ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED CONSTRUCTION OF THE PROPOSED DECENTRALISED SEWAGE TREATMENT FACILITY AT MOKOWE

REPORT SUBMITTED

TO

NATIONAL ENVIRONMENTAL MANAGEMENT AUTHORITY

(NEMA)

CONDUCTED JULY 2021

PROPONENT:

LAWASCO

LEAD EXPERT

PETRONILLA GATWIRI

NEMA REG NO.6680

CERTIFICATION

The preparation of this Environmental Impact Assessment (EIA)study report was done in accordance to the guidelines as outlined in the legal notice 101 of EMCA Cap 387 for submission to NEMA.

I, the undersigned certify that, to the best of my knowledge and according to the information provided by the proponent that this Environmental Impact Assessment Report on the proposed construction and rehabilitation of facilities at the Mokowe decentralised sewage waste treatment plant ,at GPS. -2.231285,40.861260, for Mokowe town, reflects the actual situation on the ground and recommends the best possible environmentally friendly options for implementation of a sustainable environment and sound occupational health and safety.

Signature of Experts in the EIA Study

Name	NEMA LICENCE	SIGNATURE
Samuel Muhuri Njoroge	ASSOCIATE EXPERT 8248	_____
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Phillip Wafula	ASSOCIATE EXPERT 10449	_____
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COUNTERSIGNED BY THE PROPONENT

Name: _____

Signature: _____

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FOR LAWASCO

ACKNOWLEDGEMENT

The consultant wishes to express sincere gratitude to a number of people for their invaluable support, without which it will not have succeeded. Many thanks indeed go to the local residents of Mokowe, in Lamu Municipality who were interviewed in the neighbourhood for their sincere responses.

It is through such honest responses that the project impacts were not only identified but also properly mitigated for with the aim of ensuring sustainability.

The support from the staff at the site cannot be underestimated.

To the many others who played any role however little it was towards the successful writing of this report, thanks a lot.

EXECUTIVE SUMMARY

This Environmental impact assessment was carried out from July of 2021. This report presents the outcome of EIA for the proposed construction and rehabilitation of facilities at the Mokowe decentralised sewage waste treatment plant at GPS - 2.231285,40.861260 for Mokowe town .

Background

Water Trust Fund funded 300 pit latrines for Mokowe. The project was implemented by LAWASCO. The project opened LAWASCO to another need; a sewage disposal facility. The population of Mokowe town is growing rapidly especially with the opening of the Lamu port.This means that the current problem of pit latrines filling up more frequently than before will be felt more frequently. Therefore Mokowe town needs a sustainable sewage disposal facility.

The Project Overview

The aim of the proposed construction and rehabilitation of facilities at the Mokowe sewage waste treatment decentralised plant is to provide a decentralised sewage treatment plant for Mokowe town.

It's also in line with the Kenya Environmental Sanitation and Hygiene policy 2016-2030 which lays down the strategies to achieve good sanitation. According to the Policy Strategy No. 1, scaling up access to improved rural and urban sanitation states that :Sewage treatment technologies with greater emphasis on resource recovery and recycling shall be given high priority in improving urban sanitation. Emphasis shall be placed on less energy intensive technologies such as wetland construction, oxidation ditches, extended aeration, and stabilisation ponds. In addition, multiple technology options including decentralised wastewater option shall be considered.

The legal, policy and institutional framework discussed in this report will guide on efficient delivery of sanitary waste disposal to beneficiaries and sustainability of the sanitary waste disposal system by referring to appropriate policies, laws and regulations.

LAWASCO is certified by WASREB whose mandate is to oversee the implementation of policies and strategies relating to provision of water and sewerage services.

The Objectives of the EIA will be:

(i) to identify, predict and evaluate the economic, environmental and social impact of development activities

(ii) to provide information on the environmental consequences for decision making and

(iii) to promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

Project Description

The proposed project will involve the following activities;

- ✓ Construction of a septic tank
- ✓ Rehabilitation of existing Lagoons,
- ✓ Space for trucks to siphon waste to septic tank
- ✓ Parking bay for tracks

The management has started taking measures to comply with and will observe the following laws, regulations and policies;

- LAWASCO is currently working on getting certification by WASREP
- Has acquired business registration
- Has Pin certificate for Tax compliance
- Regular enforcement on the use of PPE and active participation on Health & Safety to ensure smart work and performance;
- Provision of PPE to the staff; gloves, overall;
- Disposal of hazardous waste (The collector will be a licensed hazardous waste dealer charged with waste collection and disposal at the decentralized plant)
- The management staff will have skills in first aid and a first aid kit will be present
- The Management will regularly inspect pipes, the septic tank, the lagoons and trucks carrying sewage to the lagoons to ensure that no leakage onto land or contamination into living environments.

- The management will be enforcing good customer relations and working practices;

Methodology

Different approaches and methods were employed to identify the anticipated health, biochemical ,physical, psychological , socio-economic and cultural effects/impacts of the proposed operations on the natural environment, the stakeholders, neighboring communities and employees and the area in general.
Personal observations of the site, the facility and its environs were employed to identify the anticipated effects/impact, any potential environmental and health risks and relevant information regarding the proposed operations .
Interviews with the stakeholders, neighboring communities and employees were employed to obtain information on anticipated environmental issues.
An Environmental Management and Monitoring Plan (EMMP) was developed to guide the operations. This monitoring plan was developed after the observation, review of secondary and primary data and the assessment of the facility and anticipated operations to ensure adherence to regulatory standards.
The proposed design allows for proper functioning of the decentralised sewage disposal system.
Kenya has a policy, legal and administrative framework for environmental management. Under the frame work, the National Environment Management Authority (NEMA) is responsible for ensuring that environmental impact assessments (EIA's) are carried out for new projects and environmental audits on existing facilities as per the Environmental Management and Coordination Act Cap 387. These guidelines are generally known as the Performance Standards and the Environmental Health and Safety (EHS) guidelines. The key objective of the Kenyan policies is to ensure protection of environment, Community and Occupational Health and Safety.
The aim of the Kenyan environmental policy is to ensure that projects are developed in manner that is socially responsible and reflect sound environmental practices. Therefore the risks and impacts to the environment and communities within the project area must be avoided and if avoidance is not possible, mitigation measures must be developed.

Public Consultation of the project is a requirement for an environmental assessment process. The aims of public consultation are disclosure of planned activities of the proposed project and impacts identified through the Environmental Impact Assessment; identification of concerns and grievances from interested and affected people; harnessing of local expertise, needs and knowledge from interested and affected people and response to grievances and enquiries of affected people.
The proposed construction and rehabilitation of the decentralised sewage treatment project will increase individual income of employees and contractors as well as increasing government revenue. However, negative environmental impacts anticipated include; pollution and occupational health hazards such as fire hazards, injuries.

Conclusion

From the findings of this environmental impact assessment, this facility needs to implement the following mitigation measures;

- ✓ Construct a pavement and drainage on the tipping area and machinery/tools' maintenance area.
- ✓ Sprinkle the ground with water each day before carrying out earthwork
- ✓ Observe normal working hours.Avoid work at night hours
- ✓ Ensure that workers are paid on time as agreed in the contract
- ✓ Use the community committee in solving conflicts arising involving the community members
- ✓ Observe food safety for provision of food for workers. Food vendors should be certified by public health office
- ✓ Design a system of addressing worker grievances or adopt the one in chapter eight of this report.
- ✓ Housekeeping:Collect waste in form of rubble in one place to prevent falls or injuries;ensure waste separation for reuse, recycling and composting. Provide metallic coded waste bins.
- ✓ Avail basic training on health and safety at worker's camp and the workplace
- ✓ Use signage for warning
- ✓ Regular inspection/servicing of the sewage waste treatment lagoons, septic tank,sewage ferrying trucks/ honey suckers

- ✓ Monitoring of operations annually through an environmental audit.
- ✓ The proponent should erect shielding sheets and signs should be put to indicate the activity being carried out and the hazards present that is, it will limit debris, building stones and other building material from causing harm to people outside the building.
- ✓ Undertake and improve the already existing landscaping in order to restore destroyed areas, conserve soil and safeguard the ecosystem
- ✓ Mechanical service works to the machines should be done away from the project area to mitigate against leakage. Vehicles having oil leaks should not be allowed in the project area. The area used for servicing or maintenance of machinery should be paved with concrete and a drainage and a soakpit created to dispose and treat the liquid waste
- ✓ The machinery and vehicles to be used should be frequently maintained so as to reduce noise and leakage.
- ✓ Switch off engines when not in use to conserve energy
- ✓ Ensure use of appropriate machinery by qualified personnel
- ✓ Reduce noise by; switching off engine when not in use, use ear plugs, fencing with sound proof material,fitting machines with silencers,
- ✓ Workers should be provided with protective gears such as earplugs, earmuffs, dust masks, helmets, gloves and boots
- ✓ Keep health records of workers, update regularly, provide health cover and notify DOSH in event of an accident as in OSHA 2007 regulations
- ✓ Practise waste segregation to facilitate re-use and to allow for treatment of hazardous waste
- ✓ Provide adequate sanitation
- ✓ Create an internal environmental and safety audit committee to sustain good practices
- ✓ Ensure billing for facility maintenance
- ✓ Carry out regular inspection of machines. Keep records
- ✓ Collect and apply IKS in communtiy activities associated with the plant

- ✓ Enhance the environment through community campaigns and rehabilitation of sensitive ecosystems such as the mangrove ecosystem and conservation of water catchment areas
- ✓ Sensitise the community and workers on issues surrounding HIV/AIDS and Covid 19 with the aim of prevention
- ✓ Rehabilitate land/landscape

Conclusion

Since the client has consented to abide by the set guidelines and the developed Environmental Management and Monitoring Plan (EMMP) in accordance with the statutory requirements (EMCA 387), the EIA consultancy team requests NEMA to issue the relevant license.

ABBREVIATIONS

EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
NEMA	National Environment Management Authority
SPR	Summary Project Report
OSHA	Occupational Safety and Health Act
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
EMP	Environmental Management Plan
MoH	Ministry of Health
KPLC	Kenya Power and Lighting Company
LAWASCO	Lamu Water and Sewerage Company
PPM	Parts Per Million
SUED	Sustainable Urban Economic Development
WASREB	Water Services Regulatory Board

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CHAPTER ONE

1.0 INTRODUCTION

The Ministry of Health estimates that in 2010, almost half of rural Kenyans did not have access to even basic sanitation. In terms of improved sanitation; access has barely improved since 1990 with a small increase from 25 percent in 1990 to 29 percent in 2013; great variations in sanitation coverage however, exist in different parts of the country, with low coverage closely linked to high poverty levels, formally planned urban areas are better served than rural areas, urban slums, and informal settlements and regional disparities also prevail with a lower than national average coverage rate found especially in Arid and Semi-Arid Land (ASAL) and peri-urban areas.

Upcoming urban areas in the counties are experiencing a rise in population. These aras are welcomimg more sanitation infrastructure . Towns with anticipated sharp population increase require among other facilities, a decentralised sewage treatment plant.

In 2020**, Water Trust Fund** funded 300 pit latrines for Mokowe. The project was implemented by LAWASCO. The project opened LAWASCO to another need; a sewage disposal facility. The population of Mokowe town is growing rapidly especially with the opening of the Lamu port.This means that the current problem of pit latrines filling up more frequently than before will be felt more frequently. Therefore Mokowe town needs a sustainable sewage disposal facility.

1.2 BACKGROUND

In peri-urban areas where sewerage network system is not available, appropriate technologies are used. Each household must however, own and have access to a safe sanitary facility that is easily adaptable to existing traditional pit latrine and uses superstructures which blends very well with other buildings within the community. Any technology, however, must ensure safe sludge collection, exhaustion, and treatment. (KESH 2016-2030)

In line with this policy in KESH 2016-2031,Lamu county, in collaboration with Lamu municipality and LAWASCO sought to purchase land which hosts abandoned,

previously constructed sewage treatment lagoons with the purpose of constructing a septic tank for initial treatment and rehabilitation of the lagoons for further treatment of the waste which can then be used as manure on farms.
To achieve this , LAWASCO seeks to implement the proposed works on the land in question at GPS -2.231285,40.861260, Mokowe , in Lamu County.

1.3 Aim Of The Proposed Construction Of The Decentralised Sewage Treatment Facility

The aim of the proposed Lamu Municipality is to provide a decentralised sewerage treatment plant in Mokowe town.

1.6 Purpose And Justification For The Proposed project

Mokowe town is expanding rapidly with the recent opening of the Lamu port in June 2021. The population grows as workers, developers, investors and institutions settle in the area. This has led to increase in construction of residential houses by land owners in Mokowe town and surrounding areas in a bid to provide accommodation.
Increase in the resident population will lead to an increase in the amount of sewage generated .
The Kenya Environmental Sanitation and Hygiene policy 2016-2030 lays down the strategies to achieve good sanitation. According to the Policy Strategy No. 1, scaling up access to improved rural and urban sanitation states that ;sewage treatment technologies with greater emphasis on resource recovery and recycling shall be given high priority in improving urban sanitation. Emphasis shall be placed on less energy intensive technologies such as wetland construction, oxidation ditches, extended aeration, and stabilisation ponds. In addition, multiple technology options including decentralised wastewater option shall be considered.

1.5 Objective Of The Proposed Decentralised Sewage Waste Treatment Plant

The objectives of the proposed project are;

- ✓ Construct a septic tank
- ✓ Construct Parking space for trucks
- ✓ Construct an operations office.
- ✓ Install pipes for channelling sewage from septic tank to the lagoons.
- ✓ Install a solid waste incinerator
- ✓ Rehabilitate water lagoons

1.6 OBJECTIVES OF THE EIA

The objectives of the EIA are as follows:

(iv) to identify, predict and evaluate the economic, environmental and social impact of development activities

(v) to provide information on the environmental consequences for decision making and

(vi) to promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

1.7 SCREENING

The proposed project was screened and identified as requiring an EIA study as it is listed in legal notice 31 of high risk projects part 12 of Waste disposal works, including—

(a) sewerage works and waste water treatment plants; (c) installation of incinerators; (e) hazardous waste treatment or disposal facilities; (f) facilities for disposal of solid or liquid hazardous waste; (g) sludge treatment facility;llation for disposal of industrial wastes and (g) sludge treatment facility;

Projects in this section require an EIA study before implementation.

The first requirement was for a project report to be submitted to NEMA Nairobi . NEMA then reviewed the report and requested for a full EIA study.

1.8 EIA APPROACH AND METHODOLOGY

1.8.1 EIA Overall Approach

The terms of Reference (ToR) has set out in significant detail the requirements towards delivering a comprehensive identification and analysis of environmental and impacts as a result of the project and recommended mitigation measures as follows:

- Project Description and Institutional Framework;
- Scoping Study;
- Environmental Baseline Study;
- Socioeconomic Baseline Study;
- Assessment of social and environmental impacts at different stages of project (pre-construction, during construction, operation and maintenance and cumulative;
- Identification and development of mitigation measures;

- Identification and development of sustainable development approaches; and
- Environmental Management Plan

The requirements of NEMA are stated in the Environmental Management and Coordination Act, EMCA Cap 387.

The study followed a typical Environmental Impact Assessment Process as set out in this section. It follows a typical process of establishing the current baseline conditions, identifying specific environmental and social risks that need to be addressed, characterization of the effects the project will have and the impacts (positive or negative) they will result in, determination of significance of the issues identified, establishment of mitigation measures and monitoring measures, and finally proposals for management plans to ensure effective implementation of mitigation and management of the anticipated issues. The approach and methodology chosen ensures that the Kenyan EIA process has been followed. This involves collecting data on the environmental and social situation, conducting consultations with stakeholders and data analysis.

1.8.2.2 Scoping

An essential element of the EIA is the environmental scoping study which was undertaken in accordance with the EIA/EA NEMA regulations.

It should be emphasized that much of the work initiated in the environmental scoping process continues as a logical set of steps merging into the EIA process. The background data collected, reviews conducted, draft reports, plans, assessment of risks looked at during scoping are simply moved to a higher level of environmental assessment with emphasis on risk aversion and adaptation strategies during project implementation.

The scoping process is a discrete stage in the EIA process which helps to define and highlight key issues to be addressed in the terms of reference for the EIA. Scoping is intended to be iterative and to allow for the scope of work to be amended in the light of new issues and information. This aspect is particularly relevant in the on-going water project in which the final designs of the proposed projects are currently under preparation. This has advantages in that new issues which emerge during the course

of the environmental studies can be incorporated into the final design through consultations.

