criminal activities.

Priority will be accorded to those neighbouring and affected by the project, with extension to the larger county where relevant skills are missing in the environs.

Several workers including casual laborers, masons, carpenters, plumbers and engineers are expected to work on the site for a period of time. Semi-skilled, unskilled and formal employees are expected to obtain gainful employment during the period of construction.

With labor-intensive construction technologies, the project will provide employment for youths and provide support to the Government of Kenya initiatives on the creation of jobs. The Proponent shall expect the contractor to adhere to above minimum wages and comply with all Labour and Working conditions requirements.

Gender equality shall be considered when allocating job opportunities to ensure women (where practical) access equal job opportunities as their male counterparts – during construction and operation phases

8.4.2 Gains in the local and national economy

The project will require materials, some of which will be sourced locally and some internationally. These include ballast; sand; machine cut stones; reinforcement steel and cement. This will provide a ready market for suppliers in and outside the project area and contribute towards the growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue whilst the cost of these raw materials will be payable directly to the producers/suppliers.

8.4.3 Promotion of Local Business

For many construction projects, construction workers require that food be availed to them on site so as to reduce time wastage in going elsewhere for lunch while maintaining productivity levels. This demand for food and drinks on site will, therefore, promote and boost local businesses like fruit and food vendors. All food vendors shall be expected to have a certificate of medical examinations ensuring food hygiene. This a positive socio-economic impact.

8.4.4 Development of support infrastructure

The construction of the proposed tower shall consequently improve the local infrastructure with the upgrade of support infrastructure such as water and energy facilities to meet project demand. Partnering with MOWASCO for water distribution to the site thus provision of other necessary support infrastructure will increase.

8.4.5 Corporate Social Responsibility (CSR) Community Projects

The project budget provides for CSR projects which shall be implemented while the construction phase is ongoing. The community is expected to propose sustainable CSR projects.

8.5 Negative Impacts during Construction

The following negative impacts are associated with the construction of the proposed project

8.5.1 Interference with the physical setting

The proposed project could result in the following negative impacts to the physical setting

- Change in land use;
- Changes in the aerial view, topography during site grading and laying of water pipes to the site among others;
- Blockage of the natural drainage system and
- Development of informal business depending on the intensity of labour import

Mitigation

- Measures to reduce the ecological footprint of the building have been incorporated into the design and planned utility of the building. The projects ESMMP design incorporates green building technologies such as solar, photovoltaic cells, rainwater harvesting etc to reduce energy use associated with cooling, lifts, lighting and water heating.
- The project proponent is expected to use performance glass which reduces heat gain within the building and has comparatively lower reflectance. It is anticipated the building will have muted and controlled lighting to illuminate the building and not the adjacent environs

- The design shall in no way propose to implement developments that will hinder drainage and change the topography
- The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations
- Restoration shall be undertaken to ensure that the original setting is as much as possible retained.
- Application of Change of use permit. The property where the proposed development is to be located is under residential use as per the zoning regulations.

8.5.2 Interruption of existing underground installations/facilities

The various installations to the site e.g. water pipeline will cross, move in or move along installations among them:

- Roads
- Underground utilities e.g. electricity and telephone links

These services are critical and have implications with spillover effects on the social and economic performance.

Mitigation

- A formal request for permission to cross, break in and build should be sought from the relevant institutions such as Kenya Power and roads authorities.
- Formal engagement should be done with key land and other property owners neighboring the project
- Ensure dissemination of relevant information to each of the affected parties
- A work plan with clear responsibilities for each party should be developed to ensure smooth execution of the construction.

8.5.3 Increased Traffic Congestion and risk of Road Traffic Accidents

Accessibility to the area is a challenge due to the narrow roads and both during project construction and operational phase, it is expected there shall be increased traffic in the area.

Vehicle movements associated with project activities such as the delivery of project materials and equipment, personnel movements or maintenance activities can be a source of an increase in traffic and increased risk of road accidents or occupational accidents as well as increased emissions of dust and particulate matter and noise generation.

As a result, the project proponent commissioned a Traffic Impact Analysis to be conducted for proper traffic management. To improve on accessibility to the site and reduce road congestion

The objective of the Traffic Analysis and TMP are as follows:

- Reduce traffic congestion as a result of project operations;
- Provide measures and controls for the safe movement of vehicles for the protection of workers and the general public;
- Provide measures and controls for the reduction of emissions of dust and noise and
- Provide measures and controls for the maintenance of equipment and vehicles

Mitigation

- Relevant authorities will be consulted to agree on specific routes for project traffic during the construction phase, to prevent road congestion, improve accessibility and avoid any sensitive residential areas or unsuitable parts of the road network
- When road closures are required, diversions will be planned and communicated to the affected staff and communities as far in advance as practicable. Any road closures will be properly sign-posted and flag men positions to guide road users.
- The drivers will comply with all statutory vehicle limits (width, height, loading, gross weight) in accordance with the National Road Traffic Regulations and any other statutory requirement.
- Site and off-site access routes to be used by all traffic will be properly signposted to prevent vehicles from leaving the designated routes and ensure that the appropriate speed limits are enforced.
- Access and site roads will be maintained in good condition
- Erection of speed bumps to reduce speed
- Speed limits will be established and enforced over all traffic routes. The vehicles of the contractor and his suppliers shall not exceed a speed of 40 km/h on gravel or earth roads on site and within 500m of the site.
- Supplier/heavy traffic flows will be timed, wherever practicable, to avoid periods of heavy traffic flow along main roads (e.g. morning and afternoon).
- The Contractor will not commence any work that affects public roads until all agreed traffic safety and management measures essential for the works are accepted and agreed

with the relevant authorities.

- Vehicles shall enter and exit the site in a forward direction, as far as possible.
- Clear signs, flagmen, and signals will be set up where necessary. Where temporary traffic signals are required, the details and locations of the signs shall be agreed to with the relevant authorities.
- All road signs will be fixed safely and securely to ensure that they do not become detached or dislocated and will be visible and comprehensible by all.
- Only licensed and competent drivers and operators shall be engaged by the contractor. In addition, all drivers shall be trained and evaluated in defensive and off-road vehicle operation.
- No unauthorized passengers shall be carried on project vehicles
- The Contractor shall establish a specific mechanism for dealing with stakeholder grievances. The process for grievance resolution shall be transparent, in harmony with the local culture and in the appropriate language and all grievances shall be documented and tracked through to resolution. This shall include documentation on how the grievance has been resolved. It shall essential that the grievances are reviewed regularly to determine whether same or similar grievances are being lodged.

8.5.4 Noise generation and excessive vibrations

Construction of the proposed project is likely to lead to noise emission and excessive vibrations as a result of the construction machinery and equipment that will be used e.g. excavation equipment and construction vehicles delivering materials to the site. Noise will also be generated from the construction workers.

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels (more than 3 dBA) in the project vicinity above levels existing before the project; and
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing before the project.
- There shall be no blasting works at the site area

The Proponent through the Contractor shall put in place several measures that will mitigate noise pollution arising during the construction phase.

Mitigation

- All generators, compressors and other stationary equipment where necessary to be insulated or placed in enclosures to minimize ambient noise levels
- Statutory inspections of all moving plant and machinery as required by OSHA 2007
- Routine maintenance of all vehicles, plant, and machinery shall be to a high standard to ensure that vehicles are safe and that emissions and noise are minimized
- Use of quiet equipment (i.e. equipment designed with noise control elements)
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible
- Routine audiometric tests of the project site as required by Law
- Construction to be limited mainly daytime
- Consider labour based construction methodologies
- Provision of appropriate personal protective equipment- ear muffs and ear plugs and
- Annual Medical examinations (audiometric tests) to be conducted on workers

8.5.5 Air quality degradation

This will result from dust emissions and excessive vibrations during excavation and related earthworks. Air-borne particulate matter pollution is likely to occur during site clearance and excavation, hauling of construction materials and as a result of increased traffic in the area. This is likely to affect both the community and site workers.

Mitigation measures

- Appropriate hoarding of the construction site
- Installation of safety nets during construction.
- Minimizing the number of motorized vehicles on use
- Erection of speed bumps at different areas and the access road leading to project site to reduce speed and emissions of dust
- Use predetermined tracks
- Continuous watering of dust both within the site and in all access roads leading to the project site to reduce the amount of dust generated by the construction trucks.
- Undertake staff training and allocate roles to trained/responsible staff members.
- Provision of fit for purpose personal protective equipment to all workers
- Annual medical examination of workers/ medical surveillance program

- Contractor to establish an internal and community grievance mechanism
- Strict compliance with the provisions of EMCA (Air Quality) Regulations, 2014
- Constant undertakings of air baseline surveys as part of monitoring and evaluation exercises during the construction phase and during annual audits
- Adherence to the ESMMP provided in this EIA study
- Regular maintenance and servicing of all construction vehicles and machinery periodically to ensure efficiency thus reducing exhaust emissions
- Safe handling of construction materials
- Provision of adequate PPE (Personal Protective Equipment)
- Appropriate hoarding of the construction site
- Installation of safety nets during construction.

8.5.6 Exhaust emissions

The trucks used to transport various building materials from their sources to the project site will Contribute to increases in emissions of CO_2, NO_2 and fine particulate along the way as a result ofdiesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts. Because large quantities of building materials are required, some of which are sourced outside Junda, such emissions can be enormous and may affect a wider geographical area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of the frequent running of vehicle engines, frequent vehicle turning, and slow vehicle movement in the loading and offloading areas.

Mitigation

- Proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road
- In addition, truck drivers will be sensitized to avoid unnecessary racing of vehicle engines at loading/offloading areas, and to switch off vehicle engines at these points.

8.5.7 Disposal of spoil

Project construction will involve earthworks and excavation. This will result in the generation of some spoil materials. However, there will be little carting away from excavated material. The soils may affect the surrounding environment if not adequately disposed of.

Mitigation

- Maximize the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created
- Properly dispose of the spoil in the areas identified by the design team and approved by the confirmed landowners
- Care should be taken to avoid spoil location in a land that could otherwise be used for productive purposes.

8.5.8 Increased Waste Generation

Waste generated during the project construction phase shall include scrap metal and plastic, steel offcuts, wood and wood pallets, waste tyres and oil filters, cardboard and timber offcuts, strapping rolls and cables, plastic and polystyrene packaging, broken concrete blocks, small quantities of hazardous wastes (e.g. Used waste oils, solvents, paints) and sewage from the workforce.

Potential risks associated with generating, storing, handling, transporting, treating and disposing of these wastes include:

- Environmental and health impacts associated with ***on-site burning of site waste which is prohibited;***
- Inappropriate transport and disposal of waste (i.e. not compliant with NEMA Waste Management Regulations);
- Poor housekeeping on site causing accumulation of waste materials leading to the risk of ground/water pollution
- Environmental impacts on site associated with poor handling and storage of wastes on site (for example dust, used oil percolation on the ground surface and effluent water pollution);
- Impacts to workers' health and safety associated with handling and storage of wastes, particularly hazardous wastes e.g. used oil;
- Impacts associated with poor use of resources (for example broken concrete blocks from construction activities;
- Impacts on local people associated with increased traffic to transport waste and Environmental/health and safety impacts should waste be dumped in transit.

(*Comprehensive waste management plan for both construction and operation has been discussed in Chapter IV of this study report)*

8.5.9 Vegetation loss and soil erosion

The construction of the proposed project will involve clearing of vegetation and excavation works associated with this project may lead to increased soil erosion at the project site and release of sediments into the drainage systems. Uncontrolled soil erosion can have adverse effects on any local water bodies.

Mitigation

- The contractor will put in place measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include silt traps, barriers, vegetation planting, terracing and leveling the project site to reduce run-off velocity and increase infiltration of rainwater into the soil.
- The Contractor will ensure proper demarcation of the project area to be affected by the construction works
- Strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works
- Retention of trees and shrubs, where possible on the potential sites for the screening of the visual impact
- Where the proposed route requires the removal of any vegetation, care will be taken to minimize the destruction or damage of trees.
- Landscaping should be undertaken after the construction phase. Landscaping improves the aesthetics and the microclimate of a place.The contractor is thus required to implement a comprehensive re-vegetation and landscaping programme where works are complete.

8.5.10 Accidental Spills and Leakages

The principal chemicals held on the site during the construction site are likely to be vehicle fuel and paints. Spillage or escape of such compounds is likely to have an immediate impact upon the local water resources and consequently on the terrestrial and aquatic flora and fauna.

Mitigation

- Maintain vehicles and machinery as per manufacturers specifications
- Bunding and roofing of all chemical storage areas to prevent underground percolation prevent rain ingress and arrest spill flows
- Sensitization of workers on proper chemical handling, storage and management as per the Material Safety Data Sheets (MSDS)
- Where underground fuel storage tanks shall be used, UST tightness tests to be carried out to confirm that the UST is not leaking diesel to soil and groundwater.

- Track all diesel and chemical utilization

8.5.11 Increased water demand

The construction activities will require large quantities of water that will be supplied from the Mombasa Water and Sewerage Company and on-site sunk borehole. Water will mainly be used for concrete mixing, dust suppression and sanitary and washing purposes. Excessive water use may negatively impact on the water source and its sustainability.

Mitigation

- The Proponent through the Contractor shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use
- Any water handling equipment, facility and systems shall be appropriate for the intended usage. Water used on the construction shall reflect the level of conservation achieved by the Contractors. Documentation of amounts of water used will therefore be mandatory.

8.5.12 Energy consumption

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The project will also use electricity supplied by Kenya Power & Lighting Company (KPLC) Ltd. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be a need to use electricity sparingly since the high consumption of electricity negatively impacts on these natural resources and their sustainability.

Mitigation

- The contractor shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used.
- Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts.
- Complementary to the above measures, the proponent shall monitor energy use during construction and set targets for the reduction of energy use.
- Energy consumption to be monitored, analyzed and all documentation kept.

8.5.13 Workplace accidents and hazards

Construction workers are likely to have injuries and hazards as the construction works unavoidably expose workers to occupational health and safety risks. The workers are also likely to be exposed to the risk of accidents and injuries resulting from accidental falls and injuriesfrom hand tools and construction equipment.

Mitigation

- To reduce the worker's accidents and hazards the Proponent will develop and commit the Contractors to Site Occupational Health and Safety Plan, rules and regulations as stipulatedin the Occupational Safety and Health Act, 2007;
- Safety Induction and training of all construction workers and all personnel accessing the construction area where they shall be advised of the dangers associated with construction work; details on-site access; emergency procedures; Safe Work Procedures (SWP); SHE management systems and procedures etc. All training records must be kept by the contractor.
- Hands-on Safety Leadership at all levels starting from the top; through the OSH committee; supervisors and all persons on site
- Enforcement of Permit to Work System for high-risk activities like work at heights
- Proper planning of high-risk activities such as work at heights- use of inspected scaffolds; workers training; use of safety harness etc
- Provision of adequate sanitary facilities to workers
- Train all workers on Safety Health and Environment (SHE) with the aim of improving awareness
- Trenches over 1.5 m deep or wherever soil conditions dictate should be shored and securedagainst accidental entry by workers and the public
- Install safety signage along with the work areas
- Where construction activities interfere with the movement of traffic, the site should be signedand controlled by trained flagmen/flag women and lit by night
- Provision of suitable personal protective equipment (PPE) and
- Medical surveillance of workers as required by OSHA 2007.

8.5.14 Extraction and use of construction materials

Construction materials that will be used in the construction such as hardcore, cement and rough stone will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and land.

Mitigation

- The Contractors will source construction materials such as sand and hardcore from registered and approved quarry and sand mining firms whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Ballastor aggregate will be sourced from Jaribuni Area and Cement from Bamburi and Mombasa cement.
- Reinforcement Steel shall be from Apex and Prime Steel. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated
- To reduce the negative impacts on the availability and sustainability of the materials, the Contractor will only order for what will be required through accurate budgeting and estimation of actual construction requirements.
- In addition to the above measures, the contractor shall consider the reuse of construction materials and the use of recycled materials. This will lead to a reduction in the number of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

8.5.15 Archaeological and other cultural properties

From the field studies, there is no known impact on archaeologically protected monuments and cultural properties in the proposed project areas. However, during construction works, some archaeological or cultural sites may be encountered and damaged. Where these are encountered, they should be avoided as much as possible.

Mitigation

The contractor should develop and implement a chance to find the procedure in case archaeological sites are found during the construction process. Such a procedure must incorporate liaison with the National Museum of Kenya**.**

8.5.16 Increase in HIV/AIDS prevalence and other STIs

As the project is going to bring in a significant population of new people in the project area it is focused that rates of new infections will increase. This is due to the fact that the contractors, traders and workers will have money to attract women from the project area in a bid to solicit for sex, thereby creating avenues for the spread of HIV/AIDS and other STIs. The most vulnerable members of the community are women as they don't have access to resources necessary for production and wealth creation, in this case land. This will further predispose them to sex pests and consequently HIV/AIDS.