The purposes of a Scoping Study include:

- Providing an overview description of the project development;
- Establishing the nature of the landscape, settlements and habitats served by the project;
- Identifying critical habitats that might be directly and indirectly affected by the project;
- Identifying the scale and nature of social issues associated with the Project both directly and indirectly;
- Alternatives suitable or considered; and
- Identifying areas that would require detailed studies during the EIA process.
- Identification of social, gender and health issues and potential beneficial and adverse environmental impacts related to proposed project activities, social and economic assessments during scoping were based on preliminary screening and public consultations;
- Assessment of ongoing or planned initiatives related to sanitation by other donors, NGOs and the GoK;
- Review of existing studies, environmental legislation, environmental and social quantitative and qualitative surveys and studies, including gender analysis and technical documents related to the sector;
- A preliminary assessment was undertaken of the legal and institutional framework as well as NEMA processing procedures to assist LAWASCO to obtain the necessary approvals and licenses required for project advancement;
- Using scoping tools, the EIA team carried out field observations to identify potential beneficial and adverse environmental and social impacts associated with the anticipated scope of engineering works, land acquisition /resettlement if any ; sensitive ecological habitats; impacts on women and vulnerable groups; worker safety; and health issues;
- Assessment of preliminary environmental mitigation measures to be adopted by the sub-projects based on the application of a detailed scoping questionnaire covering

project impacts in various sectors, characteristics of the environment, and review of possible mitigation actions;

- Lastly, the Scoping Report attempted to determine the significant environmental and socio-cultural issues that should be the focus of the EIA, including potential beneficial and adverse impacts associated with several key issues, such as gender; land issues; sensitive ecological habitats; impacts on women and vulnerable groups;worker safety; and health issues.

The interactions between the environmental scoping team and the engineers engaged in the feasibility design enabled feedback to enhance the design process and address potential adverse impacts. This EIA builds upon the final designs and the Scoping Report.

1.8.2.3 NEMA Requirement

Current Kenyan environmental and social legislation requires the preparation of an environmental impact assessment report. The EIA report must be submitted to NEMA in order to obtain the necessary approvals and licenses for project implementation.

The NEMA regulatory procedures specify that the aims of scoping are to:

1. Review all applicable laws, policies and planning documents which relate to the type of project or areas in which it is to be located.
2. Review all international obligations that Kenya is signatory to and which may be affected by the proposed development.
3. Identify the relevant environmental standards to be applied in the design of the project or sub-projects.

4. Identify all possible alternatives which may relate to route, site, layout, design, technology, etc.

5. Identify the key impacts associated with the preferred option(s) and determine in consultation with NEMA and the developer, special studies that may need to be undertaken.

1.8.2.4 Literature Review

This included studying relevant legislation and policies; national, regional, provincial and local secondary (collated) data sources; available maps of the Projects area;

county development strategic documents and national programs; and other related reports and documents related to LAWASCO , NEMA and Lamu County policies and associated guidelines. Key documents reviewed included: -

- The Constitution of Kenya (2010)
- EMCA Legal notice 31 and 32
- Environmental Management and Coordination Act 387
- Environmental Management and Coordination Act 287
- Environmental Management and Co-ordination (Water Quality) Regulations 2006
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009
- Environmental Management and Coordination (Air Quality) Regulations, 2014
- The Physical Planning Act, 2019
- The Public Health Act (Cap 242)
- Occupational Safety and Health Act (OSHA), 2007
- The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005
- Water Act 2016

1.8.2.5 Baseline Data

Environmental Baseline

The following approach was used in the environmental baseline data collection and analysis presented in this EIA, with the focus particularly on issues with key impacts related to the proposed facility.

- Desk Studies

The data in the environmental baseline comprised secondary data collected through review of literature and primary data which was collected through field site visit and transect walks on the project area.

The sources of secondary data included but are not limited to: feasibility study reports; ecological and socio-economic profiles for Lamu Municipality ; other data of GoK Departments; and other available maps, related reports and documents. The data collection and review were conducted to:

- Collect documented data on all aspects of the project (e.g. physical, biological and socio-economic);
- Assess ongoing or planned initiatives related to decentralised sewage treatment by other donors, NGOs, and the GoK;
- Review in detail any existing studies, environmental legislation, environmental and social quantitative and/or qualitative surveys and studies including gender analyses, and review of technical documents related to sanitation;
- Field Site Surveys

Site surveys started prior to the preparation of the Scoping Report and continued throughout the period of the EIA studies. It involved visiting stakeholder institutions and making consultations with key community members in Lamu Municipality The main objective of this activity was to carry out on-site field assessments of the expected effects of the planned developments on the physical, biological and socio-economic environment. During these surveys, interviews, measurements and the administration of questionnaires were carried out with key informants who included County Government and National Government staff, local leaders and community representatives.

Details of each survey are explained in subsequent sections.

Flora and Fauna Surveys

The assessment of flora and fauna focused on the proposed work sites and their immediate surroundings. These were assessed by means of walks, interviews, and secondary data collection.

Walks were undertaken and interviews were conducted with both locals and key informants. Secondary data was collected through the use of appropriate maps and relevant literature. Other useful information collected included GPS locations, digital still camera records and data sheets.

Socio-Economic Baseline

The socio-economic baseline has been established from secondary data, consultations conducted and observations on-site. As far as has been possible the focus for the socio-economic baseline has been on data collection and observations in the beneficiary communities; and observations in the sorrounding community .

1.8.3 Methodology

1.8.3.1 Secondary and Primary Data

Secondary socio-economic data was obtained from books, reports, journals and other sources such as the Lamu County Integrated Development Plan , Kenya National Bureau of Statistics Reports, Feasibility study report among others. Primary data was collected from key informants and consultations which included community representatives.

1.8.2.2 Formal Public Discussion

A component of the scoping activity included a public consultative meeting which was held in the project area. The purpose of the meeting was to allow the general public, as well as interested and affected parties, to give their views on the proposed water reticulation project. The specific objectives of this public consultations were to:

- Disseminate information on the proposed project;
- Collect views and issues to be considered in the scoping process and EIA study;
- Evaluate perceptions about positive and negative impacts of the project; and
- Receive concerns about environmental impacts and other implementation
- problems such as communication strategy and avenues for participation in the project.

The meeting was facilitated by LAWASCO .Issues raised during the deliberations of this meeting were recorded and incorporated into this EIA.

1.8.4.3 Consultations

The purpose was to ensure consideration of the views of all potentially affected persons (men, women and children) within the surrounding community. The consultations were done around the proposed project area and
among residents within and in the vicinity of the project sites. The consultations took the form of barazas and individual interviews. The objectives for these consultations were to:

- Collect primary information on the socio-economic situation of the people in the communities;
- Evaluate the level of awareness of the communities about the proposed project;

- Gather information on people's perceptions of projects they considered successful based on past experiences;
- Gather the communities' perceptions about the role of local beneficiaries in the proposed implementation of the proposed project; and
- Assess the level of awareness of communities on how the proposed project will impact them both environmentally and socially and find out any suggestions on avoidance or mitigation measures for the impacts based on past experience.

1.8.4.4 Data Analysis

The purpose of data analysis was to identify impacts that would arise from the construction and operation of the proposed project. The significance of impacts was determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon.

The analysis was aided by using a summary criterion and classification. Mitigation measures and Environmental and Management Plan (EMMP) was designed based on the understanding of the identified impacts coupled with the knowledge and collected information about the project sites.

1.8.5 Identification Of Impacts And Mitigation Measures

The primary tool for identification of impacts and mitigation was discussion among members of the EIA team using expert judgment and consultations including recommendations from stakeholders. This records the rationale for the impacts and their potential significance, mitigation measures, residual impact and risk after mitigation, linked to relevant legislation, the construction contract requirements and the provisions of the EMMP. Impacts were identified from the environmental and socioeconomic baseline as affecting the receptors air, water, land, flora and fauna and community. These were further categorized into construction and subsequent operational impacts.

1.8.6 Determination Of Significance

The assessment of the significance of impacts and identification of residual impacts has taken account of any incorporated mitigation measures adopted by the Project, and is largely dependent on the extent and duration of change, the number of people

or size of the resource affected and their sensitivity to the change. The criteria for determining significance are specific for each environmental and social aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined (quantitatively where possible) and the sensitivity of the receptor is defined. Generic criteria for defining magnitude and sensitivity are summarized below.

- Magnitude

The assessment of magnitude will be undertaken in two steps. Firstly, the key issues associated with the Project have been categorized as beneficial or adverse. Secondly, the magnitude of potential impacts has been categorized as major, moderate, minor, or negligible based on consideration of the parameters such as:

- Duration of the impact – ranging from temporary with no detectable impact to continuing beyond decommissioning;
- Spatial extent of the impact – for instance, within the site, boundary to regional, national, and international;
- Reversibility – ranging from no change to permanent requiring significant intervention to return to baseline;
- Likelihood – ranging from unlikely to occur to occurring regularly under typical conditions;
- Compliance with legal standards and established professional criteria ranging from meets or exceeds minimum standards or international guidance to substantially exceed national standards and limits / international guidance.

Table 1 below outlines generic criteria for determining magnitude.

Table 1. Generic criteria for determining magnitude

Magnitude (Beneficial or Adverse)	Description
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature, and requiring significant intervention to return to baseline; exceeds national standards and limits.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific condition assessed.
Negligible	No perceptible change to the specific condition assessed.

- Sensitivity

Sensitivity is generally site specific and criteria have been developed from baseline information gathered. The sensitivity of a receptor will be determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area.

Generic criteria for determining sensitivity of receptors are outlined in Table 2. Each detailed assessment will define sensitivity in relation to their topic.

Table 2. Generic criteria for determining sensitivity

Sensitivity	Definition (considers duration of the impact, spatial extent, reversibility, and ability of comply with legislation)
High	Vulnerable receptor (human or ecological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Vulnerable receptor (human or ecological) with limited capacity to absorb proposed changes or limited opportunities for mitigation.
Low	Vulnerable receptor (human or ecological) with some capacity to absorb proposed changes or moderate opportunities for mitigation
Negligible	Vulnerable receptor (human or ecological) with good capacity to absorb proposed

	changes or and good opportunities for mitigation

- Impact evaluation and determination of significance

Impacts will be identified and significance will be attributed considering the interaction between magnitude criteria and sensitivity criteria as presented in the significance matrix in Table 3.

Table 3. Impact significance matrix

Magnitude of Impact	Sensitivity of Receptors			
	Negligible	Low	Medium	High
Negligible	Insignificant	Insignificant	Insignificant	Insignificant
Minor	Insignificant	Minor	Minor	Moderate
Moderate	Insignificant	Minor	Moderate	Major
Major	Insignificant	Moderate	Major	Critical

For each aspect, the significance of impacts will be discussed before and after mitigation (i.e. residual impact). Impacts identified as having critical, major, or moderate significance based on the above approach are classified as significant impacts.

1.8.5 Approach to mitigation and management

The EIA includes a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse impacts on the environment. The identification of such measures is an iterative process which needs to be undertaken in parallel with the design to aid the incorporation of measures into the design during project development. Early adoption of appropriate mitigation will help reduce significant environmental impacts to a practicable minimum. Where feasible the following hierarchy of mitigation measures have been applied to reduce, where possible, the significance of impacts to acceptable levels:

- Mitigation / elimination through design;
- Site /technology choice; and
- Application of best practice.

As part of the EIA approach, it is proposed that an Environmental and Monitoring Management Plan (EMMP) be produced for each of the key stages of the development by the contractor. These plans essentially set the framework for the Environmental and Management System for the Project moving forward. The assessment of the significance of impacts and identification of residual impacts has taken account of any incorporated mitigation measures adopted by the Project, and is largely dependent on the extent and duration of change, the number of people or size of the resource affected and their sensitivity to the change. The criteria for determining significance are specific for each environmental aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined (quantitatively where possible) and the sensitivity of the receptor is defined.

Land

A Resettlement Action Plan (RAP) was developed in anticipation of any issues that could arise. The RAP conducted interviews with the help of the community representatives with the aim of determining if any community members would require land compensation.

The RAP presents draft entitlements and compensation options that form the basis for further negotiations between the National Land Commission (NLC) and project-affected persons if any such cases are identified.

Collaboration

The Project includes components generated by a number of specialized teams whose results were used in the compilation of this EIA. The teams include:

- The survey team
- The engineering team
- The Design Team composed of experts drawn from LAWASCO and the county dealt with the designs;
- The EIA Team .

CHAPTER TWO

2.0 POLICY, LEGAL AND INSTITUTIONAL FRAMWORK

2.1 KESH

The Kenya Environmental Sanitation and Hygiene policy 2016-2030 lays down the strategies to achieve good sanitation. According to the Policy Strategy No. 1, scaling up access to improved rural and urban sanitation states that ;sewage treatment technologies with greater emphasis on resource recovery and recycling shall be given high priority in improving urban sanitation. Emphasis shall be placed on less energy intensive technologies such as wetland construction, oxidation ditches, extended aeration, and stabilisation ponds. In addition, multiple technology options including decentralised wastewater option shall be considered.

Each household must own and have access to safe sanitary facility that is easily adaptable to existing traditional pit latrine and uses superstructures which blends very well with other buildings within the community. Any technology, however, must ensure safe sludge collection, exhaustion, and treatment. (KESH 2016-2030)

2.2 LEGAL NOTICE 31 OF EMCA

The proposed project was screened and identified as requiring an EIA study as it is listed in legal notice 31 of high risk projects part 12 of Waste disposal works, including—

(a) sewerage works and waste water treatment plants; (c) installation of incinerators; (e) hazardous waste treatment or disposal facilities; (f) facilities for disposal of solid or liquid hazardous waste; (g) sludge treatment facility;installation for disposal of industrial wastes and (g) sludge treatment facility;

Projects in this section require an EIA study before implementation.

2.3 LAMU COUNTY SPATIAL PLAN 2016-2026

The Lamu County Spatial Plan (2016 – 2026) guides the development, use and conservation of land and resources and development of infrastructure while

safeguarding the coastal biodiversity and tourism hotspots.It highlights crucial considerations in development of infrastructure in Lamu county.

2.4 OCCUPATIONAL SAFETY AND HEALTH ACT 2007

Part II – General Duties of the Occupiers

In Section 6 (1), it is stated that the occupier shall ensure the safety, health and welfare at work of all persons working in his work place. Without prejudice to the generality of an occupier's duty under sub section 1 above, the duties of the occupier includes:-

- The provision and maintenance of plant and systems and procedures of work that are safe and without risk to health;
- Arrangements for ensuring safety and absence of risks to health and connection with the use, handling, storage and transport of articles and substances;
- The provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed;
- The maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks to health;
- The provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employees welfare at work;
- Inform all persons employed of:-
    - Any risks from new technologies; and
    - Imminent danger; and
- Ensuring that every person employed participates in the application and review of safety and health measures.

Every occupier shall carry appropriate risk assessments in relation to the safety and health of persons employed and adopt preventive and protective measures to ensure that under all conditions of their intended use without risk to health and comply with the requirements of safety and health provisions.

The occupier shall send a copy of a report of Risk Assessment carried out under this section to the area occupational safety and health officer and shall take (occupier) immediate steps to stop any operation or activity where there is an imminent and serious danger to safety and health and to evacuate all persons employed as appropriate.

Duty to prepare a safety and health policy statement

In Section 7 (1) (a) and (b), it is established that except in such cases that as may be prescribed, it is the duty of every occupier to:-

- Prepare and, as often as may be appropriate, revise a written statement of his general policy with respect to the safety and health at work of his
- employees and the organization and arrangements for the time being in force for carrying out that policy; and
- To bring the statement and any revision of it to the notice of all of his employees.

Safety and Health Committee

Section (9) (1) Illustrates that an occupier shall establish a safety and health committee at the workplace I accordance with the regulations prescribed by the Minister if:-

- There are twenty or more persons employed at the workplace; or
- The Director directs the establishment of such a committee at any other workplace.

Safety and Health Audits

Section 11 (1) of the Occupational Safety and Health Act 2007 outlines that the occupier of a workplace shall cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a safety and health advisor, who shall issue a report of such an audit containing the prescribed particulars to the occupier on payment of a prescribed fee and shall send a copy of the report to the Director. The Audit report referred above shall be preserved and be kept available for inspection by the Occupational Safety and Health Officer.

Notice of accidents and dangerous occurrences

Section 21(1) Stipulates that an employer or self employed person shall notify the area Occupational Safety and Health Officer of any accident, dangerous occurrence, or occupational poisoning which has occurred at the work place.

Where an accident in a workplace, causes the death of a person therein, the employer or self employed person shall:-

- Inform the area occupational safety and health officer within twenty-four hours of the occurrence of the accident; and
- Send a written notice of the accident in the prescribed form to the area occupational safety and health officer, within seven days of the occurrence of the accident.
- Where an accident in the workplace cause non fatal injuries to a person therein, the employer shall send to the area occupational safety and health officer, a written notice of the accident in the prescribed form within seven days of the occurrence of the accident; and ; In case of death due to a workplace accident, non fatal injuries arising from a workplace accident, an occupational disease or a dangerous occurrence at the workplace, involving a self-employed person incapable of submitting notification, such notification shall be submitted to the area occupational safety and health officer.

2.5 WORK INJURIES BENEFITS ACT 2007

The act requires that every employer shall register with the Director of Occupational Health and Safety Services and any other information as the Director may require.

Section 7 of stipulates provision of every employee with an insurance policy in respect of any liability that the employer may incur under this Act to any of his employees.

Right to compensation- 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 the Act. Subsection 3 of section 10 of the Cat however states that no employee shall be entitled to compensation if an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee.

Reporting of accidents - A written or verbal notice of any accident shall be given by or on behalf of the employee concerned to the employer and a copy to the Director

of occupational health nod Safety within twenty-four hours of its occurrence in case of fatal accident.

2.6 LABOUR INSTITUTIONS ACT 2007

The Act stipulates that an authorized officer may either alone or in the presence of another person, enter any premises or place where persons are, or may be employed for the purpose of performing his duties as specified under the Act.

The labour officer may, for the purpose of monitoring or enforcing compliance with any law require the production of wages sheets or other employment records kept by an employer, enter inspect and examine all latrines and other sanitary arrangements or water supply, inspect and examine all food provided or appearing to be provided for employees, and take samples thereof in duplicate, in the presence of the employer or the employers representative which samples shall be sealed and one sample so sealed shall be left with the employer, order that all buildings and premises where employees are housed or employed be kept in a clean and sanitary condition.

Section 37 of the act states that the medical officer shall exercise the powers conferred upon the labour officer and in addition;

- Order an employee who, in his opinion is sick and for whom the conditions prevailing at the place of employment are not conducive to rapid recovery of his health to proceed to hospital and in that case the employer shall at the earliest opportunity and at his own expense send the employee to the place of work or to a hospital, as the case may be.
- Condemn any food provided for employees which, in the opinion of the medical officer, is unfit for human consumption, and all food so condemned shall be destroyed forthwith in the presence of the medical officer.
- Order at the expense of the employer, such variety of food for an employee as he may deem necessary
- Inspect all drugs and medicine provided for the use of employees

2.7 THE ENVIRONMENTAL MANAGEMENT AND COORDINATION (NOISE AND EXCESSIVE VIBRATION POLLUTION) (CONTROL) REGULATIONS 2009;

Part II of the general prohibition of this regulation state that except as otherwise provided for in this regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Part (2) of the general prohibitions stated that in determining whether noise is loud, unreasonable, unnecessary or unusual the following factors may be considered:-

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermitted or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and
- Whether the noise can be controlled without much effort or expense to the person making the noise.

2.8 EMCA CAP 387 REGULATIONS 35 AND 36 ON THE ENVIRONMENTAL AUDIT PROCESS AND THE REPORT

Contents of an environmental audit

(1) An environmental audit shall be carried out through questionnaires, an environmental site visits and test analysis and in the manner specified in this Regulation

(2) In conducting an initial environmental audit an environmental auditor shall—

(a) consider the description of the project;

(b) indicate the objective, scope and criteria of the audit;

(c) study all relevant environmental law and regulatory frameworks on health and safety, sustainable use of natural resources and on acceptable national and international standards;

(d) verify the level of compliance by the proponent with the conditions of the

environmental management plan;
(e) evaluate the proponent's knowledge and awareness of and responsibility for the application of relevant legislation;
(f) review existing project documentation related to all infrastructural facilities and designs;
(g) examine monitoring programs, parameters, and procedures in place for control and corrective actions in case of emergencies;
(h) examine records of incidents and accidents and the likelihood of future occurrence of the incidents and accidents;
(i) inspect all buildings, premises and yards in which manufacturing, testing and transportation takes place within and without the project area, as well as areas where goods are stored and disposed of and give a record of all significant environmental risks associated with such activities;
(j) examine and seek views on health and safety issues from the project employees, the local and other potentially affected communities; and
(k) prepare a list of health and environmental concerns of past and ongoing activities.
(3) Where an environmental auditor is conducting a control audit, the environmental auditor shall—
(a) consider the description of the project;
(b) indicate the objective, scope and criteria of the audit;
(c) inspect all buildings, premises and yards in which manufacturing, testing and transportation takes place within and without the project area as well as areas where goods are stored and disposed of and give a record of all significant environmental risks associated with such activities;
(d) indicate the extent to which the environmental management plan corresponds to the planned arrangements and, if implemented, achieves the stated objectives;
(e) identify any significant source of air pollution, water pollution, land contamination and degradation, local community disturbance, wildlife disturbance and the health of the workers of the project; and
(f) prepare a list of concerns of on-going activities with recommendations.

36. The environmental audit report

(1) An environmental auditor shall indicate in an audit report the measures that exist under the environmental management plan of the proposed project to bring the project up to an acceptable environmental standard and how environmental impacts will be addressed and controlled.

(2) An environmental audit report compiled under these Regulations shall contain—

(a) a presentation of the type of activity being audited;

(b) an indication of the various materials, including non-manufactured materials, the final products, and by-products, and waste generated;

(c) a description of the different technical activities, processes and operations of the project;

(d) a description of the national environmental legislative and regulatory frameworks on ecological and socio-economic matters;

(e) a description of the potentially affected environment on ecological and socioeconomic matters;

(f) a prioritization of all past and on-going concerns of the project;

(g) an identification of all environmental and occupational health and safety concerns of the project;

(h) an opinion on the efficacy and adequacy of the environmental management plan of the project;

(i) detailed recommendations for corrective activities, their cost, timetable and mechanism for implementation;

(j) an indication of the measures taken under the environmental management plan to ensure implementation is of acceptable environmental standards; and

(k) a non-technical summary outlining the key findings, conclusions and recommendations of the auditor.

37. Post audit orders

The Authority may issue an improvement order for the carrying out of corrective measures for mitigating the environmental degradations revealed during any audit study.

2.9 EMCA CAP 387 REGULATIONS 37, 38,39 AND 40

The authority (NEMA) shall, in coordination with other lead agencies in Kenya, monitor and issue compliance orders whenever required in line with the regulations below stipulated in the act;

Regulation 37: Post audit orders.

Regulation 38: Inspections.

Regulation 39: Audit petition by public.

Regulation 40: Monitoring by the Authority and lead agencies.

EMCA CAP 387

EMCA Cap 387 ,Regulation 31 on Environmental Audits

Environmental Audit Study;

(1) An environmental audit study shall be undertaken on the following development activities which are likely to have adverse environmental impacts—

(a) ongoing projects commenced prior to the coming into force of these Regulations; or

(b) new projects undertaken after completion of an environmental impact assessment study report.

(2) An environmental audit shall, unless it is a self-auditing study under regulation 34, be conducted by a qualified and authorized environmental auditor or environmental inspector who shall be an expert or a firm of experts registered in accordance with regulation 14.

(3) The Authority shall require the proponent to undertake—

(a) in the case of an ongoing project—

(i) an initial environmental audit study followed by subsequent environmental control audit studies as may be necessary at such times as shall be agreed upon by the Authority and the proponent; and

(ii) an initial environmental audit study to provide baseline information upon which subsequent environmental control audit studies shall be based; and

(b) an environmental audit study based on baseline information provided in the environmental impact assessment report study.

2.10 LAMU COUNTY SPATIAL PLAN 2016-2026

The Lamu County Spatial Plan (2016 – 2026) guides the development, use and conservation of land and resources and development of infrastructure while safeguarding the coastal biodiversity and tourism hotspots.It highlights crucial considerations in development of infrastructure in Lamu county.

2.11 Feasibility Study Report For Lamu Municipality Water Project

The report observes that all Projects are feasible with a proposed perspective of social economic evaluation, financial evaluation and environmental assessment, which will have stable economic benefit and strong anti-risk capacity.

The analysis of the project alternative options showed that the project is indispensable. Therefore, the Lamu County Municipality project is necessary, and should be implemented as soon as possible.

Given the Project construction will be undertaken within the Lamu Municipality, a comprehensive Environmental Management Plan (EMP) and Environmental Monitoring Strategy should be developed of which the proponent will implement to ensure minimal damage to the environment.

The report therefore, recommends the project for NEMA approval after a successful EIA is done because it: -

a) well within the spirit of the National Constitution,

b) will support in the implementation of the National Water Policy (2012),

c) will contribute towards the realization of goals for Kenya‘s Vision 2030 goals, and

d) will not violate the strategies for the Lamu County Spatial Plan 2016-2026.

2.12 The Environmental Management and Coordination (Waste Management) Regulations, 2006

Relevant parts of this regulation include;

- Prohibition of any waste disposal on a public highway, street, road, recreation area or in any public place except in designated waste receptacle;

- All waste generator to collect, segregate and dispose such waste in a manner provided for under these regulations;
- All waste generators to minimize waste generated by adopting cleaner production methods;

2.13 EMPLOYMENT ACT 2007

2.13.1 General Principal

The Act constitutes minimum terms and conditions of employment of an employee and any agreement to relinquish vary or amend the terms set shall be null and void. The act stipulates that no person shall use or assist any other person, in using forced labour. Clause 5 of the act states that its shall be the duty of the Minister, Labour officer, the National Labour Court and the subordinate labour courts to; Promote equality of opportunity in employment in order to eliminate discrimination in employment Promote and guarantee equality of opportunity for a person who, is a migrant worker or a member of the family of the migrant worker lawfully within Kenya

2.13.2 Occupational Safety and Health Act 2007

Part II – General Duties of the Occupiers

In Section 6 (1), it is stated that the occupier shall ensure the safety, health and welfare at work of all persons working in his work place. Without prejudice to the generality of an occupier's duty under sub section 1 above, the duties of the occupier includes:-

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- The maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of

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- The provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employees welfare at work;
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occupational disease or a dangerous occurrence at the workplace, involving a self-employed person incapable of submitting notification, such notification shall be submitted to the area occupational safety and health officer.

2.13.3 Work Injuries Benefits Act 2007

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Right to compensation- 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 the Act. Subsection 3 of section 10 of the Cat however states that no employee shall be entitled to compensation if an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee.

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The labour officer may, for the purpose of monitoring or enforcing compliance with any law require the production of wages sheets or other employment records kept by an employer, enter inspect and examine all latrines and other sanitary arrangements or water supply, inspect and examine all food provided or appearing to be provided for employees, and take samples thereof in duplicate, in the presence of the employer or the employers representative which samples shall be sealed and one sample so sealed shall be left with the employer, order that all buildings and premises where employees are housed or employed be kept in a clean and sanitary condition.

Section 37 of the act states that the medical officer shall exercise the powers conferred upon the labour officer and in addition;

- Order an employee who, in his opinion is sick and for whom the conditions prevailing at the place of employment are not conducive to rapid recovery of his health to proceed to hospital and in that case the employer shall at the earliest opportunity and at his own expense send the employee to the place of work or to a hospital, as the case may be.
- Condemn any food provided for employees which, in the opinion of the medical officer, is unfit for human consumption, and all food so condemned shall be destroyed forthwith in the presence of the medical officer.
- Order at the expense of the employer, such variety of food for an employee as he may deem necessary
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2.14 THE ENVIRONMENTAL MANAGEMENT AND COORDINATION (NOISE AND EXCESSIVE VIBRATION POLLUTION) (CONTROL) REGULATIONS 2009;

Part II of the general prohibition of this regulation state that except as otherwise provided for in this regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Part (2) of the general prohibitions stated that in determining whether noise is loud, unreasonable, unnecessary or unusual the following factors may be considered:-

- Time of the day;
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- Whether the noise is recurrent, intermitted or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and
- Whether the noise can be controlled without much effort or expense to the person making the noise.

CHAPTER THREE

3.0 BASELINE INFORMATION

The Chapter provides a highlight of Mokowe and its sorroundings, situation analysis and resource endowment. It also provides a description of the municipality with a highlight on its history, inhabitants, location, size, physiographic and natural conditions, demographic profiles as well as the administrative and political units.
It also provides a description of some of the major economic activities, an analysis of the current municipal situation and provides critical background information that has a bearing on the development of the county.
The chapter provides an overview of sectoral information including:- infrastructure and access, land and land use, community organizations/non-state actors, crop, livestock and fish production; forestry, environment and climate change. In addition, Mining; tourism; employment and other sources of income; water and sanitation; health access and nutrition, education and literacy, trade, energy, housing, transport and communication, community development and Social Welfare, public administration and governance.

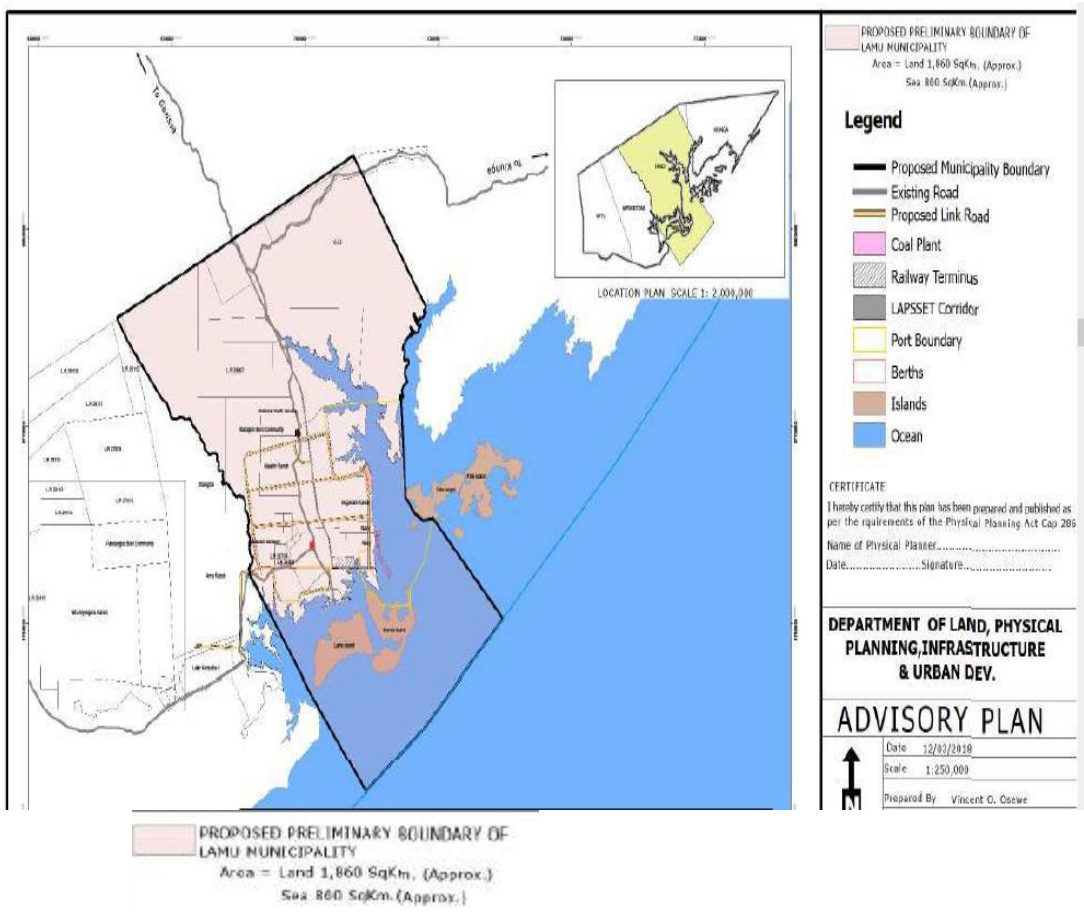


Plate 1 :Map showing the Lamu Municipality Physical Plan

3.1 Physical Plan

3.1 POSITION & SIZE

Covering an Area of approximately 2000 Km2 Lamu municipality is located in the coast of Kenya and it is one of the 12 municipalities under the SUED program in Kenya. The municipality consists of a mainland and two islands making up 4 wards;

1) Mkomani ward
2) Shella Ward
3) Hindi ward
4) Basuba War

The construction of LAPSSET corridor , the port and related infrastructure is ongoing in Hindi ward in which Mokowe town lies.The proposed Coal plant lies in the same area, adjacent to the port. The Lamu municipality physical plan is presented in the map below.