Mitigation

- The Resident Engineer should ensure that prevention and management of STIs occurrences as a result of social interaction between immigrant workers and local populations is conducted through:
- Selecting appropriate locations away from the concentration of human settlements for construction camps;
- Education and sensitization of workers and the local communities on STIs including the provision of condoms to the project team and the public;
- The contractor has to institute HIV/AIDS awareness and prevention campaigns amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations as specified by the Resident Engineer, provision of condom dispensers and voluntary testing
- The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases
- Workers to be sensitized on the local cultures and beliefs to ensure there is harmony inthe project area.

8.5.17 Spread of communicable diseases and other infections

❖ **CORONA VIRUS**

Corona virus disease (covid-19) outbreak: rights, roles and responsibilities of workers, including key considerations for occupational safety and health

Corona viruses are a group of viruses belonging to the family of *Coronaviridae*, which infect both animals and humans. Human corona viruses can cause mild disease similar to a common cold, while others cause more severe disease (such as MERS - Middle East Respiratory Syndrome and SARS – Severe Acute Respiratory Syndrome). A new corona virus that previously has not been identified in humans emerged in Wuhan, China in December 2019.

Symptoms of COVID 19

The symptoms of COVID-19 range from mild to severe symptoms that need specialized management. The symptoms are;

- Uncomplicated Illness-runny nose, fever, cough, headache, sore throat
- Mild pneumonia- breathing difficulty, inflammation in the lungs
- Severe pneumonia
- Acute respiratory distress syndrome
- Septic Shock
- Kidney failure

Control of Corona Virus at the Site

During the construction phase, there is a risk of spread of communicable diseases such as

tuberculosis and pulmonary infections. Aspects of the physical environment that promote transmission of diseases include inadequate housing, disposal of wastes and ventilation which are likely to occur during the construction phase of the project. With the influx of people, there will be a likelihood of an increase in diseases such as typhoid, tuberculosis, diarrheal diseases, respiratory diseases, dysentery and cholera.

Mitigation measures against infectious diseases

- Provision of personal hygiene facilities in good condition with adequate water supply
- Ensure awareness raising on proper sanitation and personal hygiene to promote properhealth.
- The contractor to hire an onsite project nurse and a clinic set up to treat affected local andmigrant workers which will control the movement of disease vectors

Covid-19 Safety prevention measures to the workers at the construction site

- Consistently proper wearing of mask and sneezing on elbow or use a one-off tissue
- Provide Washing hands facilities with anti-bacterial soap or alcohol based sanitizer within the site and easily accessible
- Avoiding touching the face especially the eyes, nose and mouth
- Staying home when feeling unwell
- Making use of telemedicine
- Avoiding close contact with each other and instead ensuring a 1.5 meter distance from each other during construction
- Covering head and wearing aprone all the time

g) Providing information, instruction and training on occupational safety and health, including; Refresher training on infection prevention and control (IPC); and Use, putting on, taking off and disposal of personal protective equipment (PPE);

- Provide adequate IPC and PPE supplies (masks, gloves, goggles, gowns, hand sanitizer, soap and water, cleaning supplies)
- Familiarize personnel with technical updates on COVID-19 and provide appropriate tools to assess, triage.
- Advise workers on self-assessment, symptom reporting and staying home when ill;
- Maintain appropriate working hours with breaks;
- Consult with health workers on occupational safety and health aspects of their work and notify the labour inspectorate of cases of occupational diseases in the bakery;
- Not be required to return to a work situation where there is continuing or serious danger to life or health, until the employer has taken any necessary remedial action;
- Allow workers to exercise the right to remove themselves from a work situation that they have reasonable justification to believe presents an imminent and serious danger to their life or health. When a health worker exercises this right, they shall be protected from any undue consequences;
- Honour the right to compensation, rehabilitation and curative services if infected with COVID-19 following exposure in the workplace. This would be considered occupational exposure and resulting illness would be considered an occupational disease,

- Provide access to mental health and counseling resources; and
- Enable co-operation between management and workers and/or their representatives.

8.5.17 Growth of unplanned settlements

The influx of immigrant workers may lead to unplanned settlements as the workers compete for limited resources. This will strain local resources especially accommodation.

Mitigation

- The contractor should as much as practicable employ unskilled staff from the localpopulation so as to reduce the pressure on housing.
- The contractor shall be expected to provide proper housing for immigrant staff

8.6 Positive Impacts during Operation

Just as in the construction phase, there are positive impacts associated with the operation phase of the proposed project. These positive impacts are discussed below.

8.6.1 Creation of job opportunities

During the operation phase, there will be employment opportunities especially, for those whowill be employed in masses to work in the apartments construction,etc.

The internationally-recognized hotel school covering several floors of the tower shall equip the recruits with the relevant skills allowing the local community to take advantage of the available employment opportunities provided by the project. This will improve the living standards of these employees.

8.6.2 Creation of wealth

The proposed development will ultimately provide revenues to the exchequer and expand the wealth base for the nation as a whole. It will pump both liquefied and tied up wealth hence making the nation gain. It will also go a long way in cementing the value of the project area and its neighborhood as a whole. The residential component will provide for 180 high net worth families to move to this region, either permanently or during the holiday season and each of these families will bring with them more attention to local businesses and a further requirement for other local services

8.6.3 Increased Property Value

The proposed project shall consequently lead to an increase in property value within Junda Mishomoroni which will lead to the value of the land in the Area accelerate

8.6.4 Infrastructure Enhancement

The project shall result in improved public infrastructure and the water distribution by MOWASCO and the expansion of Kengelani Road.

8.7 Negative Impacts during Project Operation Phase

The following negative impacts are associated with the proposed project

8.7.1 Impact on Marine Life

New structures in the coastal areas have potential to cause fundamental changes in the marine habitat, both above and below the water surface. As a result, the proponent commissioned marine studies to be undertaken so as to avoid and where avoidance is not possible, mitigate any possible impacts on marine life

The proposed development does not offer direct access to the creek and will therefore not interfere much with nearby marine ecosystems like mangroves and coral reefs. Some of the impacts on marine life associated with Low cost Affordable housing and mitigations measures to be implemented are as below:

a) Above the water surface, seabird and migratory bird impacts are of greatest concern. Lighting and reflected light from glass (*the albedo effect*) and may end up following the source of light rather than the ocean during nest laying and nest hatching processes.

   Mitigation

   The project proponent is expected to use performance glass which reduces heat gain within the building and has comparatively lower reflectance. It is anticipated the low cost affordable cost affordable housing will use energy efficient light system to minimize harmful effect against the hatching Birds

b) Buildings consume energy at each stage of development from design and construction through operation and final demolition. The magnitude of energy use in this process can affect the flow of greenhouse gases to the atmosphere in many different ways over a period of time. Energy consumption for lighting, heating and cooling is significant. Tall buildings by their very nature can use twice as much energy as equivalent low buildings – to raise people, goods and water. Energy use and resultant emissions will have a significant impact on the environment.

Mitigation

The project MEP design incorporates 'green building' technology to enhance energy efficiency and reduce the ecological footprint of the building. Efforts will be made to reduce energy use associated with cooling, lifts, lighting and water heating.

To ensure efficient energy consumption, energy saving policies, technologies and management strategies in the overall project management scheme shall be included

There shall be continuous monitoring of energy use during the operation of the proposed project and set targets for efficient energy use

c) Harvesting of nearby resources required for construction (mangrove trees, coral blocks and sand) from the marine environment will also have devastating effects on marine ecosystems.

Mitigation

There shall be no harvesting of construction materials from the ocean or surrounding ecosystems so the project poses no threat in that regard.

d) Wastewater and sewage, solid wastes, and runoffs are all contaminants which end up in the marine environment, either directly or through rivers that discharge into the sea.

Mitigation

The project proponent will make use of Bioliff water treatment system which will sterilize all wastewater before either re-using it or discharging it. (*The elaborate treatment system is attached as an appendix).*

Solid waste and other auxiliary waste will be fully incorporated in the project design and operations to minimize the adverse effect on existing marine ecosystems in the short term and ensure there is no net ecosystem loss from the planned development.

e) Chemicals associated with large scale developments adversely affect the marine environment. This may include continuous leaching of chemical from antifouling agents,

leaks and spills, refrigerants and increased generation of plastics, micro plastics and fibres (*ubiquitous in everyday use*) these may cause adverse alteration in the ecosystem with concomitant side effects causing chemical alterations that may be poisonous for marine species. Higher amounts of nutrients arising from the discharge of wastewater or sewage can induce algal blooms, higher heavy metal concentration could have toxic effects on marine organisms, and in addition, there can be an increase in ocean acidity.