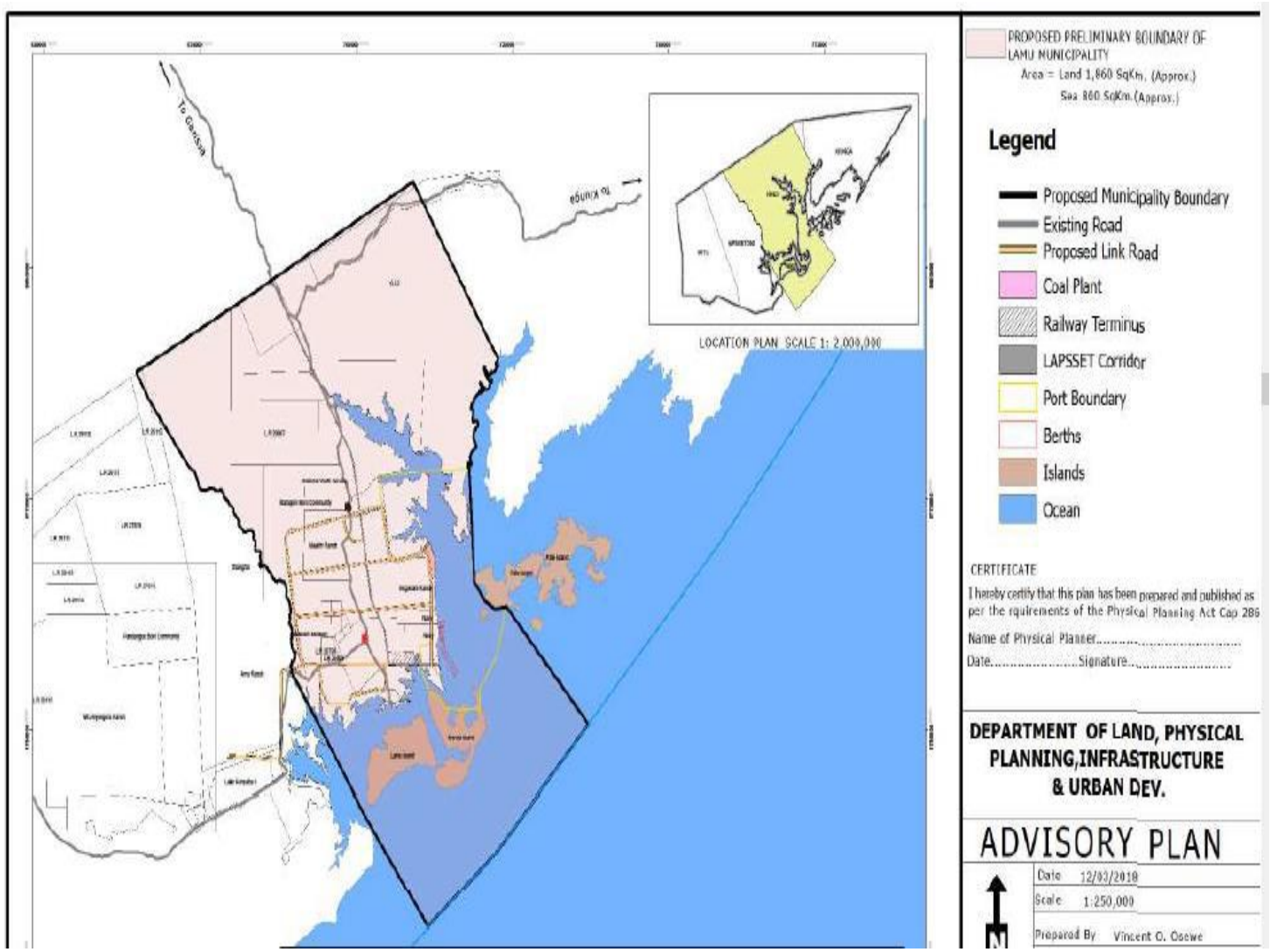


Plate 3 :Map showing the Lamu Municipality Physical Plan

3.2 Political Units in the Municipality

As previously stated, Lamu county has two constituencies namely; Lamu West and Lamu East. Within the two constituencies, there are 10 County Assembly Wards. Of these, Lamu West constituency has seven wards comprising Sheila, Mkomani, Hindi, Mkunumbi, Hongwe, Witu and Bahari, while Lamu East with three. Lamu East constituency on the other hand as County Assembly Wards comprising Faza, Kiunga and Basuba. Within the Lamu Municipality, we have the following:

Table 4: Political Units in the Municipality.

SUB COUNTY	WARD	LAND AREA (AREA KM^2)
LAMU WEST	Shella	54.7
	Mkomani	172.8
	Hindi	1150.8
LAMU EAST	Basuba	92.6
TOTAL	**4**	**1470.9**

Position & Size

Covering an Area of approximately 2000 Km2 Lamu municipality is located in the coast of Kenya and it is one of the 12 municipalities under the SUED program in Kenya. The municipality consists of a mainland and two islands making up 4 wards;

1) Mkomani ward
2) Shella Ward
3) Hindi ward
4) Basuba War

The proposed project is construction and rehabilitation of facilities at the Mokowe waste water treatment decentralised plant at Mokowe GPS -2.231285, 40.861260.

3.3 Climatic Conditions

The Climate of Lamu County is difficult to describe accurately because there are very few local recording stations. However, based on the Köppen-Geiger climate classification, Lamu County can be said to be between the Tropical Monsoon and Arid Steppe Hot climate.

The rainfall pattern in Lamu County is bimodal and is greatly influenced by the Monsoon winds with the long rains falling between late March and early June with May being the wettest month. Light showers fall in July and decreasing from August. The short rains come in November to December decreasing rapidly to a minimum in January and February.

January to March are usually dry months. The degree of reliability of the short rains decreases from South to North. The amount of rainfall in the long rains decreases from a strip of about 10km wide from the coastline into the main land at a rate of about 100mm per kilometer. The short rains increase from the coastline for the first 10km and then decreases again.

The highest average rainfall above 1000mm occurs at a range of 5-20 km inland and interrupted by the Mkunumbi Bay. Generally, rains in the County are likely to be heavy every 3 or 4 years and relatively light in the intervening periods. The highest rainfall is recorded around Lake Kenyatta settlement scheme, Hindi, immediate area surrounding Witu, and the western side of Lamu Island. The total rainfall recorded range is between 100 mm-1100 mm.

The rest of the County receives 600 mm - 700 mm with some recording, less than 500 mm and these zones are suitable for development of ranches. Temperature is usually high ranging from 230 C to 300 C. The mean annual minimum and maximum temperatures range of 240 C to 340 Celsius respectively. The hottest months are December and April while the coolest months are May and July. The mean relative humidity in the County is 75%. The total amount of vapor-transpiration is 2,230m per annum, with the highest values occurring in March and September and the lowest in May.

The high relative humidity levels in Lamu discourage certain land use aspects as the proposed coal Plant under LAPSSET as the resultant emissions will be absorbed in the evaporation processes resulting to destructive rains as opposed to productive rains.

3.4 Physiographic and Natural Conditions

Lamu Municipality areas are generally flat and lies between altitude zero and 50m above sea level.

The flat topography makes parts of the municipality prone to flooding during the rainy seasons and periods of high tides. Some areas of the municipality's mainland such as Mokowe, are below the sea level as a result of the areas being a limestone karst terrain (NEMA, 2015).

The County's coastal plain covers most of the coastline but interrupted in some areas by the coastal sand dunes (GoK, 1985). There are four major catchment areas each with unique characteristics. These are:

Dondori, Coastal zone, Duldul, the Lamu Bay drainage and Tana River catchments. The county has no permanent river but only few seasonal streams, which flow from the west towards the southeastern part of the county, with none reaching the sea. The only permanent open water site in the county is Lake Kenyatta in Mpeketoni, known to be dry during exceptionally dry years. The county also has several swamp areas occasioned by rain water with the main ones located in Dodori, BeleBele in Hindi, Ziwa la Magarini, and Chomo Ndogo - Chomo Kuu along the Hindi-Bargoni road, Luimshi and Kenza on Nairobi Ranch and Kitumbini and Ziwa la Gorjji in Witu.

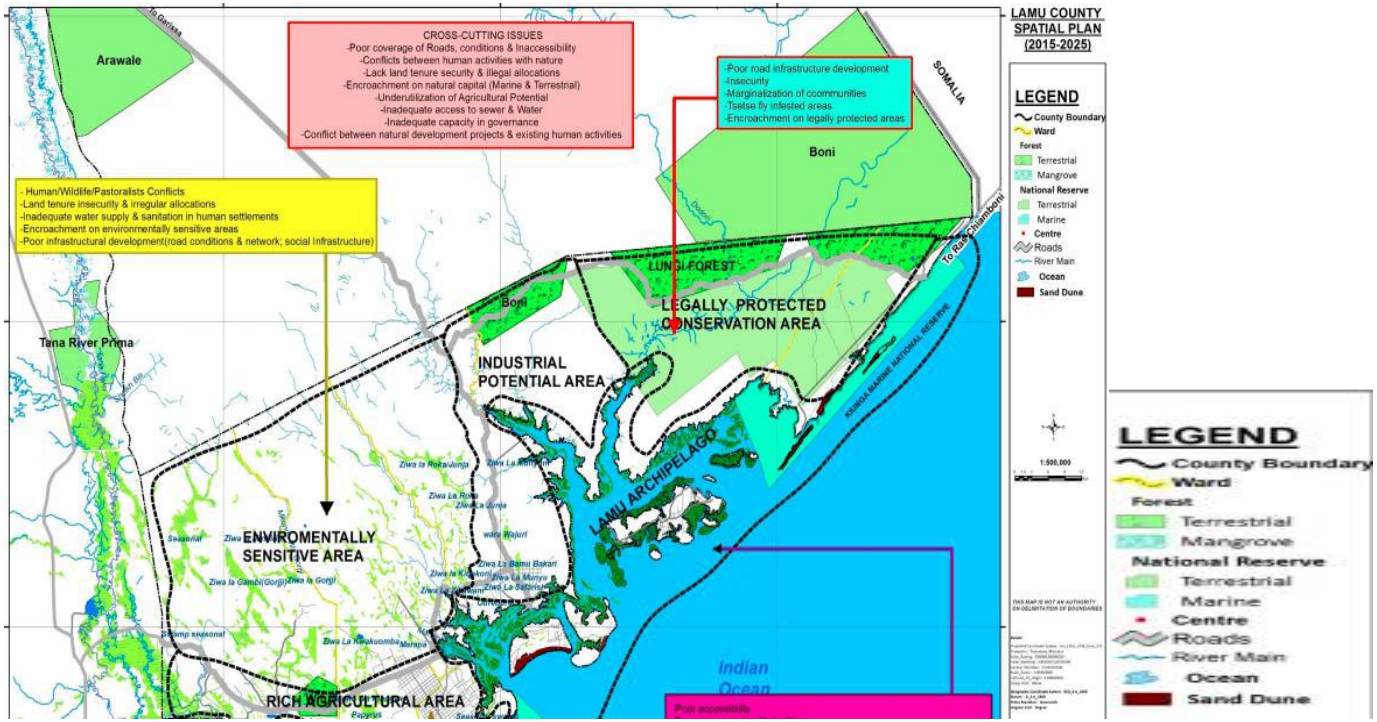


Plate 4: Map showing Natural Features in and around Lamu Municipality

3.5 HYDROLOGY AND GEOLOGY

The population distribution in the county is influenced by a number of factors including access to economic opportunities such as agriculture, livestock keeping, fishing and trade. This trend can be demonstrated by the fact that over 50 percent of the county population lives in Amu and Mpeketoni in Lamu West Constituency, whereas Lamu East Constituency accounts for 17 percent of the county population. Witu that is predominately a livestock zone is occupied mainly by the Orma community. Mpeketoni, Hindi and some parts of Witu are settlement schemes and are predominantly agricultural cosmopolitan areas.

Besides Lamu, the other islands comprising Pate, Kizingitini, Ndau and Siyu are mainly occupied by the Bajuni community. Kiunga is inhabited by the Boni and Bajunis communities. The Municipality has the following water resources:

Table 5: Water Resources in the Municipality.

No.	Resource/Aquifer	Ward	Sub-County
1.	Shella Sand dunes	Shella	Lamu West
2.	Chomo	Hindi	Lamu West
3.	Belebele	Hindi	Lamu West
4.	Mangai	Basuba	Lamu East

Water Supply Schemes

The following are the water supply schemes within the Municipality:

Table 6: Water Supply Schemes in the Municipality.

No.	Water Supply Scheme	Ward	Sub County
1.	Lamu Water Supply	Mkomani	Lamu West
2.	Mokowe Water Supply	Hindi	Lamu West
3.	Hindi Water Supply (HIMWA)	Hindi	Lamu West
4.	Milimani Water Supply	Basuba	Lamu East

3.6 Health Facilities within the Municipality

Mkomani Ward

1. Lamu County Referral Hospital
2. Matondoni Dispensary
3. Kipungani Dispensary

Shella Ward

1. Shella Dispensary
2. Manda Dispensary

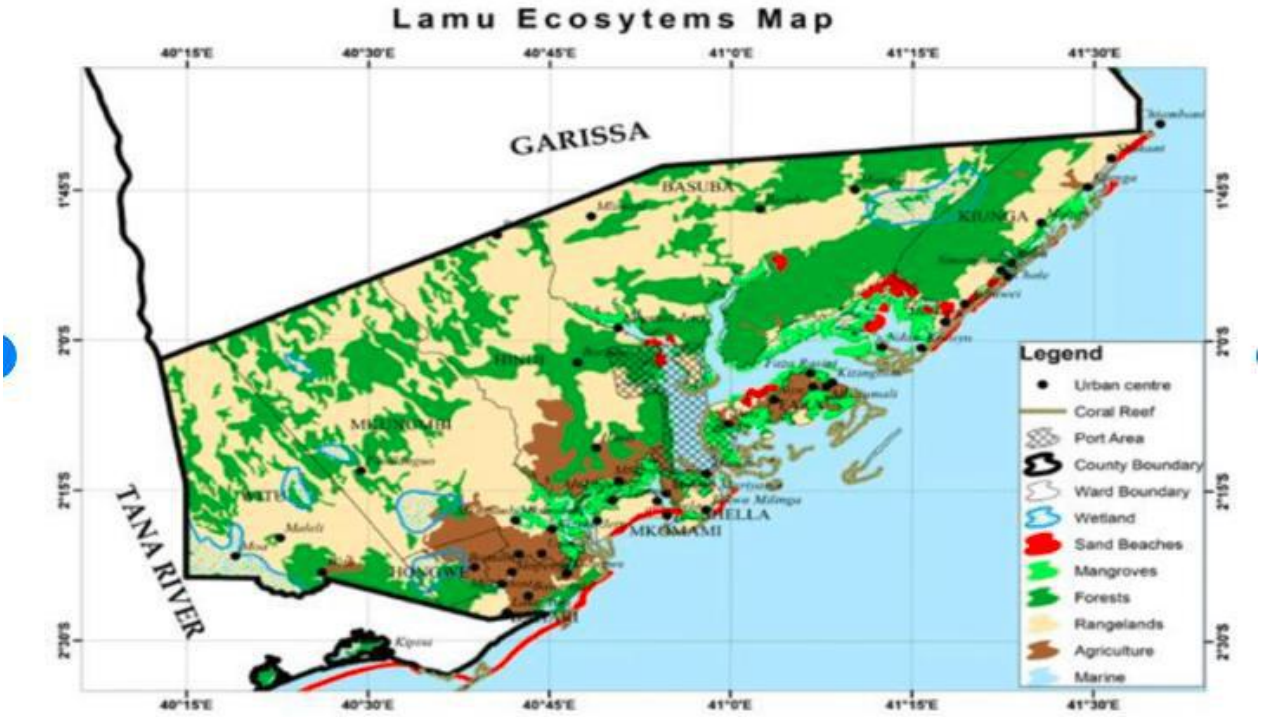
Basuba Ward

1. Kiangwe Dispensary
2. Mangai Dispensary

Hindi Ward

3.7 Biological Environment

Vegetation and Agriculture



Lamu County ecosystem

Plate 5 : Vegetation

Rainfall variability patterns experience throughout the County highly influences different agro-ecological zones and somehow define the natural potential of Lamu County and Lamu municipality at Large.

As such, the county can be sub divided into two livelihoods zones with varying economic diversities, which are distinct in terms of ecology, infrastructural network and population distribution. The zones are; the rich agricultural and livestock zones in the mainland (mainly settlement schemes) and the fishing and marine zones (Islands). The difference in physiographic, climatic and other natural conditions therefore categorizes the county into four agro-ecological zones namely Coastal lowland (CL) Coconut-cassava zone (CL-3), Cashew nut-cassava zone (CL-4), Livestock-millet zone (CL-5) and Lowland ranching zone (CL-6). The areas under CL-3 and CL-4 are sustainable for agricultural activities whereas those under CL-5 and CL-6 are suitable for livestock keeping.

3.8 Population Density and Distribution

Lamu has a population of 101,539 (2009 census). The population distribution in the county is influenced by a number of factors including access to economic opportunities such as agriculture, livestock keeping, fishing and trade. This trend can be demonstrated by the fact that over 50 percent of the county population lives in Amu and Mpeketoni in Lamu West Constituency (which includes Mokowe), whereas Lamu East Constituency accounts for 17 percent of the county population. Witu that is predominately a livestock zone is occupied mainly by the Orma community. Mpeketoni, Hindi and some parts of Witu are settlement schemes and are predominantly agricultural cosmopolitan areas. Besides Lamu, the other islands comprising Pate, Kizingitini, Ndau and Siyu are mainly occupied by the Bajuni community. Kiunga is inhabited by the Boni and Bajunis communities. The table below gives population of the Municipality Based on the constituencies.

Table 7: Population Density and Distribution.

SUB COUNTY	DIVISION	AREA KM^2	2019	
			POPULATION	DENSITY
LAMU WEST	Amu	102.4 28	28,032	334
	Mokowe	75.6 7	7,857	104
	Hindi	1804.9	19,193	9
	Basuba	92.6	2,802	2
Total	3	1999.9	57, 884	26

3.9 CULTURE

The population in Lamu consists of four main indigenous communities: the Bajuni, Sanye, Aweer (Boni), and Orma. The Bajuni, who are the largest in population of the four groups, trace their origins to diverse groups, primarily Bantu and Arab descent. They mainly derive their livelihoods on fishing, farming, and more recently tourism-related activities. The Orma are pastoralist, while the Cushitic Sanye and Aweer(Boni) are hunter-gathers primarily living off the forest resources and farming. All tribes are found in Mokowe with the majority being the Swahili natives of the area.

<u>The Aweer(Boni)</u>

The Aweer are the smallest of the four groups in population and they are mostly found in Basuba Division in which part of Boni forest lies.The area has inadequate infrastructure owing to frequent incidences of insecurity hindering construction projects.Examples of infrastructure in Kiangwe and Basuba locations are; for Kiangwe, one dispensary , one school(grade one to grae 3) ,one social hall,paths used by motorbikes,one functional community djabbia and one djabbia at the primary school and an aborted water desalination project; the desalination plant was removed and taken back from the plant house by the donorowing o the high cost of maintenance and non viability. The abandoned plant house stands near the bay where the boats dock at sea.

The water pans(djabbias) are filled with water from a rainfed natural water pan about 2 kilometers from Kiangwe village.

The main source of livelihood for the Aweer is use of forest resources and farming as well as livestock rearing.They practise rain fed agriculture as the area does not have irrigation infrastructure.A few of the locals practise fishing too at Kiangwe but owing to the low population and unpopularity of fish, the activity is not a major source of income .

Basuba division also has solar electricity powering street lights and the locals get their source of power from solar installations.However , most households have not installed solar lighting. This is a setback in development of income generation opportunities such as posho mills,barber shops and internet cafes which require electricity.

The area also hosts minimal trading avenues in form of 'kiosks' (retail shops). During drought some households receive food donations from well wishers.

The Sanye

The Sanye are found scattered in the county but mostly on Pate Island. Their livelihood at the Island is mostly from fishing and rain fed agriculture. They also keep livestock.

The Orma

The Orma are mainly found in Witu ward . Their main source of livelihood is cattle rearing with most of them practising pastoralism in the rangelands around River Tana and around the delta at Dide Waride. A large number of households also practise rain fed agriculture.

3.10 INFRASTRUCTURE

The surrounding area has several health facilities;Mokowe health center, Hindi Magogoni Dispensary,Hindi GK Prison Dispensary,Bargoni Dispensary and several privately run health facilities.

There is a police station at Mokowe and others at Hindi and Bargoni.

The area is also served by safaricom, airtel, Telkom mobile networks.

There is a bitumen road serving Mokowe area, therefore transportation of sewage to the decentralised treatment site will be easy.

CHAPTER 4.0 PROJECT DESCRIPTION

4.1 PROJECT DESCRIPTION

4.1.1 Location

The proposed construction and rehabilitation of facilities at the Mokowe waste water treatment decentralised plant ,will be carried out at GPS. -2.231285, 40.861260, for Mokowe town.

4.1.2 Objectives

The specific project objectives are to ;

- ✓ To construct a septic tank
- ✓ To rehabilitate of existing Lagoons,
- ✓ To construct space for trucks to siphon waste to septic tank
- ✓ To construct a parking/tipping bay for trucks

4.2 THE LAYOUT

Below are site maps and a drawing of the layout.

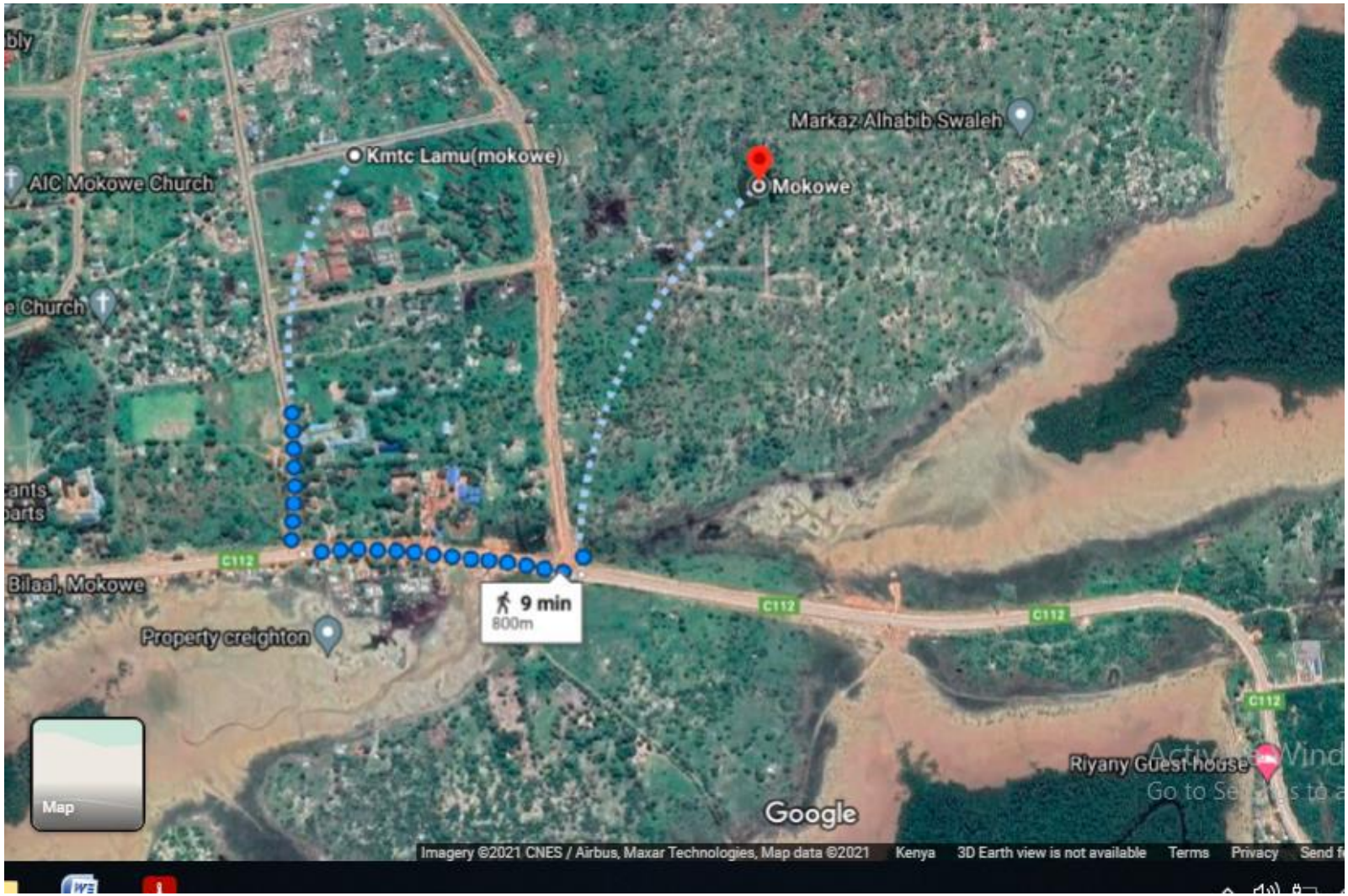


Plate 1: The route from KMTC to the site

Plate 2: The proposed site(Waste treatment Lagoon on site)

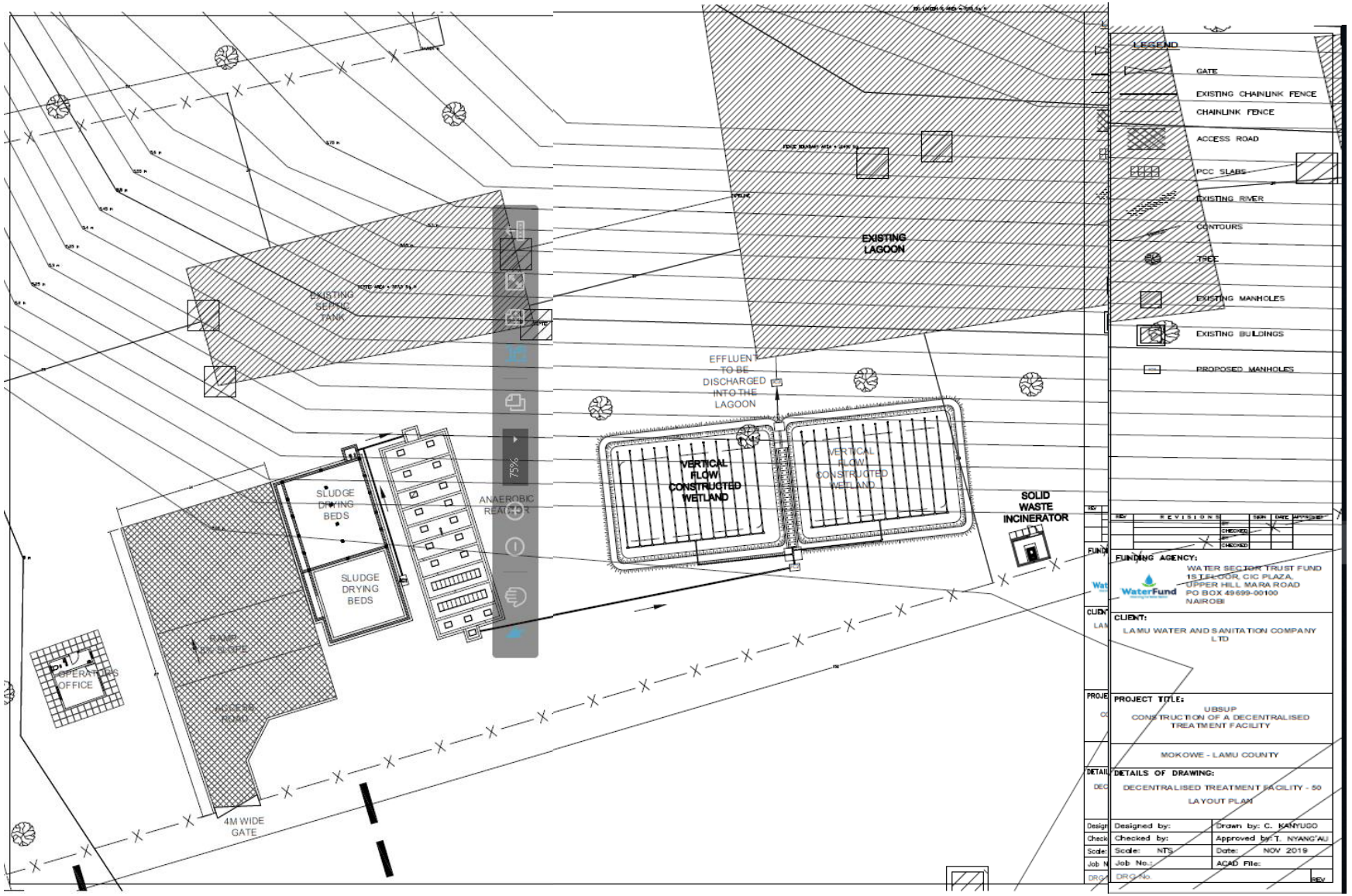


Figure 1: Layout of the DTP Plan

4.3 Land Ownership

Proof of land ownership by the Municipality is attached at the appendix of this report.

4.4 Land Use In The Project Area

The proposed project will be located outside KMTC-Mokowe, in the outskirts of the town as shown in the maps.

Mokowe town is currently hosting many ongoing constructions of residential houses , with septic tanks for waste water disposal. County administrative centers and guest houses are also on the rise with many more similar construction projects scheduled in the area.

Moreover, Mokowe town is expanding rapidly with the proposed opening of the Lamu port in June 2021. The population grows as workers, developers, investors and institutions settle in the area. This has led to increase in construction of residential houses by land owners in Mokowe town and surrounding areas in a bid to provide accommodation.

Increase in the resident population will lead to an increase in the amount of sewage generated .

The Kenya Environmental Sanitation and Hygiene policy 2016-2030 lays down the strategies to achieve good sanitation. According to the Policy Strategy No. 1, scaling up access to improved rural and urban sanitation states that ;sewage treatment technologies with greater emphasis on resource recovery and recycling shall be given high priority in improving urban sanitation. Emphasis shall be placed on less energy intensive technologies such as wetland construction, oxidation ditches, extended aeration, and stabilisation ponds. In addition, multiple technology options including decentralised wastewater option shall be considered.

4.5 Staff Welfare and Proposed Activities and Utilities

4.5.1 Proposed Activities

The activities that will be assessed as part of the EIA Study of the proposed construction and rehabilitation of the decentralised waste-water treatment facility are outlined below;

i) Acquisition of water supply
ii) Construction of a fence

iii) Earth works
iv) Transportation
v) Construction of a tipping/truck parking bay with a round about
vi) Construction of a n operations office, water storage facilities
vii) Construction of a Camp site with sanitation facilities , and a security office and accomodation;
viii) Rehabilitation of wastewater treatment lagoons
ix) Construction of a septic tank
x) Decommissioning;dismantling of equipment and machinery;site restitution; removal of construction machinery;solid waste management from dismantled materials as well as proper handling and disposal of liquid effluents;de-staffing.

4.5.2 Staff Welfare

The expected number of workers for this proposed construction and rehabilitation of the decentralised waste-water treatment facility will be less than 20 personnel including security guards.

Health And Safety

Assessing the earthworks, construction , installation , decommissioning and operation activities, there will be a need to address health and safety (H&S) aspects for the workers ,personnel involved and neighboring community.

Assesment of the anticipated health and safety of workers and the immediate neighbouring community and proposed mitigation measures for the construction, decommissioning and operation phases will be detailed in the EIA study report.

4.5.3 Waste management

There will be different types of wastes (non-hazardous and hazardous) that will be produced by the project site and as such the proponent proposes integrated waste management. Management of solid waste and liquid waste during the construction/installation, decommissioning and operations phases will be assessed and mitigation measures recommended. The EIA study will provide specifications for the appropriate waste management procedure.

4.5.4 Utilities

Water for construction will be provided from the LAWASCO Mokowe water supply.

Electricity will be supplied from the KPLC connection at the site. A generator will be provided for backup.

CHAPTER FIVE:ENVIRONMENTAL AND SOCIAL SCREENING

5.1 POSITIVE IMPACTS

5.1.1. Employment opportunities

The quantifiable benefits from the project are the employment opportunities that will be created. People will be employed at the site in all the phases of the project. The project has provided employment to the people right from the planning through to the assessment. Others to be employed are the contractor, the supervisors and the construction workers during the construction phase and the management staff during the operation phase. Self-employment will be realized with the people who will come to the site to sell foodstuffs to the workers.

5.1.2. Improved Living Standards

Employment will improve the living standards of the employees and their families as they will be able to acquire basic needs from the income that they will earn from employment.

5.1.3. Increased Economic Activity

There will be increased economic activity due to the project. The supply of materials for the construction, food businesses to operate at the site in all the phases and the commercial activities to be carried out within the facility are examples of the economic activities to take place. The workers at the facility will offer a market for locally produced farm products such as vegetables.

5.1.4. Provision of a decentralised sewage treatment plant

The proponent will provide a decentralised sewage treatment plant for Mokowe town. The community will benefit from this project by getting a proper sanitary waste disposal system. This will decrease cases of illnesses caused by poor disposal of sanitary waste as the population grows.

5.1.5. Increased revenue collection

Upon completion of the project, there will be an increase in the revenue through billing,taxes and licenses implemented by the county government.

5.2. NEGATIVE IMPACTS

5.2.1. Noise

A significant increase in noise is expected during construction. The main sources are heavy machinery such as excavators, stabilizers, concrete mixers, and drills. Vehicles transporting materials to the site will generate noise. Noise is unavoidable during the construction period, although it may cause disruption to nearby Mokowe residents and facilities.

Mitigation measures

- Provision of ear protective devices to workers in noise dense areas to prevent high frequencies of noise emitted by the high-frequency machines during construction
- Proper equipment maintenance and restricted operation only during daytime hours so as to reduce noise
- Operation of shorter shift period for workers who come in direct contact with high concentrations of noise

5.2.2. Dust

During the construction phase of the project, a significant amount of dust will be produced which will affect the health of the workers on the site and the locals. Dust can lead to respiratory disorders and eye irritation.

Mitigation measures

- Areas generating dust particles should be controlled by regular cleaning or sprinkling of water to reduce dust

- Contractors should provide personal protective equipment, materials, and clothing such as nose masks and goggles to workers during demolition and construction phases

5.2.3. Waste production

The project is expected to generate wastes during the construction and operational phase. During the construction phase, the left-overs of the construction materials will be the main source of solid wastes. These will include soil, broken blocks, sand, empty cement bags, broken pipes, and empty paint containers, among others. The bulk of the solid waste generated during the operation of the project will consist of wastes produced in the fish rearing station, the washrooms, and the staff quarters. These wastes will include waste papers, plastic, soap wrappings, packaging material, broken piping, pump repairs, and inorganic wastes.

Mitigation measures

- The materials should be properly segregated and separated to encourage recycling of some of them.

- Provision of dustbin cubicles at the gate as the central collection point.

.• Waste receptacles will be placed at strategic points to discourage littering.

5.2.4 Injuries

During the construction phase of the proposed project, the workers on the site handle hazardous equipment such as hoes, hammers, machetes, iron sheets, and slashers, which can lead to injuries. The physical movement of heavy loads during construction

can cause accidents. The workers also get involved in accidents during the operational phase of the project either through mishandling electric equipment, which can lead to short circuits, be in slippery surfaces, or even trip along the staircase.