Mitigation

To mitigate this, the project proponent will make use of Bioliff water treatment system which will sterilize all wastewater before either re-using it or discharging it.The elaborate treatment system is attached as an annex.

f) The ocean is an acoustically diverse environment. Sounds and acoustics are vitally important in for marine animal, movement, communication, reproduction, orientation, and prey and predator sensing and interaction. Increased ambient noise from construction and eventual resulting population increase from people who will settle in the new property may adversely affect acoustically sensitive species like cetaceans. Studies suggest that marine mammals respond by moving away from an area where construction is taking place (Brandt *et al*. 2009).

Mitigation

- Engineering controls in project design to reduce noise
- All fittings shall be frequently serviced and maintained. Also all generators and heavy stationery equipment to be insulated or placed in enclosures to minimize ambient noise levels

g) Electromagnetic effects can arise in the case of power generation; during transmission of the produced electricity, the cables will emit low-frequency electromagnetic fields. The movement of water and organisms through the emitted magnetic field will then induce localized electric fields. If alternating current cables are used, the magnetic field associated with the cable has a rotational component, which also induces electric fields in the surrounding environment. This is likely to disorient marine species that use electroreception as a fundamental sensory mode (Boehlert & Gill, 2010)

Mitigation

Water is a good conductor of electricity and it’s where the marine life is situated. The project is located inland and not on the beach front

In addition, during electrical distribution the required buffer shall be maintained. The Proponent shall work closely with KPLC to ensure the electromagnetic effects are mitigated.

h) Land use change usually results in a textural change in coastal areas manifested in ways such as clearing of mangroves. Land conversion alters the interaction of the marine and coastal (immediate terrestrial) environment.Inter-tidal habitats (which are spawning areas and nurseries for fish) may be disturbed and lost. Furthermore, there is disruption of water circulation causing stagnant water, creation of garbage. Loss of mangrove habitats leads to disturbances in fish and shellfish populations that depend on this habitat for their survival, increase in beach erosion and exposure to extreme weather events. Land use change alters the quality and quantity of surface and groundwater. In addition, wastewater and sewage, solid wastes, and runoffs are all contaminants which end up in the marine environment, either directly or through rivers that discharge into the sea

Mitigation

The project is not located at any sensitive ecosystem and does not have direct access to the beach so the project poses no threat in that regard.

Efforts will be made to reduce and mitigate against invasive species either for landscaping or beautification, indigenous plants will be incorporated as much as possible.

There shall be no harvesting of construction materials from the ocean or surrounding ecosystems hence the project shall not interfere with the integrity of sensitive ecosystems such as mangroves and corals.

The project proponent has developed a comprehensive water management plan. In summary, potable water for consumption will be sourced mainly from Mombasa Water andSewerage Company Ltd (MOWASCO), a sunk borehole, a desalination plant and a rainwater harvesting system. The water management plan (*attached as an annex*) contains a detailed explanation of how all waste materials from this development will be handled in an environmentally safe manner.

The proposed foundation will be sitting on a pile averaging 100 meters deep and the piles will have minimum excavation. The major excavation will be about 20 meters deep from the ground level. On the wall of the embankment, the project proponent proposes to do grouting to prevent any contamination of groundwater. The grouting process will create an almost impervious curtain around the excavation.

8.7.2 Energy management

During project operation there shall be increased energy demand for lighting; HVAC, lifts andother fittings in the building. Efficient energy use should be a priority to avoid wastages

Mitigation

- To ensure efficient energy consumption, energy saving policies, technologies and management strategies in the overall project management scheme should be included
- It will be important to monitor energy use during the operation of the proposed project and set targets for efficient energy use
- Appropriate power transformers and accessories shall be installed in conjunction with the power distribution company
- Stand -by generators shall be installed and form part of the power supply system on site. These generators shall be soundproofed and kept in good running condition by regular checks and testing.
- Energy audits shall be carried out as required by Energy Regulatory Commission.

8.7.3 Water Management

The estimated daily water demand for the project during the operation phase is 300m^3which is higher than any other development in the area. Potable water for consumption will be sourced mainly from Mombasa Water and Sewerage Company Ltd (MOWASCO) where the management has confirmed by a letter (attached in the appendix section) that there is adequate supply to meet project demand.

However, due to the vital nature of reliable water supply to the development of this class and scale, there shall be site-generated using boreholes and containerized desalination plant. Efficient water management shall be prudent to reduce on natural resource utilization.

Mitigation

- Rainwater harvesting shall be undertaken to supplement the main water sources. Harvested rainwater is proposed to be filtered, treated and dosed, via the same desalination plant, used throughout the building
- Recycling of the clear water from Bioliff waste treatment plant for use in the ablutions (WC and urinals) and activities like gardening.
- Water utilization shall be monitored

8.7.4 Increased Traffic Congestion

The project is expected to lead to an increase in traffic congestion in Junda along Kengelani Road.

As a result, the project proponent commissioned a Traffic Impact Analysis to be conducted for proper traffic management. To improve on accessibility to the site and reduce on road congestion,Kengelani Road shall be rehabilitated and expanded providing adequate acceleration and deceleration lanes. This will be subject to a different ESIA study and appropriate authorization shall be sought from KURA. All the relevant requirements and conditions shall be adhered to.

8.7.5 Increased waste generation

The proposed development will result in increased solid and liquid waste generation. Comprehensive Solid Waste Management and Liquid Waste Strategies for this project are found in Section 4.2 and 4.3 of this report, respectively.

8.8 Impacts during the Decommissioning Phase

Decommissioning refers to the formal process of removing something from operational status. It requires time in order to properly deal with potential hazards and risks that may be encountered.

Should there be a need for eventual decommissioning of the project, in which case the construction would have to be demolished and land put to alternative use, the following would be the potential environmental impacts:

8.8.1 Positive Impacts

8.8.1.1 Ecological restoration

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to a better state than it was originally. This will include re-vegetation which will lead to the improved visual quality of the area.

8.8.1.2 Employment Opportunities

For demolition to take place properly and in good time, several people would need to be involved. As a result, several employment opportunities would be created for demolition staff during the decommissioning phase of the project.

8.8.2 Negative Impacts

8.8.2.1 Noise and Vibration

Demolition works would lead to significant deterioration of the environment within the project site and the surrounding area. This would be as a result of the noise and vibrations that would be experienced. In the case of demolition, all activities should be carried out during the day and the demolition staff should minimize noise and vibrations as much as possible.

8.8.2.2 Solid Waste Generation

Demolition of the buildings and related infrastructure would result in noticeable quantities of solid waste. The waste would contain the materials used in construction including concrete, metal, wood, glass, paint, adhesives, sealants and fasteners. Although demolition waste is generally considered less harmful to the environment since it is composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

All waste should be handled with care and a licensed company should be contracted for solid waste disposal. Re-use and recycling should be given priority before disposal.

8.8.2.3 Air pollution (Dust and exhaust emissions)

Large quantities of dust would be generated during demolition works. This would affect the demolition personnel as well as the neighbours.

Machinery and vehicles that would be used during decommissioning would emit exhaust fumes which would affect the ambient air quality. Demolition staff should wear protective clothes and masks during demolition to eliminate hazards and accidents at the site.

All mitigation measures referred to under the construction phase will be applicable during decommissioning. Furthermore the following shall be undertaken under the decommissioning phase.

i. Public consultation

The Proponent shall undertake a thorough consultation with stakeholders to among others establish the following:

- Determine the anticipated impacts and provide mitigation;
- Develop a decommissioning schedule; and
- Create awareness among stakeholders.

ii. Decommissioning closeout

The Proponent shall carry out all works based on the findings of the stakeholders' consultations. At the end of these works, the Proponent shall obtain Certificates of Completion from all the necessary authorities including NEMA.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Overview

This Environmental Impact Assessment Project Report complies with the requirements of the Environmental Management and Co-ordination Act (EMCA) of 1999 and takes into consideration the applicable local and international standards and best practices.As a requirement in EMCA, the report should provide for a detailed Environmental Management and Monitoring Plan (EMMP).

The EMP presented in this Chapter summarizes the key impact elements identified and the remedial measures, the actions to be taken by various parties and the monitoring activities. An indication of the time scale for implementation and cost involved is also provided. The EMP can be further expanded during implementation with documented procedures and guidelines for work practices so as to be as responsive to the situations that various Contract Parties will encounter. The Parties should formulate procedures and practices and maintain records as required by the Act (EMCA, 1999). The implementation of the EMP should be one within the provisions of the law and for the ultimate benefit of the stakeholders in the project area. The effectiveness of the EMP shall be monitored and assessed during spot checks, formal inspections and at the end of the project when an overall audit of the works shall be carried out.

Table 9-1: Environmental Social Management and Monitoring Plan for the Proposed Low cost Affordable Housing in Mlango Saba,Kisauni Sub-County

Impact/ Objective	Mitigation Measure	Responsibility	Time Frame	Means of verification/ Monitoring indicators	Approximate Cost
CONSTRUCTION PHASE					
Interference with the physical setting	• The design shall in no way propose to implement developments that will hinder drainage • The tower construction specifications shall adhere to all relevant permit conditions like MOWASCO,KURA,NEMA etc. • The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations • Restoration shall be undertaken to ensure that the original setting is as much as possible retained.	Contractor Project proponent	During design and construction phase	Valid site Inspections records	Project Design cost
Increased exploitation of Raw Materials	• Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered	Contractor	Monthly	Inventory records	Operational cost
	• Maximize sourcing of construction materials from suppliers who use environmentally friendly processes in their operations.	Contractor	Monthly	Procurement policy Suppliers verification documents	-
	• Ensure that damage or loss of construction materials at the construction sites are kept minimal through proper storage and	Contractor	Monthly	Valid site Inspection records	Operational cost

Impact/ Objective	Mitigation Measure	Responsibility	Time Frame	Means of verification/ Monitoring indicators	Approximate Cost
	monitored with records kept				
	• Re-use of excavated soil for landscaping • Utilize opportunities for donating recyclable/reusable or residual materials to local community groups, institutions and individual local residents or homeowners. • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste • Ensure that damaged or wasted construction materials will be recovered for refurbishing and use in other projects • Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of	Contractor	Throughout the construction phase	-	Operational Cost
Vegetation Loss and SoilErosion	• The Contractor will ensure proper demarcation of the project area to be affected by the construction works • Retention of trees and shrubs, where possible on the potential sites for the screening of the visual impact • Where the proposed route requires the removal of any vegetation, care will be taken to minimize the destruction or damage of trees.	Contractor	Before the start of operations	-	1,000,000
	Apply soil erosion control measures such as	Contractor	Monthly	Valid site inspection	900,000

Impact/ Objective	Mitigation Measure	Responsibility	Time Frame	Means of verification/ Monitoring indicators	Approximate Cost
	leveling of the project site to reduce run-off velocity and increase infiltration of storm waterinto the soil, e.g. silt traps, barriers, tree planting.			records	
	Strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works	Contractor	Throughout the project cycle	Valid site inspection records	600,000
	Replanting of destroyed trees in cleared areas where works are complete	Contractor	Throughout the project cycle	-	500,000
Impact on marine life	• Use of performance glass for cladding which reduces heat gain within the building and has comparatively lower reflectance • There shall be no harvesting of construction materials from the ocean or surrounding ecosystems • Use of Bioliff water treatment system which will sterilize all wastewater for treatment of sanitary waste before either re-using it or discharging it. • The water quality from the Bioliff system shall be continuously tested for both bacteriological and physical element, monitored and benchmarked against WHO water quality standards	Project proponent Contractor	During construction	- Water quality test for the Bioliff system	Project Design cost

Impact/ Objective	Mitigation Measure	Responsibility	Time Frame	Means of verification/ Monitoring indicators	Approximate Cost
	• Green building technology to enhance energy efficiency and reduce the ecological foot print of the building • Proper solid waste management to minimize the adverse effect on existing marine ecosystems in the short term and ensure there is no net ecosystem loss from the planned development. • Engineering controls in project design to reduce noise levels • Grouting to be undertaken to prevent any contamination of groundwater • Indigenous plants will be incorporated as much as possible to reduce and mitigate against invasive species either for landscaping or beautification				

Increased Traffic Congestion and Road Traffic Accidents	• Relevant authorities consulted to agree on specific routes for project traffic to prevent road congestion, improve accessibility and avoid any sensitive residential areas or unsuitable parts of the road network. • Clear signs, flagmen, and signals will be set up where necessary. Where temporary traffic signals are required, the details and locations of the signs shall be agreed to with the relevant authorities.	Project proponent Contractor	Before routing traffic	Traffic Management Plan	900,000
	• Diversions planned and communicated to the affected staff and communities as far in advance as practicable. • Any road closures will be properly sign-posted and flag men positions to guide road users • Speed limits will be established and enforced over all traffic routes.	Contractor	Before routing traffic	Traffic Management Plan	800,000
	• Supplier/heavy traffic flows will be timed, wherever practicable, to avoid periods of heavy traffic flow along main roads (e.g. morning and afternoon).	Contractor	Throughout Construction phase	-	-
	• Only licensed and competent drivers and operators shall be engaged by the contractor. In addition, all drivers shall be trained and evaluated in defensive and off-road vehicle operation.	Contractor	Throughout the construction phase	Valid drivers' and operators' licenses Training records No complaints from the community	600,000 annually
	• The vehicles of the contractor and his suppliers shall not exceed a speed of 40 km/h on gravel or earth roads on site and within 500m of the site.	Contractor	Throughout the construction phase	Contractor/ Suppliers agreements	-

Noise Generation	• Use of attenuated equipment • Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels. • Statutory inspection and certification of all mobile machinery and equipment	Contractor	At the beginning of the project Every 6 months	Machinery & Equipment inspection certificates Servicing and maintenance records	700,000
	• Restriction of construction activities to day time	Contractor	Throughout the construction phase	No complaints neighbours about loud noise	No additional cost
	• Sensitize construction drivers to avoid running of vehicle engines or hooting especially when passing through sensitive areas such as residential areas and schools	Contractor	Throughout the construction phase	No complaints from workers and neighbours about loud noise	-
	• Annual audiometric tests as required by OSHA 2007	Contractor	Annually	Audiometric reports	900,000 annually
	• Provision of appropriate PPE- ear muffs and ear plugs • Annual Medical examinations (audiometric tests) to be conducted on workers	Contractor	Throughout the construction phase	Workers medical examination reports PPE Registers	15,000,000 annually
Air and Dust Pollution	• Appropriate hoarding of the construction site • Installation of safety nets during construction.	Contractor	At the beginning of the project Throughout the construction phase	Minimal dust on site No complaints from neighbours	800,000
	• Dust suppression by watering on graded access routes each day to reduce dust generation by construction vehicles	Contractor	Throughout the construction phase	No complaints from workers and community	Operational cost
	• Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the road	Contractor	Throughout the construction phase	-	-
	• Erection of speed bumps at different areas	Contractor	Throughout the	No complaints from	

	and the access road leading to project site to reduce speed and emissions of dust		construction phase	workers and community	
	• drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas. Switch off or keep vehicle engines at these points	Contractor	Throughout the construction phase	Training records	Operational cost
	• Provision of fit for purpose personal protective equipment to all workers • Annual medical examination of workers/ medical surveillance program	Contractor	Throughout the construction phase	PPE registers Medical Examination records	600,000 annually
	• Control earthworks and minimal clearance of vegetation • The positioning of stockpiles to minimize the effect of wind • Dust sheets over the surface of stockpiled materials	Contractor	Throughout the construction phase	Site inspection records No complaints from neighbors on dust	-
	• Burning of waste on site shall be prohibited • Use of unleaded fuels	Contractor	Throughout the construction phase	-	-
Disposal of Spoil	• Maximize the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created • Properly dispose of the spoil in the areas identified by the design team and approved by the confirmed landowners • Care should be taken to avoid spoil location in a land that could otherwise be used for productive purposes.	Project Proponent Contractor	At the beginning of the project	-	900,000
Impact of waste management on environment health and safety	• Characterize waste types. • Undertake an environmental, health and safety risk assessment for each waste stream • Plan storage, handling, transport and treatment/disposal for each waste stream in line with good international industry	Contractor	Throughout the construction phase	Waste Inventory EHS assessment for waste streams Procurement policy	Operational cost

	practice • Design project to minimize waste and hazardousness of waste materials on site (e.g. substituting inputs which are less hazardous or which lead to lower waste volumes) • Procure goods to minimize waste (e.g. reduce packaging/select returnable packaging, procure lower hazard materials, select reusable materials) • Construct to minimize waste (e.g. require good inventory control to minimize wastage/breakage, limit off-specification materials, limit orders in excess of needs, employ good housekeeping to avoid hazardous/non- hazardous waste mixing)			Solid waste receptacles at the site	
	• Plan for and manage waste in accordance with waste hierarchy: give priority to avoidance and minimization of waste, followed by recovery, reuse and recycling. The least preferred option is disposal (landfill or incineration). • There shall be no burning of waste on site				Operational cost
Hazardous waste e.g. wasteoil	• Segregate hazardous from non-hazardous waste. Avoid mixing hazardous and non-hazardous waste to limit the total volume of hazardous waste • Use waste containers that are compatible with hazardous waste types and in line with national regulations and good practice. Containers to be sealed and kept in good condition • Label hazardous waste containers in accordance with national regulations and good practice	Contractor	Throughout the construction phase	Inspection records of waste storage facilities on site	800,000

	• Provide a dedicated hazardous waste storage area. Locate storage in a safe area with the limited change of exposure to hazards and accidents (e.g. away from main construction). Cover to prevent rain ingress (could lead to groundwater contamination) and wind (could lead to odor and dust). Seal area off and operate with limited access. Use safety signs to indicate hazard and restricted access. Design with sufficient capacity for anticipated types/volumes of waste. Separate containers to allow for inspection of leaks and spills. Restrict access to the hazardous waste storage area to those that have had training on the MSDS • Use a secondary containment system for liquid volumes greater than 220 liters, in line with national regulations and good international industry practice • Provide portable sanitary conveniences for the construction workers for control of sewage waste. A ratio of approximately 25 workers per chemical toilet should be used. Effluent will be treated as hazardous waste. • Provide information on characteristics of each hazardous waste type (using MSDS) and compatibility of wastes to staff /contractors handling waste • Provide personal protective equipment (PPE) suitable for handling each waste type, in line with waste characteristics • Use legitimate NEMA authorized waste carriers to transport hazardous waste. Engage waste carriers through a formal	Contractor	Throughout the construction phase	Availability of MSDS on site Visual inspection of the secondary containment system Provision of PPE and regular inspection thereof Review of waste carriers' legal authorization Review of waste facilities for licensing approval Incident report as applicable	

	Contract/procurement process. • Monitor and document waste until each load is safely disposed of • Arrange to treat/dispose of hazardous waste at licensed facilities that are properly designed and operated in line with national regulations and good international industry practice. • Report any spills to the regulator in line with regulations.				
Waste storage	• Use containers that are compatible with wastes • Food and perishable wastes to be sealed containers (bags, bins) to reduce odour and restrict access by vermin • Allow space between containers to allow inspection for leaks and spills. Containers to be kept on pallets to prevent contamination in the event of a spill • Store wastes away from direct sunlight, wind and rain • Use a secondary containment system for liquid volumes greater than 220 liters, in line with national regulations and good international industry practice	Contractor	Throughout the construction phase	Visual inspection and records of waste storage facilities Training Attendance register and content	1,000,000
Waste transportation	• Use legitimate, NEMA authorized waste carriers that operate in line with national regulations. Procure services of waste transporters through proper contracts • Select appropriate waste transport containers and ensure these are properly labelled and secured • Use covers on vehicles to prevent litter/dust	Contractor	Throughout Construction phase	Review of waste carriers' legal authorization Review of waste shipment documentation	Annually 600,000

	• Label vehicles with correct signage (e.g. in accordance with hazardous waste) • Ensure each waste shipment is accompanied by shipping paper (manifest) e.g. covering unique consignment number, date of collection, nature and quantity of waste, information on containment, producer of waste, details of a waste carrier, destination, waste producer representative (name)				
Accidental Spills & Chemical leakage	• Where underground fuel storage tanks shall be used, UST tightness tests to be carried out to confirm that the UST is not leaking diesel to soil and groundwater. • Track all diesel and chemicals utilization • Maintain vehicles and machinery as per manufacturers specifications • Bunding and roofing of all chemical storage areas to prevent underground contamination prevent rain ingress and arrest spill flows • Sensitization of workers on proper chemical handling, storage, and management as per the Material Safety Data Sheets (MSDS) • Oil water separators and grease traps should be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.	Contractor	Throughout the construction phase	UST Tightness tests Inventory records Site inspection records Availability of MSDS on site	
Increased Water Demand	• Install water-saving equipment in lavatories, such as low flow toilets • Sensitizing construction staff to avoid irresponsible water use • Rainwater harvesting and water storage	Contractor	Throughout the construction phase	Documentation of water consumption Rainwater harvesting structures	

	facilities • Regular maintenance of plumbing systems				
Increased Energy Demand	• Use of energy saving appliances/fittings • Sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used.	Contractor	Throughout the construction phase	Use of energy saving appliances Documentation of energy consumption	400,000
	• Energy consumption to be monitored, analyzed and all documentation kept • Regular comparison and monitoring of energy consumption with performance targets for the reduction of energy use • Stand -by generators shall be installed and form part of the power supply system on site. These generators shall be soundproofed and kept in good running condition by regular checks and testing • Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Contractor	Every 6 months	Track fuel (consumption) through inventory records	600,000
Increase in HIV/AIDS prevalence and other STIs	• Education and sensitization of workers and the local communities on STIs including the provision of condoms to the project team and the public • HIV/AIDS awareness and prevention campaigns amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations as specified by the Resident Engineer, provision of condom dispensers and voluntary testing • Ensure that staff are made aware of the risks of contracting or spreading sexually	Contractor	Throughout the construction phase	HIV/AIDS awareness board/ signs Condom dispensers on site	Approx. 300,000

	transmitted diseases • Workers to be sensitized on the local cultures and beliefs to ensure there is harmony in the project area.				
Hygiene and spread of communicable diseases	• Suitable, efficient, clean, well-lit and adequate gender specific sanitary conveniences should be provided for construction workers • Provision of adequate showering, cleaning and storage facilities for employees • Provide an adequate supply of wholesome drinking water which is easily accessible and all practicable measures are taken to prevent contamination. Quarterly drinking water tests(pH; coliform bacteria; residual chlorine) • Outlets displaying unsafe/untested drinking water should be conspicuously posted-WATER UNSAFE FOR DRINKING • Ensure awareness raising on proper sanitation and personal hygiene to promote proper health. • Onsite project nurse and a clinic set up to treat affected local and migrant workers which will control the movement of disease vectors • Daily housekeeping in all workstations • Proper maintenance of the sewerage system and piping • Provision of a clean eating area for employees away from chemicals & dust • Proper connection of wastewater and sewerage system to the treatment plant	Contractor Project Proponent	At the beginning of the contract during site set up Quarterly drinking water tests	Drinking water tests and analysis Food hygiene certificates for onsite food vendors Number of sanitation-related incidents	Approx 500,000 Approx 5,000 each drinking water test
Grievances	• Establish a specific mechanism for dealing	Contractor	Weekly	Number of grievances	To be discussed

	with stakeholder grievances. The process for grievance resolution shall be transparent, in harmony with the local culture and in the appropriate language and all grievance shall be documented and tracked through to resolution. • Analysis and review of all recorded grievances to determine whether same or similar grievances are being lodged	Project proponent		Analysis of community grievances	
Occupational Health and Safety Risks	• The hiring of Project EHS Manager • Develop, document and display prominently an appropriate SHE policy for construction works • To reduce the workers' accidents and hazards the Proponent will develop and commit the Contractors to Site Occupational Health and Safety rules and regulations as stipulated in the Occupational Safety and Health Act, 2007; • Safety induction and training for all workers and personnel on site • Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer and the workers are represented • Use of permit to work for all high-risk activities e.g. work at heights • Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction to comply with the prescribed safety and health standards and be appropriately	Contractor	At the beginning of the contract Throughout the construction phase	Number of workplace accidents Permit-to-work form for high-risk jobs Number of workers trained on safety 100 % use of appropriate PPE by workers A clean, organized workplace	EHS Manager salary-approx. 3,000,000 annually Operational costs

	installed maintained and safeguarded • Trenches over 1.5 m deep or wherever soil conditions dictate should be shored and secured against accidental entry by workers and the public • Where construction activities interfere with the movement of traffic, the site should be signed and controlled by trained flagmen/flag women and lit by night • Pinned signage all throughout the site on-site safety instructions and safe working procedures • Hand, knee and foot railings should be installed on stairs, fixed ladders, platforms, permanent and interim floor openings, loading bays, ramps, etc. • Provision of suitable personal protection equipment (PPE) (footwear, masks, protective clothing and goggles in appropriate areas), emergency eyewash and shower stations, ventilation systems, and sanitary facilities				
	• Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Directorate of Occupational Health and Safety Office (DOHSS) are in place	Project proponent Contractor	Weekly	Number of accidents reports	Operational costs
	• Ensure that the premises/works are insured as per statutory requirements (third party and workman's compensation)	Project proponent Contractor	Annually	Insurance cover for construction workers	1,500,000 annually
Machinery Safety	• Only Licensed and competent operators	Contractor	At the beginning	Valid Operators'	1,000,000

	involved in machinery operations • All moving parts of machinery should be adequately guarded • Shut down of machinery during maintenance • Reports of safety examinations must be presented in prescribed forms, signed by the examiner and attached to the general register • Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations		of the project Throughout the construction phase	licenses Machinery records	
Fire Hazards and accidents	• Develop Fire Safety Policy outlining evacuation procedures, provision for maintenance and servicing of appliances, training of workers, assignment of responsibilities, planning and organization of fire drills and identification of fire assembly points. • Provision of fit for purpose firefighting and fire detection facilities that are easily accessible • Frequent Servicing of firefighting equipment by a reputable service provider • Appoint and train Fire Marshals • Fire safety awareness training for all employees and annual fire drills	Contractor	Throughout the construction phase	Fire safety policy Firefighting equipment inspection certificates and reports Fire drill Report and evacuations register. Fire marshals training certificates Presence of clearly marked warning signs and evacuation procedures	EHS Manager salary 3000,000 annually Operational Cost (1,000,000)

	• Secure all gas cylinders • Gas cylinders should NEVER BE STORED IN CONFINED SPACE • Provision of fire-resistant cabinets at fueling stations for storage of fuels and flammable. All cabinets labeled HIGHLY FLAMMABLE either in Swahili or English.				
Emergencies	• Design suitable documented Emergency Preparedness and ResponsePlan (EPRP) for all project emergencies- accidents; fire; spills; structural collapse etc • All employees and personnel on site to beoriented on all emergency response and evacuation procedures • All emergency and evacuation proceduresmust be tested at least bi-annually and at regular intervals e.g. fire drills • Ensure that adequate provisions are in place to immediately stop any operations where there is an imminent and serious danger to health and safety and to evacuate workers • Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site • Provide measures to deal with emergencies and accidents including	Contractor	At the beginning of the project Throughout the construction phase	Fire drills and evacuation reports Training register Emergency contacts & evacuation procedures prominently pinned on site First aid station and first aid facilities	EHS Manager salary 3000,000 annually

	adequate first aid arrangements • Engage a full-time resident nurse on site • Sensitize the public on potential				

	emergency situations • Fit for purpose fire-fighting equipment such should be provided at strategic locations such as stores and construction areas. • Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained • Appointment of First Aiders. Minimum 1:50 employees, who shall undergo training by a recognized body. • Training of all emergency response personnel				
Security	• Ensure that the site is always guarded by a reputable security firm • Constant site patrol • Collaboration with existing security machinery • Partnership with neighbours and police in community policing	Contractor Project proponent	24-hours a day throughout the project cycle	Zero cases of burglary or vandalism at the site	100,000 each month
Capacity building	• Provide a forum for human resources development on environmental conservation • Establish a schedule for continuous improvement of human capacity • Develop in-house guidelines on environment, health and safety Management.	Contractor Project proponent	Throughout the project	-	Operational cost
Archeological and other cultural properties	• The contractor should develop and Implement a chance to find the procedure in case archaeological sites are found during the construction process. Such a procedure must incorporate liaison with the National Museum of Kenya.	Contractor/National Museums of Kenya/ Project proponent	Throughout the project	-	No additional cost

Public health and safety	• Proper handling and disposal of solid waste • Operation of noisy machinery at daytimeonly • Control of visitors to the site • Traffic control	Contractor	Throughout the project	No complaints from the community Number of Road Traffic Accidents (RTA)	Operational Costs
Immigration and settlement	• Workers should be sensitized on the localcultures and beliefs to ensure there is harmony in the project area.	Contractor	Throughout the project	-	-
Growth of unplanned settlements	• The contractor should as much as Practicable employ unskilled staff from thelocal population so as to reduce the pressure on housing.	Contractor	At the beginning and throughout the project construction phase	-	-

Operational Phase ESMMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of the project are outlined below.

Table 9-1: ESMMP for Project Operational Phase

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
Impact on marine life	• Use of performance glass which reduces heat gain within the building and has comparatively lower reflectance • Use of Bioliff water treatment system which will sterilize all wastewater before either re-using it or dischargingit • The water quality from the Bioliff system shall be continuously tested for both bacteriological and physical element, monitored and benchmarked against WHO water quality standards • Green building technology to enhance energy efficiency and reduce on the ecological foot print • Indigenous plants will be incorporated as much as possible to reduce and mitigate against invasive species either for landscaping or beautification,	Project Proponent	-	Project design cost
Increased energy consumption	• Formulation and enforcement of energy saving policies, technologies and management strategies in the overall project management scheme should be included	Project Proponent	Energy consumption records	-

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
	• Monitor energy use during the operation of the proposed project and set targets for efficient energy use • Regular comparison and monitoring of energy consumption with performance targets to identify where action should be taken to reduce energy • Promptly repair distribution system leaks • Appropriate power transformers and accessories shall be installed in conjunction with the power distribution company • Stand -by generators shall be installed and form part of the power supply system on site. These generators shall be soundproofed and kept in good running condition by regular checks andtesting		Energy audit reports	
	• Undertake Energy Audits as required by ERC	Project Proponent	Every three years	Approx 450,000

Increased water consumption	• Install self-closing taps, automatic shut- off valves, spray nozzles, pressure reducing valves, and water conserving fixtures (e.g. low flow shower heads, faucets, toilets, urinals; and spring-loaded or censored faucets) • Install water-saving equipment in lavatories, such as low flow toilet • Frequent maintenance of plumbing systems • Rainwater harvesting	Project Proponent	During project fittings and throughout the operational phase	Project design cost

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
	• Recycling of the clear water from Bioliff waste treatment plant for use in the ablutions (WC and urinals) and activities like gardening.			
Increased	• Kengelani Road shall be rehabilitated providing adequate acceleration and deceleration lanes • Authorization from KURA has already been obtained (attached in annex section)	Project Proponent	No complaints from the community	-
Increased	• Grease traps to be used in drain pipes to separate the fat, oil and grease from the wastewater and the grease retained in the traps to be collected by a licensed waste oil collector at regular intervals. • The grease traps shall be frequently serviced and maintained and written records of maintenance kept • Engage waste carriers through a formal contract/procurement process • All waste transfer records shall be maintained • Waste management training of all employees working in the low cost affordable cost • Use of waste containers that are compatible with hazardous waste types and in line with national regulations and good practice. Containers to be sealed and kept in good condition	Project proponent	Waste registers Annual Environmental audits Grease traps maintenance records Permit documents for the licensed waste handlers	

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
	• Maintain all waste transfer log (the type of materials, physical state solid/liquid/gas, quantity, date dispatched, date received, any repacking, treatment/disposal details)			
Organic kitchen waste	• The proponent shall acquire waste trucks which shall be registered with NEMA for waste transportation. • Use covers on vehicles to prevent litter • Label vehicles with correct signage (e.g. in accordance with waste) • Residents to make work easier by disposing their house hold waste into waste collection bay on the ground floor • Separate waste as organic, inorganic for easier disposal • Annual Environmental audits as required by EIA/EA regulations	Project proponent	All permits necessary and licenses required for composting and recycling shall be obtained. Waste transportation licenses Annual Environment audits	
Liquid Waste/ Effluent	• All wastewater- both black and grey shall be channeled to a fully automated wastewater treatment plant using the Bioliff system • The final product of Bioliff wastewater treatment is clear and odorless water that is sterilized to	Project proponent	Annual environmental audits Water quality tests from Bioliff treatment	Project design cost

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
	make sure there are no pathogens and which shall be recycled for use in the ablutions (WC and urinals) only and activities like gardening. • Continuous water quality testing of the end product of the Bioliff system which shall be monitored against WHO water quality standards		plant	
General waste	• Use of recyclable glass bottles as opposed to plastic. • Plans are underway to have a private dumpsite and waste recycling center • Ensure that contractors handling, treating and disposing of waste are reputable and legitimate enterprises, licensed by NEMA and following good international industry practice • Undertake INTERNAL audits of waste segregation, tracking waste, characterization and disposal methods. • Maintain completed waste transfer log (the type of materials, physical state solid/liquid/gas, quantity, date dispatched, date received, any repacking, treatment/disposal details);	Project proponent	Annual Environmental and waste audits Waste transfer logs	400,000
Emergency preparedness	• Develop a comprehensive Emergency Response Plan for the tower • A state-of-the-art automatic addressable fire detection system shall be provided with an annunciator panel located in the Control Room. • 100% building coverage via smoke and heat detectors with appropriately located sounders and manual call	Project proponent	Fire inspection records Pinned evacuation procedures and emergency contacts on all floors of the building	Project design cost

Objective/Plan	Recommended Mitigation Measures	Responsibility	Monitoring mechanism	Cost (Kshs)
	points. The system shall interface with other firefighting systems and door holders/closets for smoke control. • A digitalized public address system with pre-recorded evacuation warning messages. The system will also be integrated with the building's communication systems including security, life safety, and monitoring and control systems. • Posting of all emergency contacts and evacuation procedures in all floors of the building • The building system shall be able to initiate the shutdown of the air conditioning and mechanical ventilation in the event of a fire. • All emergency and evacuation procedures must be tested at least annually and e.g. fire drills • Installation of fit for purpose fire protection services- horse reels; extinguishers, sprinkler systems, wet risers and automatic Gaseous fire suppression system • Frequent servicing of all fire detection and firefighting equipment by a reputable company			

Decommissioning Phase

This is an important phase in a project cycle which comes when the lifespan of a project has come to an end. If by any unforeseen circumstances the operation of the proposed Low cost affordable houses 1,001 in total with 9 Shops, the removal of facilities and structures will entail demolition of buildings, slabs, foundations and other structures within the built area and proper disposal and/or re-use of demolition materials followed by backfilling, grading, and re-vegetation of the site All underground storage tanks and any facility containing hazardous liquid shall be located and removed. Disposal of such materials shall be governed by the national regulatory requirements. The following should be undertaken to restore the aesthetic value of the environment.

- The proponent to employ integrated solid and liquid waste management system.
- The proponent together with the county government will select disposal locations based on properties of particular wastes generated.
- Removal, recycling, re-use or selling of scrap materials
- All disposals should be done according to legal requirements.
- Re-vegetation of the site to restore the aesthetic value of the environment.
- Proper erosion control measures during re-vegetation
- Proper monitoring and inspection of the site for indications of erosion
- Fencing and signs restricting access to Minimize disturbance.
- Ensure the safety of workers
- Offer advice and counseling to employees on other livelihood opportunities
- Assist with re-employment and job-seeking of the involved workforce
- Compensation and suitably recommend the project workers in seeking employment opportunities elsewhere.

Below is a summary table with the necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project

Table 9-2: ESMMP for the Decommissioning Phase

.Objective: To make the place occupied by the proposed project equivalent or better than its original condition

Environmental Impact	Mitigation measures	Responsibility	Time-frame	Cost (Kshs)
Solid waste management	• All removed materials that will not be used for other purposes must be removed and recycled/reused as far as possible • Where recycling/reuse • materials and other demolition waste is not possible, the materials should • licensed waste disposal site or arrangement made with Mombasa County • Donate reusable demolition waste • Ensure NO oil spillage occurs during equipment removal and ensure the use of serviceable machinery	Contractor	One-off	
Degeneration of vegetation atthe construction site	• Implement an appropriate programme to restore the site to a better status • Consider the use of indigenous plant species in re-vegetation • Trees should be planted at suitable locations so as interrupt slight planting), between the adjacent residential area and the development.	Contractor	One-off	

10 AUXILLIARY INFORMATION

10.1 Monitoring Guidelines

Monitoring will be conducted by the Supervising Engineer, with Contractor responsible for regular reporting (as indicated in ESMMP). Continuous observations and assessment is essential so that if unforeseen safety dangers are noticed, alternatives must be sought for. Risk assessment of accidents and other adverse impacts should not be ignored in the construction plan. Waste management in the construction should be strictly followed including proper off-site disposal using legitimate waste handlers. Safety standards should constantly be maintained, with indicators like the condition of equipment, contractor compliance with the set regulations, and tracking of accidents on-site logged regularly as required by the Directorate of Occupational Health & Safety Services, DOHSS under the Kenyan Ministry of Labor & Social Services.

10.2 Reporting

Constant reporting by the site contractor to the proponent is necessary to ensure the project is executed as per the plans and drawings. Such reporting should be submitted to the client on a regular basis (as defined in ESMMP). The project safety manager should always remain on site to report any safety concerns for urgent mitigation.

The officer should also at all times enforce safety requirements as per the relevant legislation. The contractor must consult the proponent to maintain a clear understanding of all the aspects of the project. All project licenses and permits should be adhered to and the relevant authorities involved in the project where required to increase acceptance and ensure the necessary partnership is in place.

11 HEALTH, SAFETY, AND ACCIDENT PREVENTION ACTION PLAN

In order to ensure public health and safety, and to prevent accidents or emergency situations at construction, operation or decommissioning phases, the following action plan shall be incorporated in the project cycle.

Table 11-1: Health, Safety, and Accident Prevention Action Plan

Issue	Specific measures	Responsibility	Timing
Project design	• Incorporation of environmental, health and safety measures in project design	• Project architect • Structural and civil engineers	Design stage
Site organization and cleanliness	• Site inspections • Proper site planning with clear access and egress routes • Keep construction materials in the correct place • Maintain cleanliness at the site at all stages of the project cycle	• Construction company • Proponent	All stages of the project cycle
Fire safety	• Fire safety awareness and fire marshals training • Installations of fit for purpose firefighting facilities at the site • Safe handling of fire • No burning of waste at the site	• Construction company • Proponent	All stages of the project cycle

Issue	**Specific measures**	**Responsibility**	**Timing**
Accident prevention	• Hiring competent personnel for the different tasks • Implementation of Permit to Work (PTW) for all hire risk activities like work at heights, confined spaces • Safe handling of tools and machinery • Use of appropriate personal protection equipment • Controlling visitor entry onto the site • Safety training and implementation of toolbox talks	• Construction company • Proponent • Visitors • Security company	Construction stage
Waste disposal	• Provision of adequate waste disposal facilities at the site • Engagement of a licensed waste disposal company • Separation, reuse, and recycling of certain waste materials • Proper maintenance and connection of waste water system/drainage system to ensure that there are no leakages • Waste management training	• Construction company • The contracted Waste disposal company • Proponents	All stages of the project cycle
Tools and machinery safety	• Only licensed and competent personnel authorized to operate machinery • Use of tools and machines for the designated job • Regular servicing of machinery and inspection of all tools • Proper storage and handling of tools	• Construction company	Construction stage

Issue	**Specific measures**	**Responsibility**	**Timing**
Emergency preparedness	• Keeping passages clear • Marking emergency exits • Training personnel in emergency preparedness and response • Keeping a well-equipped first aid kit on site • First aid facilities provided	• Construction company • Proponent	All stages of the project cycle
Insurance	• Insurance for all workers at the construction site	• Construction company	Construction stage
Site security	• 24-hour security at the site • Control of visitor entry onto the site	• Construction company • Security company	Construction and operation stage

RECOMMENDATIONSAND CONCLUSION

A major recommendation measure is a need for the contractor to submit (prior to the commencement of the project) to the proponent, comprehensive stand alone:

- Waste (solid and liquid) Management Plan;
- Emergency Preparedness and Response Plan;
- Occupational Health and Safety Plan and
- Stakeholders' engagement plan

The proponent and the contractor will also be required to develop and implement internal environmental and social policies and plans, including setting up of relevant institutional frameworks to oversee their fruition.

In addition to the ESIA study, the proponent is required to meet the following:

- Regular Environmental Monitoring and Evaluation during the construction phase;
- An annual Environmental Audit (after year in operation of the proposed project);
- Fire audit, risk assessment and safety and health audit has to be conducted for the site at least once every year
- Undertake EIA/ESIA for all ancillary sites.

This Environmental and Social Impact Assessment report identifies the environmental and social issues that are likely to be significant (scoping) and thereafter their assessment in detail. In the screening and scoping process it has been determined that the project meets a threshold requirement of a finding of significant impacts under established environmental examination procedures, and as stipulated under EMCA (1999) and (Amendment) 2015 and the EIA regulations (2003). However, noting that the project impacts can be mitigated, the study recommends that the project be licensed but with conditions to implement the ESMMP.

LIST OF ASSESSMENT EXPERTS

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Patron	Mr Salim	0722998290
Electrical and Mechanical Engineers	Prime Consultancies Ltd	

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APPENDICES

Appendix 1: The Terms of Reference (TOR) of the ESIA Study

Appendix 2: Bioliff wastewater treatment system

Appendix 8: Sample questionnaires filled in by the public

Appendix 9: Minutes of the Public Meeting Held

Appendix 10: List of Attendants;

Appendix 15: Experts Licence

Appendix 16: Sample Chance find Procedure

Appendix 17: Building Plans and Architectural Drawings