Mitigation measures

- Regular training of the personnel in case of any emergency including those involving fire outbreaks and accidents
- All the electrical connections shall be connected to one central emergency stop switch; also, they shall be designed by a registered engineer

5.3 Public Participation

It was paramount to hold a public participation session through a formal meeting to get the views and concerns of the neighbouring community on the project. The residents were informed of the project and were given an opportunity to communicate their concerns. Details of the meeting and list of attendance are attached in this report.

5.4 Sensitivity Analysis

This section identifies the probable anticipated impacts of the project, their analysis, and mitigation measures.

Implementation of the proposed development will have both positive and negative impacts resulting from activities carried out during Construction, Occupation, and Decommissioning phases. Mitigation measures give ways of reducing or avoiding adverse environmental impacts of the project.

Construction and Occupation phases of the proposed development shall have a bearing on site physiography, utility services such as water and electricity, space use and densities, the horizon profile, and human aspects that espouse labor, incomes, and new opportunities.

The table below gives an overview of the potential impacts due to project location, construction and occupation.

Table 8: Potential Impacts Due To Project Location, Construction And Occupation.

No.	Impacts	Negative		Positive		None
		Short Term	Long Term	Short Term	Long Term	
A	Project Setting					
i.	Change of land use				√	
ii.	Shifting of utilities					√
B	Construction Phase(including Pre-construction activities)					
i.	Loss of Habitat and Biodiversity		√			
ii.	Creation of employment				√	
iii.	Pollution	√				
iv.	Traffic congestion	√				

No.	Impacts	Negative		Positive		None
v.	Material sourcing for construction, installation maintenance			√		
vi.	Transitory population increase	√				
vii.	Public health and safety	√				
C	Operations Phase					
i.	Increased Waste Generation	√	√			
ii.	Increased traffic flow and conflicts on the access road	√	√			
iv.	Increased Pressure on Trunk infrastructure		√			
v.	Incidents, Accidents Occurrences/ Health and Safety		√			

In conclusion, from the sensitive analysis above it is evident that the project will have potential short term and long-term adverse impacts if mitigation measures are not put

in place.d during transportation and offloading/siphoning of waste into the treatment facility. This places the project under high-risk category as sanitation infrastructure.

CHAPTER SIX

6.0 ALTERNATIVES

6.1 SEWERAGE WORKS AND WASTE WATER TREATMENT PLANTS;

The conventional waste water treatment method could be applied.However this would require more land, higher cost, more complex machinery, more time and more qualified personnel to construct. Its maintenance and operations would also require more qualified personnel.

6.2 INSTALLATION OF INCINERATORS;

The proposed decentralised sewerage treatment plant can utilise incineration of sludge for generation of energy, which can be used for domestic or industrial purposes. The county can generate revenue from this.

The proposed facility can procure high energy incinerators or low energy incinerators depending on whether the sludge is incinerated while dry or wet.

6.3 'NO PROJECT' ALTERNATIVE /SITING.

The 'no project' alternative would mean that there is no implementation therefore no provision of a safe disposal system for sewage waste, no creation of jobs and revenue and no creation of income generation opportunities. Maintenance of status quo would mean that Mokowe town population increases with no improved disposal of sewage waste. This would increase risk of increased diarrhoeal diseases as pit latrines fill up more frequently.

CHAPTER SEVEN

7.0 PUBLIC CONSULTATION

Public participation is basically concerned with involving, informing and consulting the public in planning, management and other decision-making activities. Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. It encompasses the public actively sharing in the decisions that government and other agencies make in their search for solutions to issues of public interest.

Public consultation in this project was carried out with the following aims:

- To inform the local people, leaders and other stakeholders about the proposed project and its objectives
- To seek views, concerns and opinions of people in the area concerning the project
- To establish if the local people foresee any positive or negative environmental effects from the project and if so, how they wish the perceived impacts to be addressed

Interview schedules administered to respomdents are attached in the appendix of this report.

7.1 CONSULTATION ,AWARENESS AND INTERVIEWS

This EIA has been prepared in close consultation with local communities, business and special sector groups, government agencies and other stakeholders, who have been informed about the Project and the likely impacts. Consultations were through informal group discussions in the Project communities and through formal meetings with local authorities and LAWASCO management.

Interview of the stakeholders was undertaken during the EIA study process. The principle was to assess the initial opinions and attitude of the stakeholders to the project including all the components. Categories of stakeholders contacted include:

- Community members and opinion leaders of the project locations
- Members of Local Administration, National Government, County Government and Water Services Provider (LAWASCO)

In March, community members and stakeholders in Lamu municipality gave their opinions on the proposed project as shown in the minutes of two different community meetings conducted at; Mokowe Lamu Water Office, Mokowe Dispensary, attached in the appendices.

7.2 FINDINGS

7.2.1 Income Generation

Households in Lamu Municipality are in the low income bracket. Most youth are jobless and look forward to jobs or income generation opportunities associated with the proposed project.This is also reflected in the minutes and questionnaires.

7.2.2 Knowledge

The communities show an understanding of health issues surrounding poor disposal of sanitary waste.

They appreciate the proposed project in light of curbing the overflow of pit latrines together with the high cost of pit latrine construction as the population increases.

7.2.3 Culture

Most of the locals in each village were of the same tribe; either Boni (in Kiangwe-Basuba), or Swahili(at Amu Island) , Swahili(Matondoni) with a few people of different tribes on short visits to the area for short assignments (carpenters, teachers, health care workers, police). In Mokowe, there are multiple tribes as well as the native waswahili and Somalis. At Manda Island nearby, there are Giriamas, Luos, Luhyas,Kikuyus and Merus.In areas with many tribes, the population density is much higher and water uses are more making scarcity of portable water a felt need as much as there were existing water projects.For instance , a higher number of food kiosks in Mokowe as compared to Matondoni means that water and latrine uses in Mokowe are more than in Matondoni and more water is needed for cleaning toilets.

7.2.4 Socio-economic Benefits

Community members appreciated that once implemented, the projects would lead to an improvement in infrastructure as land would increase in value. This applies for all the areas in the municipality especially around the LAPSSET area.

This would increase job and income generation opportunities for locals.

7.2.5 Revenue

County authorities and local authorities as well as LAWASCO staff and stakeholders appreciated that the county would get revenue through billing for services offered by LAWASCO.

7.2.6 Tourism.

Community members expressed hope that once the project is implemented, tourism would expand to these areas as it would be possible for locals to put up guest houses and provide meals with easy access to a sewage disposal system.

7.2.7 Health care

Dispensaries in Mokowe will be able to access the sewage disposal that will promote hygiene .

7.2.8 Conflict

The community committee offered to resolve conflict incase of it arises regarding land use or sewage transportation and job creation. To further prevent chances of conflict, the community committees and youth were involved in the project implementation as early as the surveying stage.

7.2.9 Occupational Health Issues

The management of LAWASCO will ensure that the health of workers is covered incase of injuries. Work schedules will be adhered to so that no work is done at night and no one works for more than eight hours per shift. The proponent will also ensure that food vendors abide by the public health regulations

7.2.10 Covid 19

The site manager will ensure that regulations on prevention of Covid 19 will be observed. Hand sanitisers and masks shall be worn by workers. Temperature shall be monitore daily as workers report to work and records shall be kept.

7.2.11 HIV/AIDS

The proponent shall provide awareness campaigns for workers and the community during the duration of the project. This will prevent spread of infection due to social changes with influx of immigrants related to the project.

CHAPTER EIGHT

8.0 ENVIRONMENTAL IMPACTS AND MITIGATION

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's sustainability. The anticipated positive and negative impacts associated with the different phases of proposed project are outlined in the EMMP in this chapter.

8.1 CLASSIFICATION OF IMPACTS

The significance of impacts has been determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon. The analysis was aided by using the classification of impacts shown in **Table 11 .**

Table 9. Classification of impacts

		Classification of Effects	
Impact criterion	**Effect on environment**	**Expression**	**Effect description**
Positive or Negative	Will impact be positive or negative?	Positive	A positive impact
		Negative	A negative impact
Likelihood of Occurring	What certainty of occurrence is associated with impact?	Unlikely	Probably will not occur
		Possible	May not occur
		Certain	Will not occur
Duration	What timeframe or period is effect to be felt or last?	Short Term	Will last up to end construction Activity
		Medium Term	Will last as long as operational Activity
		Long Term	Will last beyond project operation
		Permanent	Will last a lifetime
Timing	At what stage will the impact occur or be felt?	Immediately	Will occur upon starting project Activities
		Near Future	Will occur during project operation

Impact criterion	Effect on environment	Expression	Effect description
		Negative	A negative impact
		Distant Future	Will occur beyond project operation
Significance	How severe will the impact be?	Minor	Little impact
		Moderate	Moderate impact
		Significant	High Impact
Extent	What is the areal extent or coverage of impact?	Project area	Effect confined to project area
		Environs	Effect to be felt by surrounding Areas
		Beyond environs	Effect to be felt within surroundings and beyond environs
Overall rating	How important is impact in	Insignificant	Impact not substantial, needs no
	Project design?		mitigation/enhancement
		Minor	Impact of little importance, needs limited mitigation/enhancement
		Moderate	Impact has influence and requires mitigating/enhancing
		Significant	Impact of great importance, mitigation/enhancement a must

8.2 POSITIVE/BENEFICIAL IMPACTS

8.2.1 Construction Phase

8.2.1.1 Creation of employment opportunities

During the process of excavation, laying of pipes and foundation and back filling, in addition to the skilled personnel, unskilled staff may be required. However, this will only be for a few days for a number of locals who will be involved. As a measure of enhancement, the unskilled personnel should be sourced locally.

8.2.2 Operation Phase

8.2.2.1 Impacts Regarding Water Supply

The proposed decentralised sewage treatment plant project will result in increase in proper disposal of sewage in the project area. This will consequently, minimize exposure to sewage in residences and work environments and reduce health risks in the area.

Significance of Impact

Improvement in disposal of sewage is considered positive impact of high of high significance. Implementation of the proposed project will enable the local community to access sound disposal of sewage.

Table 10 . Employment/Business Creation

Impact source(s)	Availability of sufficient and good quality water		Status	+
Nature of impact	✓ Minimization of exposure to unsafe water and attendant health risks ✓ Increase water supply to the local Community			
Reversibility of Impact	N/A			
Degree of irreplaceable loss of Resource	N/A			
Affected Stakeholders	Local community			
Magnitude	Extent	Regional -3 (on a scale of 1 to 10)		
	Intensity	Medium – 5 (on a scale of 1 to 10)		
	Duration	Long term – 5 (on a scale of 1 to 10)		
Significance	Probability	Definite – 5 (on a scale of 1 to 10)		
	Without mitigation	(Extent + Intensity + Duration + Probability) x WF (3+5+5+5) x 5 = 90 Low-Medium		**H**
	With mitigation	Positive impact		**N/A**

8.2.2.2 Time and Resource Management

Availing the decentralised sewage treatment plant will save them the timeabd resources used in construction of many more septic tanks and pit latrines. This time can be used to engage in other economic activities.

8.2.2.3 Improved Health Standards

A lack of adequate sewage disposal and low economic status usually increases the incidence of diarrhoeal diseases and reduces hygiene levels .

8.3 NEGATIVE/ADVERSE IMPACTS

Even though the project has many positive impacts that will lead to social economic development in project area, it also will come with negative impacts that need to be mitigated during the construction, operation and decommissioning phases. The categorization of impacts has been based on the severity of the potential impact using predefined impact rating criteria as minor, moderate or major according to the definitions below.

(a) Minor impact – an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.

(b) Moderate impact – an impact that will be within accepted limits and standards. They may vary from a threshold below which the impact is minor up to a level that might be just short of breaching an established regulatory limit.

(c) Major impact – is where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors.

Extent: within limited area (<200m from site), local (up to 10 km) or wide (regional or global > 10km); Duration: temporary (1 year), short term (1-5 years), medium term (5 - 10 years) long term (> 10– 50 years) or permanent.

The potential environmental impacts resulting from implementation of civil works are expected to be minor and short-term since the improvement works are principally for the installation of facilities and works at ground, sub surface and at existing above ground structures.However , the operations phase will involve high risk category activities; transportation and siphoning of sewage into the treatment facility.

8.3.1 Impact on Utilities

No damage is anticipated to the facility as the right materials will be used as per the engineer's specification.

8.3.2 Impacts on Flora and Fauna

A loss of habitat at the proposed site will result due to construction.

However, the species present in the project area, are common and widely distributed throughout the area and the loss of a few individuals will have a negligible impact on the overall population both at local and regional level.

In this project, low impact is expected on vegetation and any fauna in the area since the site is devoid of significant unique floral and faunal life.

The clearing of project sites through excavations will not adversely affect flora and fauna and all the impacts caused by construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that will be prescribed by the EMMP.

8.3.3 Impact on Air Quality

The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.

It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.

Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. Trenches will be dug and therefore the amount of spoil material will be used for backfilling using the same spoil material

undertaken. Sources of air pollutants from the construction works will include emissions from machinery in and out of the site emitting and earth works at site during the excavation of trenches.

Significance of Impact

The impact on air quality is regarded as low even without mitigation and limited within the footprint due to the minimal use of motorized equipment with respect to gaseous emissions and particulate matter with respect to dust emissions. The project will be implemented through the use of manual labour and mostly through manual equipment for digging the trenches. The difficulties in isolating air pollution originating from construction works and air pollution from the surrounding sources are expected, which will have impact on monitoring programme.

8.3.4 Impact on Soil and Geology

The excavations of trenches are not anticipated to significantly impact on soil and geology of the project site other than disturbances to soil which could subsequently resulting in erosion and soil contamination by oil leaks from excavation and construction equipment.

The works on construction including removal of topsoil and digging, as well as presence of machinery and workers at site will have minor negative impact on soil quality. The identified impacts are the following:

- Mechanical impact on soil during trench excavation;
- Stimulation of water and wind erosion;
- Soil pollution by spilling or discharge of oil and oil derivates, motor oil, and similar wastes originating from machinery and vehicles on site;
- Soil pollution due to uncontrolled deposition of solid waste (spoil material) on the land;

In the areas where steep slopes are to be crossed, construction can have potential to cause soil erosion and sediment run-off. Soils in the area are sandy and not clay which are known to be particularly prone to erosion. Reinstating the land is standard practice and will be carried out once the project is complete. The objectives of restoration are twofold:

- In the shorter term, to reinstate the land contours, drainage patterns, stabilize the soils by installing permanent erosion control and redistribute the topsoil to allow vegetation to grow; and
- In the longer term, to establish sufficient vegetation cover to reinstate the local plant species and ecology.

The delay in reinstatement can cause deterioration in topsoil quality, dissatisfaction by land owners and can increase the cost of later reinstatement. Where required, the seed of species remaining in the preserved topsoil will be supplemented with equivalent materials (seeds, bulbs, and plants) and/or by the re-planting of species removed from project area before construction.

During construction, the correct preservation of topsoil to maintain fertility will be carried out. The topsoil will be carefully stripped and stockpiled at all sites. Reinstating activities will take place immediately after pipe is buried in order to preserve quality of topsoil removed. With implementation of these measures, the residual impacts are not considered significant.

Significance of Impact

The impact on soil and geology is regarded as low even without mitigation and limited within the project footprint. The depth of the trenches will be shallow (1-metre-deep and 2 metres wide) and the excavated soil (spoil) will be used as backfill thereby reducing potential run off associated with spoil wastes. The use of motorized equipment likely to lead to soil contamination from oil leaks is also expected to be minimal as a result of little or no use of motorized equipment during construction.

8.3.5 Noise and Vibration Emission Impacts

During the construction phase of the project it is expected that noise will be produced in the construction area.

During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration. This impact is therefore expected to be low in nature and short term

experienced only in cases where motorized equipment is used. The works will mainly be carried out during the daylight working hours with no night working expected. Mitigation measures will prescribe daylight working hours .

Impact Significance

The significance of this impact will be low with mitigation measures in place as described in the mitigation measures section. In undertaking the construction activities described above, the Contractor will comply with the national regulatory noise quality emission standards. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.

8.3.6 Solid Waste Generation

- Solid wastes will mainly emanate from the construction activities and will include among others:
- Excavated soil
- Cement storage bags and other packets from materials used during construction.
- Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.

The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance.

The soil excavated will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes including will be disposed in an approved NEMA waste disposal site. The contractor will develop a **Waste Management Plan** (WMP) to guide the disposal of all types of wastes emanating from the project. The EMMP in this report can be used to guide.

Impact Significance

The impact significance is expected to be low in nature as a result of the low quantities of solid wastes that will be generated during construction and use of excavated soil and backfill material.

8.3.7 Visual Impacts

Visual related impacts mainly include open trenches excavated which could be an eye-sore and a health hazard. The trenches are depressions which would scar the earth surface and lead to significant visual impacts. This impact is therefore not considered to be significant and will be experienced for a short period

of time because of the immediate backfilling of the trenches by the excavated soil/spoil. The laying of some pipes is expected.

Impact Significance

The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.

8.3.8 Impacts on Surface Water

The excavation activities (trenching) and associated run-off, oil leaks and proximity to surface water bodies may lead to contamination of ocean water if measures are not taken to manage any potential storm drain

Mitigation:

Pave the fuelling area and create a soak pit to drain storm/waste water.

8.3.9 Impacts to Occupational Health and Safety

Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. In this project, the use of manual labour is envisaged and will account for over 90% of the construction activities. This is because the project area is peri-urban and congested with little room to employ mechanized equipment.

Impact Significance

Occupational health and safety impacts during construction is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.

8.3.10 Impacts on Community Health and Safety

No specific serious adverse impacts on community health and safety are expected as a result of construction and operations. There is potential hazard risk from open trenches in the vicinity of populated areas during the construction phase that should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized. The contractor will prepare an **Occupational Health and Safety Plan** for minimizing occupational and community health and safety impacts.The EMMP in this report can be used as a guide.During operations, the transportation of sewage should be guided by OSH guidelines using appropriate containment to prevent leakage of sewage along the road and into human sorroundings. The process of offloading should also prevent spillage.

Impact Significance

The health and safety impacts during construction is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery.However the impacts anticipated during transportation and offloading of sewage is considered to be of high level impact and strict mitigation guidelines will be required.

8.3.11 Impacts on Traffic

There is likely to be any snarl up on the paths used by pedestrians as Mokowe has vehicles and the project site is within the municipality.

8.3.12 Public Health Diseases

There is a potential induced impact during construction causing increased incidence of HIV/AIDS and communicable diseases due to new entrants in communities for

employment. There is a potential induced impact when increased income in the communities, from construction worker salaries, leads to domestic abuse in the home. Both these impacts can be mitigated by the HIV/AIDS and sensitivities awareness programs set out in the EMMP.

8.3.13 Resettlement Impacts

The project will not displace anyone.

The proposed site was bought by LAWASCO.

8.3.14 Gender Based Violence

Gender-Based Violence (GBV) is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed (i.e. gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private. A project of this magnitude is likely to exacerbate any of the various forms of GBV and could be perpetrated between workers themselves, between bosses and workers and between workers and the community members.

The term GBV is used to underscore systemic inequality between males and females (which exists in every society in the world) and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls. The United Nations Declaration on the Elimination of Violence against Women defines violence against women as "any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women." The nine core types of GBV are; -

- Rape
- Sexual Assault
- Sexual Harassment
- Sexual Exploitation and Abuse
- Sexual favours
- Physical Assault
- Forced Marriage

- Denial of Resources, Opportunities or Services
- Psychological / Emotional Abuse

The Contractor will ensure the relevant Code of Conduct already included as part of the bidding documents is signed at the corporate and individual workers levels in regard to observing GBV aspects of the project.

8.3.16 Child Protection

Violence Against Children (VAC) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.

The Contractor will ensure the Code of Conduct is signed at the Corporate and individual workers levels in regard to observing Child Protection aspects of the project.

8.3.17 Labour Influx and Recruitment

The project will involve recruitment of laborers which may lead to influx of persons looking for work in the project area. The significance of labour influx is expected to be low or moderate and mostly unskilled in nature. The Contractor will comply with the national labour laws as well as the develop a **Labour Recruitment Plan and Influx Management Plan** .

8.4 OPERATION IMPACTS

8.4.1 Contamination of the environment by sewage

Poor sewage disposal could lead to health impacts on the community. To prevent spillage of sewage during transportation and delivery at the plant, safety guidelines will have to be followed . These guidelines will be derived from the OSHA 2007 and EMCA 287.

Impact Significance

The impact is considered high in significance due to the potential high risk biological hazard.

8.4.2 Solid Waste Generation

Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others:

- Excavated soil
- Cement storage bags and other packets from materials used during repair and maintenance.
- Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.

The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes will be disposed in the Municipal waste disposal site. The operator (LAWASCO) will develop a **Waste Management Plan** (WMP) to guide the disposal of all types of wastes emanating from the project.The plan will include reuse of some waste types.

Impact Significance

The impact significance is expected to be low in nature as a result of the low quantities of solid wastes that will be generated during operation.

8.4.3 Visual Impacts

Visual related impacts mainly include housekeeping, waste management and landscaping.This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil/spoil.

Impact Significance

The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.

8.4.4 Impacts to Occupational Health and Safety

Operation and maintenance of the plant will involve workers whose safety may be at risk as a result of operation of equipment among others. Occupational health and safety impacts during operation/maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.

8.4.5 Impacts on Community Health and Safety

There is potential hazard risk from leakage of sewage during transportation and this could lead to community health and safety risks and should be mitigated by appropriate warnings and fencing and appropriate containment.

Health impacts associated with air and dust emissions on the community is expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance.

Impact Significance

The health and safety impacts during repairs and maintenance is considered to be moderate in significance due to the expected use of non-mechanized equipment and machinery.

8.4.6 Impacts on Traffic

Mokowe has vehicle routes. The vehicles at site delivering the sewage will be trucks. The potential of traffic snarl up though during sewage transport could be low to medium. Specific time or days could be allocated for this activity to help traffic in regulating traffic.

8.4.7 Noise and Vibration Emission Impacts

Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used. The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g. pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

The table below shows a summary of potential impacts .

TABLE 11: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Water	Contamination of underground water by oil/grease spills at site Pollution of sea water by runoff; accidental spillage of fuels,lubricants and other chemicals;siltation of water courses from runoff laden with sediment and dust; high suspended solids from soil from trenches *Project area has only no surface water	Direct/Minor Direct	Local Local	Temporary Temporary	Pavement on the surfaces where the machinery will be stored/maintenance area	Water Quality National Standards as in Water Act 2002	Contractor	Presence of storm drain Regular laboratory analysis of well water	20,000 5,000
	Conservation	Direct	Local	Temporary	Reuse water Harvest rain water	Water act 2006	Contractor	rain water harvesting facilities	100,000

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Waste	Vegetation and Soil from excavation,construction waste material and packaging material may produce moderate quantities of waste.	Direct, minor	Local	Temporary	Waste segregation at generation to allow for reuse Waste collection and disposal at the municipal dumps	EMCA 287 (National laws on waste management)	Site supervisor Throughout	Waste bins present	5,000
Air	Emission from vehicles , construction equipment and site (dust)	Direct, minor	Local	Temporary	Switch off engine when not in use,Ensure only exact site where buildings will stand to be excavated,Sprinkle water on dusty ground twice a day during dry spell,Provide employees with dust masks,Plant trees on open ground; Encourage vegetation growth in open areas	Sound air quality	Proponent Throughout	Air quality Or absence of musky smell(engine oil under combustion)	10,000
	Noise from vehicles and machines may cause nuisance to neighborhood	Direct, minor	Local	Temporary	Switch off engine when not in use Fence the site with iron sheets or any material that can reduce noise, Have noise producing machines be fitted with silencers -Provide employees with ear protectors	No complaints from residents of Shela village	Proponent Throughout	Noise level	10,000

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Plants and Animals	Removal of vegetation may lead to potential habitat loss of its associated fauna	Direct, minor	Local	Temporary	Environmental and Ecological Enhancement through campaigns, community activities such as rehabilitation of turtle nesting sites and beach clean ups.	Conserve biodiversity	Proponent Throughout	Zero loss of species	100,000
Soil	Site clearance of vegetation and Excavation works using equipment may induce/accelerate soil erosion and siltation of water courses.	Direct, minor	Local	Temporary	Rehabilitate land/land scaping	Restored site	Contractor After project implementation	Soil cover/vegetation	100,000
	Contamination may occur as a result of accidental or structural spillage of fuels,lubricant,chemicals, sanitary	Direct, minor	Local	Temporary	Construct pavement with drains and soak pit on the car park and machinery yard or storage area.	Zero pollution of ground water and soil	Throughout	Presence of pavement	20,000

	wastewater,etc., as well as from leakage from inadequately protected solid hence soil erosion and implication on agriculture is minor.								

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Accidents and OHS/Health	Workers may be exposed to occupational Health and safety hazards;accidents; lifting of objects; storage, handling and use of dangerous substances and wastes. Workers may be exposed to HIV and other STDs.Operation and maintenance could lead to health risks. Collapse of structures Sanitation	Direct, minor	Local	Temporary	Use of PPE Place a first aid box at a strategic location at the site, Proper housekeeping, Display signage for warning to prevent accidents, Keep records of injuries/ accidents at work and submit a report regularly to the Director of Occupational Safety and Health as required in OSHA 2007, Fence off and seal site from public access Employees working at height to be provided with appropriate working gear -Use appropriate elevators and other lifting machinery in conveying building material to high levels Building to be constructed strictly with specifications of Structural Engineer's requirements Constant checking of adherence to	OSHA 2007 requirements	Contracter Site Manager Project Manager Throughout	Number of accidents/injuries	20,000

					required specification and verifications by Government Engineers Adherence to site specification Adherence to time and material specifications Use of pit latrines, bathrooms and wash basins at office site Follow health guidelines in containment and transportation of sewage to the plant(prevent spillage or leakage along the route and to the ground)				

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Management	Conflict at work	Direct, minor	Local	Temporary	-Conflict resolution Communication -Internal audit committee consisting of staff and management representatives to ensure that environmental , occupational health ,safety procedures are put in place and adhered to.	Conflict resolution	Community committee, Project Manager, Throughout	Records on conflict	20,000
Aesthetics	Laying of pipelines may have a negative impact on aesthetics of the surroundings ; the soils from trenches that will be dumped along trenches	Direct, minor	Local	Temporary	House keeping Landscaping	Good aesthetics	Contractor Proponent , after implementation of the project	Appearance , Good aesthetics	
Environmental and Ecological Enhancement	Loss of species in the marine ecosystem	Direct	Local	Permanent	Segregation o f hazardous waste such as cigarettes(cigarettes are toxic to fish) and chemicals which harm marine life and segregation .	Conservation of biodiversity	Site Manager/Estate manager- Throughout	Prepare a checklist of plants and animals at site based on baseline data	10,000

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Promoting Environmental Protection and Conservation through Partnership with Stakeholders	Loss of marine life	Direct	Local	Permanent	Participate in marine conservation activities such as beach clean up organised by Lamu Marine Trust.	Marine conservation	Project Manager -Throughout	Regular reports of activities	-
Education and Awareness	Covid 19	Direct	Local	Permanent	-Orientation on safety practices; sanitizing hands and use of face masks Behavior change towards the environment Participation in environmental events with communities and schools Sensitization of staff, food vendors and public on Environmental sustainability relevant to the	Prevent spread of Covid 19 infection	Project Manager-Continous	Health records, medical records,	10,000

					institutional mandate Recognition of environmental champions				
	HIV infection				Participation in environmental events with communities and schools, Sensitization of staff, food vendors and public on prevention of spread of HIV	Prevent spread of infection	Proponent Continous	Health records, medical records,	20,000

Environmental Aspects	Potential Issues	Impact Type and Rating	Extent	Duration	Management Action	Targets	Responsibility and Timeframe	Monitorable Indicators	Cost (Ksh)
Environmental Sustenability and Planning	Stopping the spread of Covid 19 Stalling of the project Failure to maintain facilities Lack of community involvement	Indirect Direct	Local	Permanent	Community involvement Billing to raise money to maintain facilities Educate community and stakeholders on water conservation and protection of water catchment areas	Sustainable project	Comminity, Water subscribers/Customers, Proponent/LAWASCO	Regular maintenance of facilities Continued and adequate supply of water in households	100,000
Climate Change	Drying up of shallow wells Receding of water levels	Direct	Local	Permanent	Water conservations,Rain water harvesting, Measures to control green house gases, Rehabilitating water catchment areas, Planting trees at appropriate sites	Sustain underground water levels	Comminity, Water subscribers/Customers Proponent/LAWASCO	Number of wells that have been rehabilitated, Number of trees planted,	100,000
Indigenous Knowledge Systems	Use of inappropriate technology, Loss of catchment areas	Direct	Local	Permanent	Collect data /knowledge from the community, Field work,Data storage and application	Applying the best possible technology and systems in protecting catchment areas and conserving water.	Community,Proponent	Records on indegious knowledge collected from the community	100,000

CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

The consultancy team recommends the following:

- ✓ Construct a pavement and drainage on the tipping area and machinery/tools' maintenance area.
- ✓ Sprinkle the ground with water each day before carrying out earthwork
- ✓ Observe normal working hours.Avoid work at night hours
- ✓ Ensure that workers are paid on time as agreed in the contract
- ✓ Use the community committee in solving conflicts arising involving the community members
- ✓ Observe food safety for provision of food for workers. Food vendors should be certified by public health office
- ✓ Design a system of addressing worker grievances or adopt the one in chapter eight of this report.
- ✓ Housekeeping:Collect waste in form of rubble in one place to prevent falls or injuries;ensure waste separation for reuse, recycling and composting. Provide metallic coded waste bins.
- ✓ Avail basic training on health and safety at worker's camp and the workplace
- ✓ Use signage for warning
- ✓ Regular inspection/servicing of the sewage waste treatment lagoons, septic tank,sewage ferrying trucks/ honey suckers
- ✓ Monitoring of operations annually through an environmental audit.
- ✓ The proponent should erect shielding sheets and signs should be put to indicate the activity being carried out and the hazards present that is, it will limit debris, building stones and other building material from causing harm to people outside the building.
- ✓ Undertake and improve the already existing landscaping in order to restore destroyed areas, conserve soil and safeguard the ecosystem
- ✓ Mechanical service works to the machines should be done away from the project area to mitigate against leakage. Vehicles having oil leaks should not be allowed in the project area. The area used for servicing or

maintenance of machinery should be paved with concrete and a drainage and a soakpit created to dispose and treat the liquid waste

- ✓ The machinery and vehicles to be used should be frequently maintained so as to reduce noise and leakage.
- ✓ Switch off engines when not in use to conserve energy
- ✓ Ensure use of appropriate machinery by qualified personnel
- ✓ Reduce noise by; switching off engine when not in use, use ear plugs, fencing with sound proof material,fitting machines with silencers,
- ✓ Workers should be provided with protective gears such as earplugs, earmuffs, dust masks, helmets, gloves and boots
- ✓ Keep health records of workers, update regularly, provide health cover and notify DOSH in event of an accident as in OSHA 2007 regulations
- ✓ Practise waste segregation to facilitate re-use and to allow for treatment of hazardous waste
- ✓ Provide adequate sanitation
- ✓ Create an internal environmental and safety audit committee to sustain good practices
- ✓ Ensure billing for facility maintenance
- ✓ Carry out regular inspection of machines. Keep records
- ✓ Collect and apply IKS in communtiy activities associated with the plant
- ✓ Enhance the environment through community campaigns and rehabilitation of sensitive ecosystems such as the mangrove ecosystem and conservation of water catchment areas
- ✓ Sensitise the community and workers on issues surrounding HIV/AIDS and Covid 19 with the aim of prevention
- ✓ Rehabilitate land/landscape

Conclusion

Since the client has consented to abide by the set guidelines and the developed Environmental Management and Monitoring Plan (EMMP) in accordance with the statutory requirements (EMCA 387, Water Act 2006 and EMCA 287), the EIA consultancy team requests NEMA to issue the relevant license.

References

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The County Government of Lamu Environmental Impact Assessment Guidelines

MINUTES OF COMMUNITY MEETINGS

I. Minutes For The Public Participation Meeting Held At Mokowe Lamu Water Office With The Mokowe Community Representatives On 17th July 2021 From 8.00 A.M TO 9.00 A.M

Members Present

1. Bakari Mohamed Omar 0720745992
2. Mohamed Hussein 0723378473
3. Jackson Charo 0707076867
4. Athman Mohamed 0758880203
5. Rahma 0710430018
6. Bonaya 0710127634
7. Mzee Lausi 0720745992

Agenda

1. Opening
2. Introduce Background of the proposed project
3. Discuss anticipated challenges
4. Discuss mitigation measures for challenges mentioned

Min 1/2021:

The meeting was started by the Chairman of the community committee inviting all members and inviting one of the elders to lead in prayer.

Min2/2021:

The Chairman explained the history of the abandoned decentralised sewage plant ; he explained that in the 1980s the facility was constructed by world bank along with the Mokowe health center, anticipating that it would handle the sewage from the then proposed hospital block to host the Lamu referral hospital.However, the referral hospital remained at the Island and this led to underutilisation of the sewage plant in the then sparsely populated Mokowe town area.

Min 3/2021:

The members present reacted to the presentation by the lead expert by expressing their appreciation for the visit.

They highlighted a problem ; risk of sewage spillage along the road. However overall, they strongly expressed their support for the project.

Min4/2021:

The members also expressed desire to be briefed on the budget breakdown for the project citing that transparency would promote trust and community involvement . On this the lead expert made known that the proposed budget for the entire water infrastructure in Lamu municipality is Ksh. 10 million.

Min 6/2021:

Members explained that there was need for LAWASCO to engage a contracter who would deliver the project efficiently without leaving hazardous waste or trenches indiscriminately to prevent accidents.

They also mentioned the need for their youth to be hired in the activities proposed.

The meeting ended at 9.00 A.M.

Secretary: _____

Petronilla Gatwiri

Community Committee:_____

Mzee Lausi

II. Minutes For The Public Participation Meeting Held At Mokowe Dispensary With The Mokowe Bandar Hidaya Self Help Group That Consists of Mokowe Community Residents On 18th July 2021 From 8.00 A.M To 8.30 A.M.

Members Present

1.	Yufuna Yusuf Kupi	Chairman	0720979137
2.	Ahmed Hassan	Secretary	0720979137
3.	Abdul Aziz Omar	Executive Member	0720979137
4.	Abdisalat Ahmed	Executive Member	0720979137
5.	Amina Shali	Executive Member	0720979137

Agenda

1. Opening
2. Introduce Background of the proposed project
3. Discuss anticipated challenges
4. Discuss mitigation measures for challenges mentioned

Min 1/2021:

The meeting was started by the Chairman of the community committee inviting all members and inviting one of the elders to lead in prayer.

Min2/2021:

The Chairman explained the history of the abandoned decentralised sewage plant ; he explained that in the 1980s the facility was constructed by world bank along with the Mokowe health center, anticipating that it would handle the sewage from the then proposed hospital block to host the Lamu referral hospital.However, the referral hospital remained at the Island and this led to underutilisation of the sewage plant in the then sparsely populated Mokowe town area.

Min 3/2021:

The members present reacted to the presentation by the lead expert by expressing their appreciation for the visit.

They highlighted a problem ; risk of sewage spillage along the road. However overall, they strongly expressed their support for the project.

Min4/2021:

The members also expressed desire to be briefed on the budget breakdown for the project citing that transparency would promote trust and community involvement . On this the lead expert made known that the proposed budget for the entire water infrastructure in Lamu municipality is Ksh. 10 million.

Min 6/2021:

Members explained that there was need for LAWASCO to engage a contracter who would deliver the project efficiently without leaving hazardous waste or trenches indiscriminately to prevent accidents.

They also mentioned the need for their youth to be hired in the activities proposed.

The meeting ended at 8.30 A.M.

Secretary: _____

Petronilla Gatwiri

Chairman :_____

Yufuna Yusuf Kupi

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Ahmed Hassaf 0720979137

Occupation : ---Local trader and farmer

Residence: ---Mokowe.

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Through notification by the local community opinion leaders.

2. What positive environmental impacts do you anticipate for the proposed project?

   Creation of jobs and income generation opportunities.

3. What negative environmental impacts do you anticipate for the proposed project?

   Risk of leakage of sewage during transportation.

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   Injuries / accidents during implementation.

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   First aid and use of personal protective gear during implementation.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :.....Athman Mohamed 0758880203

Occupation : ....Farmer and Trader

Residence: ....Mokowe.

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes: Through the community committee.

2. What positive environmental impacts do you anticipate for the proposed project?

   Creation of jobs for the local community. Creation of income opportunities e.g. more trucks for sewage transportation to employ more people.

3. What negative environmental impacts do you anticipate for the proposed project?

   Injury of workers during construction work.

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   Injuries. Exposure of workers or community to sewage leakage during transportatio

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   - Provision of PPE for the workers.
   - Provision of first aid for workers.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Rahma 0710430018---

Occupation : ---

Residence: ---Mokowe.---

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   ---Yes. Through the community committee---

2. What positive environmental impacts do you anticipate for the proposed project?

   ---Creation of jobs.---

3. What negative environmental impacts do you anticipate for the proposed project?

   ---Delayed project implementation. The community needs the project as the population and settlements are growing).---

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   ---Injury of workers, Accidental spillage of sewage during transportation to the site.---

5. Do you support the proposed project's implementation?

   ---Yes.---

6. What mitigation measures do you recommend for the issues you have mentioned above?

   ---Provision of PPE and first aid kit.
   The proponent should speed up the process of implementation and preferably engage a local contractor for faster progress.---

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Jackson Charo 0707076867

Occupation : ---Trader - Mokowe

Residence: ---Mokowe

1. **Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?**

   Yes: Through the Community Committee LAWASCO.

2. **What positive environmental impacts do you anticipate for the proposed project?**

   Improved infrastructure, more urban growth, greater investments and more jobs.

3. **What negative environmental impacts do you anticipate for the proposed project?**

   Sometimes contractors drag projects. The project could delay.

4. **What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?**

   Injury of workers, spillage of sewage during transportation.

5. **Do you support the proposed project's implementation?**

   Yes.

6. **What mitigation measures do you recommend for the issues you have mentioned above?**

   Provide first aid kits and personal protective equipment for the workers. Fast-tracking & Monitoring by the proponent to ensure that the project implementation and operations are safe for the surrounding community.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Jufuna Yusuf Kupi 0720979137

Occupation : ---Health practitioner / Chairperson, Bandar Hidaya Self Help Group

Residence: ---Mokowe.

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Through your notification recently.

2. What positive environmental impacts do you anticipate for the proposed project?

   Creation of jobs,

3. What negative environmental impacts do you anticipate for the proposed project?

   Hopefully, locals will be hired and contracted, to implement the work. Previously, projects have been implemented by non locals leading to stalling/incomple

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   Injuries/accidents, accidental spillage or accidental exposure of workers to sewage causing illness.

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   Uses of PPE, a health and safety plan in place for project implementation and operations.
   - Engage qualified Engineers for safe operations and to prevent leakage.
   - Engage a local contractor.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Bonaya 0710127634---

Occupation : ---Community opinion leader.---

Residence: ---Mokowe---

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   ---Yes. Through the community committee. (mobilisation by LAWASCO)---

2. What positive environmental impacts do you anticipate for the proposed project?

   ---Less cases of overflow of pit latrines during the rainy season. Job creation---

3. What negative environmental impacts do you anticipate for the proposed project?

   ---Accidental leakage of sewage during transportation to the plant.---

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   ---Injury of workers.---

5. Do you support the proposed project's implementation?

   ---Yes---

6. What mitigation measures do you recommend for the issues you have mentioned above?

   ---Provision of PPE to workers
   Engage strict adherence to engineering guidelines during implementation.---

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :....Amina Shali 0720979137

Occupation : ....Housewife

Residence: ....Mokowe.

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Through Community members.

2. What positive environmental impacts do you anticipate for the proposed project?

   More jobs. Growth of the town. No need to spend more money constructing pit latrines once they fill up.

3. What negative environmental impacts do you anticipate for the proposed project?

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   Injuries during construction by workers.

5. Do ~~yopriprinu~~ you support the proposed project's implementation?

6. What mitigation measures do you recommend for the issues you have mentioned above?

   Provide first aid kit or personal protective equipment.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :- Bakari Mohamed Omar 0707745992

Occupation : ----------

Residence: ----------

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes, from local authorities and the community.

2. What positive environmental impacts do you anticipate for the proposed project?

   - Less costs on pit latrine construction.
   - Tax and revenue from the project.
   - Job creation

3. What negative environmental impacts do you anticipate for the proposed project?

   Injuries
   Road blockage during transportation by trucks (of raw materials for construction)

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   - Injuries / accidents.

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   - Notify the public before blocking road.
   - Use of first aid or PPE

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :Abdisalat Ahmed 0720979137

Occupation :

Residence: Mokowe

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Through community members.

2. What positive environmental impacts do you anticipate for the proposed project?

   Job creation.

   Better sewage disposal. Lower cost of pit latrine implementation, as the pit latrines can be emptied.

3. What negative environmental impacts do you anticipate for the proposed project?

   - Accidents/injuries for construction workers
   - Spillage/Leakage of sewage during transport.

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   - Provide personal protective equipment and first aid kits.
   - Proper engineering/employ professionalism to avoid designs that can lead to spillage of sewage in the environment during operations.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Abdul Aziz Omar 0720979137

Occupation : ---Local resident & Commmunity Advocacy through Self Help G

Residence: ---Mokowe

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes, through the Chair of Bandar Hidaya Self Help Group.

2. What positive environmental impacts do you anticipate for the proposed project?

   Creation of jobs.
   Improved health infrastructure

3. What negative environmental impacts do you anticipate for the proposed project?

   - Accidents.
   - Road blockage by trucks during construction and during transportation of sewage (operations phase

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   - Injuries
   - Disease outbreak.

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   - First aid provision
   - Health guidelines.
   - Use of signage along route and at site to prevent accidents.
   - Informing the public incase of need to block the road.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :---Mahamed Hussein 0723378473

Occupation : ---Trader - Mokowe.

Residence: ---Mokowe

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Through the Chairman of the community committee.

2. What positive environmental impacts do you anticipate for the proposed project?

   It will create jobs for the youth. It will promote sanitary infrastructure for the growing town.

3. What negative environmental impacts do you anticipate for the proposed project?

   In previous projects, the contractor leaves trenches bare, land degraded. This could happen.

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ?

   Injury of workers.

5. Do you support the proposed project's implementation?

   Yes.

6. What mitigation measures do you recommend for the issues you have mentioned above?

   Provide first aid services at the site. The contractor should rehabilitate the land upon project completion.

QUESTIONNAIRE ADMINISTERED TO RESPONDENTS FOR THE EIA FOR THE PROPOSED MOKOWE DECENTRALISED TREATMENT PLANT

Personal Information:

Name :.....Mzee Lausi 0720745992.....

Occupation : .....Resident and Farmer. Also Chairs the community committee.

Residence: .....Mokowe.....

1. Are you aware of the proposed decentralised sewage treatment plant for Mokowe? If so, how did you know about it?

   Yes. Notified by LAWASCO during an appraisal forum.

2. What positive environmental impacts do you anticipate for the proposed project?

   Mokowe town's growing urban population and filling up of latrines will benefit from a sewage disposal plant.

3. What negative environmental impacts do you anticipate for the proposed project?

   Leakage of or spillage of sewage along the way.

4. What occupational health and safety issues do you anticipate to arise in the course of the proposed project ? Injury of workers during implementation

   Risk of contamination for the people who accidentally come into contact with leaked sewage.

5. Do yo~~priprinu~~ support the proposed project's implementation?

   Yes

6. What mitigation measures do you recommend for the issues you have mentioned above?

   Provision of personal protective gear for the workers.

   Engage a maintenance team to monitor project and mitigate accidental leakage or spillage.

COUNTY GOVERNMENT OF LAMU

Office of the County Executive Committee Member Health

Telephone: +254-077870537
E-mail: cohealth@lamu.go.ke
Ref. No. LMU/CEC/FN/VOL.1/81

LAMU WATER & SEWERAGE CO. LTD
RECEIVED
03 DEC 2019

LAMU COUNTY
P.O. Box 45-80500
LAMU

Date: 3rd 12 2019

RE: CONSTRUCTION OF SEWAGE TREATMENT FACILITY AT MOKOWE HOSPITAL GROUNDS.

Your letter Ref: LAM/LAWASCO/LCG/VOL.1/003 refers.

After deliberations, it has been agreed that the sewage treatment facility can be constructed at the designated site at Mokowe hospital grounds. We look forward to benefitting from this project.

With regards,

Dr Gathoni A

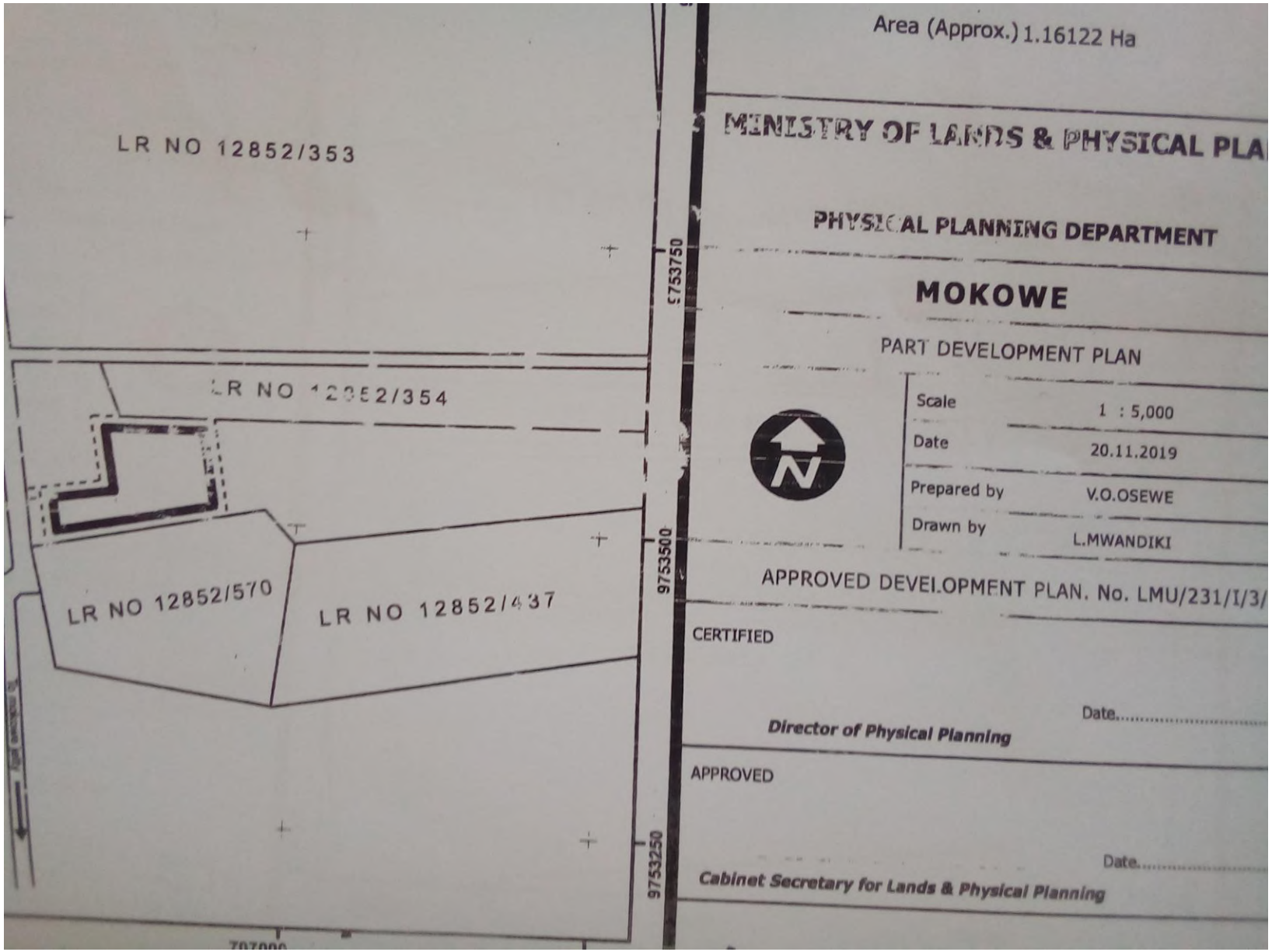
CECM Health

Lamu County

Cc: H.E Deputy Governor

CECM Agriculture and Water

Lamu County.


LR NO 12852/353
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LR NO 12852/570
LR NO 12852/437
9753750
9753500
9753250
Area (Approx.) 1.16122 Ha
MINISTRY OF LANDS & PHYSICAL PLA
PHYSICAL PLANNING DEPARTMENT
MOKOWE
PART DEVELOPMENT PLAN
Scale 1 : 5,000
Date 20.11.2019
Prepared by V.O.OSEWE
Drawn by L.MWANDIKI
APPROVED DEVELOPMENT PLAN. No. LMU/231/I/3/
CERTIFIED
Date.....
Director of Physical Planning
APPROVED
Date.....
Cabinet Secretary for Lands & Physical Planning

No. C. 122235

CERTIFICATE OF INCORPORATION

I hereby Certify, that—

LAMU WATER AND SEWERAGE COMPANY LIMITED....................

is this day Incorporated under the Companies Act (Cap. 486) and that the Company is LIMITED.

Given under my hand at Nairobi this THIRD day

of FEBRUARY Two Thousand AND SIX

KENYA

Dy. [signature] Registrar of Companies

GPK 6249—40m—12/2003—(B/6(B18)

VAT 31

Kenya Revenue Authority

Value Added Tax Department

Effective Date of Appointment 24-OCT-2007

CERTIFICATE OF APPOINTMENT AS WITHHOLDING VAT AGENT

VAT NO.	AGENCY NUMBER	PIN NO.
	LMULWSC/102007/2856	P051201623G

NAME OF AGENT LAMU WATER AND SEWARAGE COMPANY LTD

Name of main office MILIMANI (RIYADHA)

Postal Address: 185 LAMU TEL. NO. 633037 TOWN LAMU

Physical Address - Road/Street LANGONI BUILDING

B. ONDIEKI

Date Issued 21ST AUGUST 2008

For: COMMISSIONER OF VALUE ADDED

FORM 7

(r.15(2))

nema

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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/14705

Application Reference No: NEMA/EIA/EL/19007

M/S **PETRONILLA GATWIRI**
(individual or firm) of address

P.O. Box 274, Lamu

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **6680**

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

Issued Date: **4/9/2021**

Expiry Date: **12/31/2021**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified