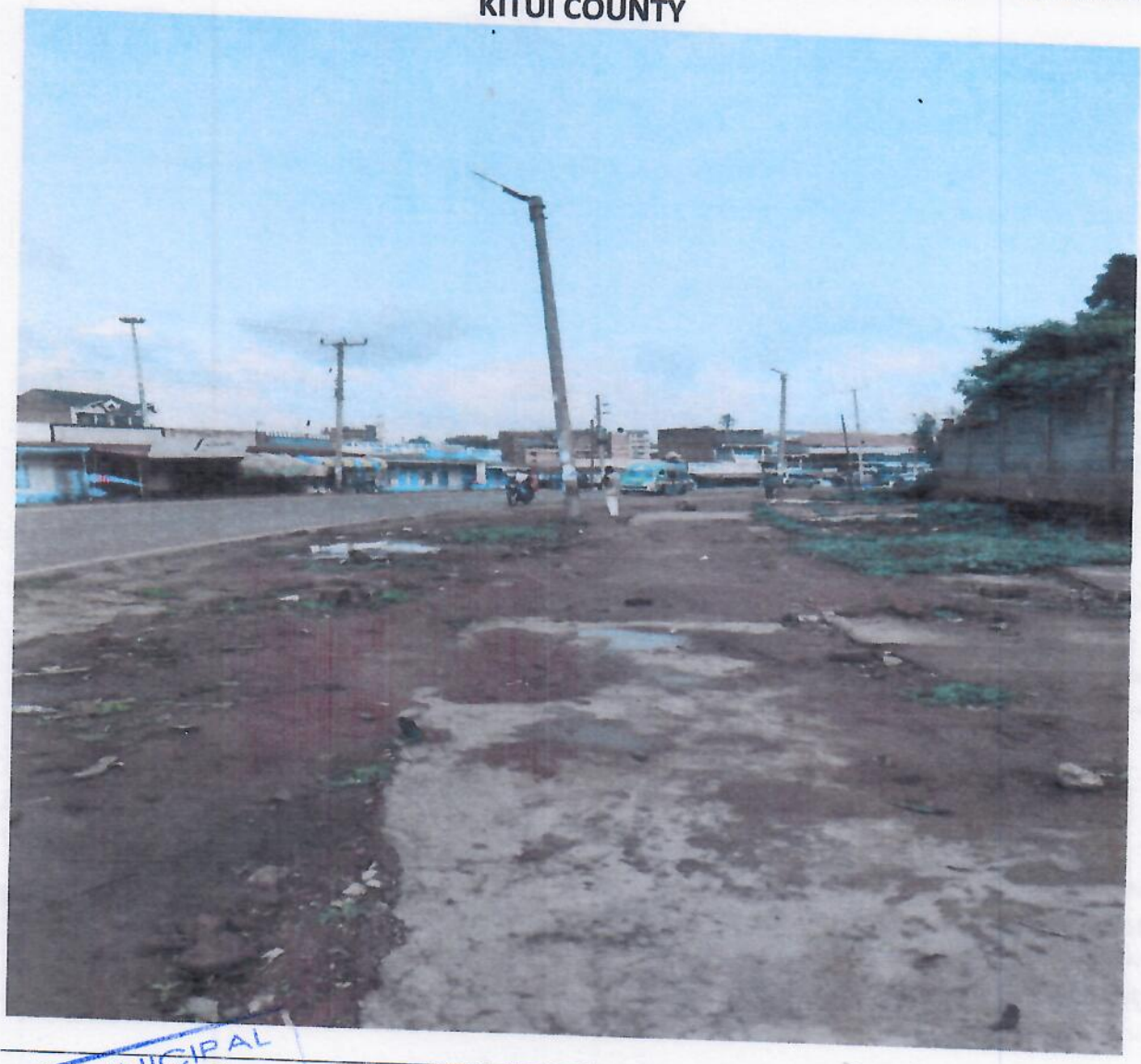
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT FOR THE PROPOSED IMPROVEMENT OF DRAINAGE AND PEDESTRIAN WALKWAYS FROM AIC JUNCTION TO KANDA SUPERMARKET (RHS) AND ALONG HOSPITAL WALL TOWARDS KCRH GATE UP TO KMTC JUNCTION UNDER URBAN SUPPORT PROGRAMME (KUSP II) IN KITUI TOWN, TOWNSHIP WARD, KITUI CENTRAL, KITUI COUNTY



ENVIRONMENTAL CONSULTANT

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SUBMISSION OF DOCUMENTATION

I, Aaron Mwaniki, Submit this Environmental and Social Impact Assessment Project Report for the **Proposed Improvement of Drainage and Pedestrian Walkways from AIC Junction to Kanda Supermarket (RHS) and Along Hospital Wall Towards KCRH Gate Up to KMTC Junction-Kitui Town, Township Ward, Kitui Central, Kitui County.** To the best of my knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the project.

Signed at KITUI on this 27th ***day of April 2026***

Signature.....

Designation: *Lead Environmental Consultant, NEMA Reg. No. 6467, License No.* ***NEMAENVIS/EL/0521***

SUBMISSION OF DOCUMENTATION

I, **the Municipal Manager, Kitui,** Submit this Environmental and Social Impact Assessment Comprehensive Project Report for the **Proposed Improvement of Drainage and Pedestrian Walkways from AIC Junction to Kanda Supermarket (RHS) and Along Hospital Wall Towards KCRH Gate Up to KMTC Junction-Kitui Town, Township Ward, Kitui Central, Kitui County.** To the best of my knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the project.

Signed at KITUI on this 27th ***day of April, 2026***

KITUI MUNICIPAL MANAGER
27 APR 2026
COUNTY GOVERNMENT OF KITUI
P. O. BOX 33 - 90200, KITUI

Signature.....

Designation: Municipal Manager, Kitui.

KITUI MUNICIPAL MANAGER
29 APR 2026
COUNTY GOVERNMENT OF KITUI
P. O. BOX 33 - 90200, KITUI

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT FOR THE PROPOSED IMPROVEMENT OF DRAINAGE AND PEDESTRIAN WALKWAYS FROM AIC JUNCTION TO KANDA SUPERMARKET (RHS) AND ALONG HOSPITAL WALL TOWARDS KCRH GATE UP TO KMTC JUNCTION UNDER URBAN SUPPORT PROGRAMME (KUSP II) IN KITUI TOWN, TOWNSHIP WARD, KITUI CENTRAL, KITUI COUNTY

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Signature……..

Designation: Municipal Manager, Kitui.

ACRONYMS

ESIA	***Environmental and Social Impact Assessment***
EMCA	***Environmental Management Coordination Act***
ESMP	***Environmental and Social Management Plan***
KM^2	***Kilometres square***
KWS	***Kenya Wildlife Services***
NEC	***National Environment Council***
NEAP	***National Environment Action Plan***
NEMA	***National Environment Management Authority***
NGOs	***Non-Governmental Organizations***
NPEP	***National Poverty Eradication Plan***
PAPs	***Project affected persons***
PPE	***Personal Protective Equipment***
TOR	***Terms of Reference***
GOK	***Government of Kenya***
WRMA	***Water Resource Management Authority***
TANATHI	***Tana Athi***
CPP	***Consultation and Public Participation***
OSHA	***Occupational Safety and Health Act***
SEKU	***South Eastern Kenya University***

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

EXECUTIVE SUMMARY

Introduction

Our client, County Government of Kitui (Kitui Municipality), has received funding from the World Bank under the Kenya Urban Support Program II (KUSP II) to carry out infrastructural projects within the municipality. Key among the infrastructural projects to be undertaken is Improvement of Drainages, Pedestrian Walkways and Car Parking Areas Between Kunda Kindu and KMTC Junction -Kitui Town, Township Ward, Kitui Central, Kitui County. Typically, the existing legislative and regulatory provisions require that such a project is preceded by environmental impact assessment with the twin objective of identifying the likely negative impacts and proposing appropriate mitigation measures at the early stages of project planning. It is against this background that this EIA process was initiated for purposes of compliance. The proposed project starts at Kunda Kindu GPS pickings of -1.365692 and 38.012037 latitude and longitudes respectively and terminates at -1.373529, 38.012618 at KMTC Junction. The road corridor has a general elevation of 1100-1150m a.s.l. Immediate neighbors and beneficiaries of the project are the many institutional, residential and business premises in the project environs.

Generally, Kitui County is located in lower Eastern Kenya at 1°22'S 38°01'E/1.367°S 38.017°E. It boarders the following Counties: Tana River to the East and South East, Taita Taveta to the South, Makueni and Machakos to the West, Embu to the North West, Tharaka and Meru to the North (figure 1). The County is divided into eight Sub-Counties: Kitui Central, Kitui west, Kitui Rural, Kitui East, Kitui South, Mwingi Central, Mwingi West and Mwingi North. The County has a population of 1,149,332 (KNBS, 2019) and an area of 30,462 km². Kitui Central with a total population of 131,715 comprises of five (5) Wards that is Miambani (pop. 22,164), Township (pop. 26,016), Kyangwithya West (pop. 22,121), Mulango (pop. 28,573) and Kyangwithya East (pop. 32,841). The proposed project falls under the Township ward.

Our client opted to confine the project activities within the existing legal framework by subjecting the proposal to upgrade the road to environmental impact assessment before project commencement. Environmental Impact Assessment is a tool for environmental Planning and has been identified as a key component in new project implementation.

According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, new projects must undergo Environmental Impact Assessment. The Report of the same must be submitted to National Environment Management Authority (NEMA) for approval and issuance of relevant certificates. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

Scope

Aaron Mwaniki of Mwingi municipality, who is registered and licensed by the National Environment Management Authority (NEMA) as Lead Expert in Environmental Impact Assessment and Auditing, was engaged as a consultant to conduct the Environmental Impact Assessment of the proposed road tarmacking project. The scope of the assessment covered construction works of the proposed development which included ground preparation, construction of the building, installation of service lines as well as the utilities required such as water lines, power lines, sewer lines, solid waste disposal point among others. The output of this work was a comprehensive Environmental and Social Impact Assessment project report for the purposes of applying for an ESIA license. The consultant on behalf of the proponent conducted the study by incorporating but not limited to the following terms of reference:

- Description of the nature of the proposed project;
- The location of the project including the physical area that may be affected by the project's activities;
- The activities that shall be undertaken during the project construction, operation and decommissioning phases;
- The design of the project;
- The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
- The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;

- An action plan for the prevention and management of possible accidents during the project cycle;
- A plan to ensure the health and safety of the workers and neighbouring communities;
- The economic and socio-cultural impacts to the local community and the nation in general;
- The project budget; and
- Any other information the Authority (NEMA) may require.

Methodology

The data collection was carried out through interview schedules by use of checklists, structured questionnaires, observations and photography, site visits, desktop environmental studies in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

Project Description

The project entails Improvement of Drainages, Pedestrian Walkways and Car Parking Areas Between Kunda Kindu and KMTC Junction. The project will involve site clearance and preparation, followed by excavation and grading of the construction area. This will be followed by the construction of the walkway base and the laying of paving blocks (cabro) to form the walking surface. Additional works will include the installation of kerbs and bollards to enhance pedestrian safety and delineate the walkway. Drainage structures will also be constructed to facilitate proper storm water management. The project will further incorporate landscaping and beautification of the surrounding area, as well as the installation of street furniture such as benches and waste bins to improve comfort and cleanliness along the walkway.

The project will cost approximately Kenya Shillings Twenty-eight million, four hundred and sixty-four thousand, four hundred and sixteen only (KShs 28,464,416.00).

Impacts and Mitigation Measures

There are both positive and negative impacts associated with the proposed drainages and walkway improvement. These are identified according to phases namely: Construction Phase, Operational Phase and Decommissioning Phase.

In general, the following positive impacts are associated with the proposed development: -

- Contribution towards achievement of KUSP II objectives
- Improvement of pedestrian infrastructure within the locality
- Enhancement of pedestrian safety along the road corridor
- Improved accessibility for pedestrians including persons with disabilities, the elderly, and school children
- Promotion of Non-Motorized Transport (NMT) such as walking
- Reduction in pedestrian-vehicle conflicts along the road
- Improved urban aesthetics and streetscape within the project area
- Improved roadside drainage and reduction of water stagnation along the corridor
- Creation of employment opportunities during the construction phase
- Expansion of local market base for consumables during construction phase
- Increased cash flow within the locality during construction and operation phases
- Improved accessibility to businesses and social amenities along the corridor
- Enhanced public health through promotion of walking and physical activity
- Participation and increased human productivity amongst others

The negative Impacts associated with the proposed project are:

- Temporary disruption of pedestrian movement during construction
- Disruption of underground utilities such as water, sewer, and communication lines
- Temporary disruption of business activities along the project corridor during construction
- Clearing of existing roadside vegetation in sections where the walkway will be

constructed

- Soil disturbance and possible soil erosion during excavation works
- Noise pollution from construction machinery and equipment
- Dust emissions during excavation and material handling
- Increased water demand during construction activities
- Temporary traffic alterations due to construction activities and material storage
- Risk of accidents involving workers and pedestrians during construction
- Generation of construction waste and related waste management challenges
- Possible encroachment of the completed walkway by vendors, motorcycles, or parked vehicles during operation amongst others.

Mitigation measures

Some of the mitigation measures proposed for these negative impacts include: -

Disruption of sewer, electricity and water lines along the road corridor

Some sewer, electricity and water lines are within the corridor. Some have been placed by the respective service providers while others by private land developers. The proponent and the contractor will put in place the following to minimize the impact:

- Notify the service lines owners of the proposed road construction
- Give the owners of the service lines adequate notice to relocate them
- Sensitize the owners of the service lines on the provisions of the Roads Act 2013 on placement, relocation and reinstatement of structures along road corridors
- Where applicable, the proponent and the contractor can assist in removal and reinstatement of such service lines

Disruption of business activities during construction of roads

The contractor will put in place the following to minimize the impact:

- Sensitize the local people on the kind of project taking place
- Restrict earthworks on mandatory areas
- Restrict traffic to designated routes
- Drivers to switch off engines and avoid unnecessary revving and engine idling

- Carry out some construction activities at night to avoid disruption
- Secure sensitive areas with a danger tape
- Execute the project as per project schedule to avoid delays

Reduction of vegetation destruction

The proponent will put in place the following strategies to mitigate the negative impacts: -

- Rehabilitate borrow pits
- The contractor will sensitize the workers to avoid unnecessary destruction of vegetation during site preparation
- Limit construction activities to mandatory routes
- Limit traffic to designated and mandatory areas
- The contractor will undertake landscaping activities using the native and exotic species to compensate vegetation that will be lost.

Controlling soil erosion and subsequently siltation

Soil erosion within the project site will be mitigated by applying several measures such as:

- Planning all land clearance, site excavation and trench digging works during the dry seasons and ensuring one section is completed and rehabilitated before another section begins
- Levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil
- Ensuring that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site
- Ensuring that open areas are landscaped using appropriate trees, grasses and flower to avoid bare soil that may be prone to erosion.

Dust Emission Control

Suggested mitigation measures during construction phase include:

- Cover all trucks hauling loose soil
- Sprinkling of the ground with water to minimize dust
- Restricting traffic on necessary parts of the project
- Avoid haulage of soil over elevated areas
- Provide dust screen to sensitive areas
- Provide construction workers with dust masks

Noise Pollution Control

The proponent will undertake the following to reduce the impact:

- Reduce noise at the source points
- Workers in high noise areas to be provided with earmuffs
- Proper servicing of machines
- Turning off the machinery to reduce noise and vibrations when not in use
- Drivers to minimize unnecessary vehicle reving and engine idling
- If possible, avoid blasting and use light machineries
- Undertake loud noise activities during off-peak hours

Accidents Control

This will be mitigated through:

- Provide adequate diversions
- Control traffic by posting sentries with green and red flags
- The provision of construction workers with the necessary protective gear to ward off risks of accidents and injuries.
- Secure risky/sensitive work areas with a danger tape
- Always post warning or information sign such as “MEN AT WORK, KEEP OFF, FLYING/FALLING ROCKS, HEAVY TRUCK TURNING” etc
- Provide a well-equipped first aid kit at the construction site

Waste Disposal

The proponent will ensure:

- There will be environmentally sound disposal of waste water from the Road tarmacking
- Solid waste would be disposed off in the dump site designated by the local authorities
- Waste bins are installed during operation phase
- During construction phase, the proponent will ensure that temporary pit latrines and waste bins are put up to be used by construction workers.
- Wastes from construction materials will be properly disposed and pilling of the same will be avoided
- Excavated soil should be safely hauled and disposed appropriately

Efficient water use

The project management shall promote efficient water use within the project sites by: -

- Sensitizing the workers to use efficiently the authorised water collection points provided
- Use water efficient apparatus/dischargers in watering dusty road surfaces
- Ensuring installed taps are not left running when not in use.
- Recycling of waste water where necessary

Environmental and Social Management Plan (ESMP)

A comprehensive environmental management plan has been prepared to assist the proponent and contractor address the identified adverse environmental impacts of the project. Strict adherence to the environmental management plan and observation of principles of best practice for projects of this nature is recommended to ensure environmental sustainability of the project.

Conclusions and recommendations

The proposal by our client, County government of Kitui (Kitui Municipality), to Improve Drainages, Pedestrian Walkways and Car Parking Areas Between Kunda Kindu and Kmtc Junction through a grant from the World Bank under the Kenya Urban Support Program II (KUSP II) has been subjected to the EIA process as required by the existing legal provisions. Assessment findings indicate that the proposal to pave the 1000m long walkways is a move in the right direction and will contribute greatly towards achievement of KUSP II objectives of improving infrastructure and dustless towns in selected municipalities. Currently, the walkways and drainages are in a poor state and some sections are rendered impassable especially during the rainy seasons. The proposed improvement works will restore the section to a well-drained and improved state while also improving service delivery to the residents of the project site and its environs.

The EIA process has established that established that traffic data has been collected and project designs developed. The contractor is expected to strictly follow the project designs and material specifications to avoid collapse of structures and possible liability issues arising. As per the requirements of the industry standards, material testing by accredited government institution is mandatory. It is the sole responsibility of the project contractor to ensure material testing is done. The contractor is also expected to execute the project within the set timelines to avoid project delays and inconveniences caused by the construction works to the road users and the immediate community. The inhabitants of surrounding area are workers, home owners, institutions and business people. Public participation done during the EIA process indicate that the local people have been well sensitized about the project by different stakeholders and as such, the project has the full support of the immediate community.

The proposed works will bring positive and negative effects in the project area and its environs. Key positive impacts include: opening up the project area, employment of local people, payment of taxes, achievement of KUSP II objectives amongst others. Against the background of the positive impacts are several negative impacts such as relocation and demolition of illegal structures, disruption of service lines, dust pollution, loss of vegetation, risk of soil erosion amongst others. However, the expected negative impacts can be mitigated appropriately by implementing the provided ESMP.

The assessment has noted with concern that several service lines such as sewer, electricity and water lines are within the corridor proposed for improvement. The proponent and the contractor are, however, expected to work closely with the service lines owners to ensure removal, relocation and reinstatement of such lines. It is important that the service lines owners are sensitized on the provisions of the Roads Act 2013 on placement, removal and reinstatement of structures on road reserves. This will greatly reduce possible conflicts and disruption of service provision to the local residents.

To minimize risk associated with occupational health and safety, the proponent and the contractor are expected to observe the general and specific industry standards and OSHA regulations for projects of this nature and magnitude. The contractor is expected to pay special attention to safety issues related to workers at workplaces as required by OSHA and other pertinent legislative provisions. This will ward-off incidences of work related injuries and possible liability issues arising. Key among the OSHA requirements is provision of workers with appropriate protective gears based on work assignment. Though the contractor plans to extract construction materials from an existing borrow pit, it is advisable that he executes all quarrying works within the confines of the existing legal frameworks for such activities.

Taking into cognizance that the proposed drainage and walkway improvement will greatly contribute towards achievement of KUSP ii objectives of infrastructural upgrade and dustless towns in Municipalities and given that all the likely negative impacts have been identified and appropriate mitigation measures proposed, it is my recommendation that Nema approves the proposed project and grants an ESIA license to the proponent.

CHAPTER ONE

1.0 INTRODUCTION

1.1. Background and Rationale for an Environmental Impact Assessment

Kitui municipality is one among the selected municipalities to benefit from a World Bank funding to support infrastructural upgrade and dustless towns under the Kenya Urban Support Program II (KUSP II). Several projects ranging from roads, water, markets amongst others are being implemented under the program. Under the roads infrastructure, the section between Kunda Kindu and KMTC junction has been proposed for improvement in regards to the drainages, walkways and car parking area within the section. However, existing legislative and regulatory provisions require that such a project is preceded by environmental impact assessment primarily to identify the likely negative impacts and propose appropriate mitigation measures at the early stages of project planning. It is on this legal background the proposal to improvement works were subjected to the ESIA process. The proposed project starts at Kunda Kindu GPS pickings of -1.365692 and 38.012037 latitude and longitudes respectively and terminates at -1.373529, 38.012618 at KMTC Junction. The road corridor has a general elevation of 1100-1150m a.s.l. Immediate neighbors and beneficiaries of the project are the many institutional, residential and business premises in the project environs.

Kitui County is located in lower Eastern Kenya at 1°22'S 38°01'E/1.367°S 38.017°E. It boarders the following Counties: Tana River to the East and South East, Taita Taveta to the South, Makueni and Machakos to the West, Embu to the North West, Tharaka and Meru to the North. The County is divided into eight Sub-Counties: Kitui Central, Kitui West, Kitui Rural, Kitui East, Kitui South, Mwingi Central, Mwingi West and Mwingi North. The County has a population of 1,149,332 (KNBS, 2009) and an area of 30,462 km². Kitui Central with a total population of 131,715 comprises of five (5) Wards that is Miambani (pop. 22,164), Township (pop. 26,016), Kyangwithya West (pop. 22,121), Mulango (pop. 28,573) and Kyangwithya East (pop. 32,841). The proposed project falls under the township ward.

This EIA report has been prepared in accordance with EMCA provisions for projects of this nature and magnitude. According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) of 1999 and Part II and III of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), construction of such a development requires an Environmental Impact Assessment Project Report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This is necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

1.2 Scope, objective and criteria of the Environmental Impact Assessment

1.2.1 Scope

The Kenya Government policy on all new projects, programmes or activities requires that an environmental impact assessment be carried out at the planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of the facility. The scope of this Environmental Impact Assessment, therefore, covered:

- The baseline environmental conditions of the area,
- Description of the proposed project,
- Provisions of the relevant environmental laws,
- Identification and discussion of any adverse impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Provision of an environmental management plan outline.

1.2.2 Terms of Reference (TOR) for the EIA Process

Aaron mwaniki, of Mwingi and Lead Expert registered with NEMA, was appointed as a Consultant to conduct the Environmental Impact Assessment of the Proposed Drainage,

pedestrian walkways and car parking improvement Project. The scope of the assessment covered construction works of the proposed development, which included ground preparation, removal of structures and trees within the corridor, excavations for structures, stone pitching, back-filling, compaction and drainage related works. The project will also entail quarrying and hauling of marrum soil and stones from an existing borrow pit. The output of this work is a comprehensive Environmental Impact Assessment project report for the purposes of applying for an ESIA licence.

The main objective of the assignment was to assist the proponent to prepare a project report after carrying out an Environmental and Social Impact Assessment (ESIA) of the proposed drainage improvement and walkways project, to ensure the proposed development takes into consideration appropriate measures to mitigate any adverse impacts to the environment. The study identified existing and potential environmental impacts and possible concerns that interested and/or affected parties have with the development, as well as the associated prevention and mitigation measures for the negative impacts as stipulated in the Environmental Management Plan (ESMP) proposed.

The Lead expert on behalf of the proponent conducted the study by incorporating but not limited to the following terms of reference: -

- Description of the nature of the proposed project;
- The location of the project including the physical area that may be affected by the project's activities;
- The activities that shall be undertaken during the project construction, operation and decommissioning phases;
- The design of the project;
- The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
- The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;

- An action plan for the prevention and management of possible accidents during the project cycle;
- A plan to ensure the health and safety of the workers and neighbouring communities;
- The economic and socio-cultural impacts to the local community and the nation in general;
- The project budget; and
- Any other information the Authority (NEMA) may require.

1.2.3 Data collection procedures

First, the lead expert undertook environmental screening and scoping to avoid unnecessary data. The data collection was carried out through structured questionnaires/standard interview schedules, use of checklists, observations and photography, site visits and desktop environmental studies where necessary in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

1.2.4 EIA organization and structure

The ESIA was carried out to full completion within a period of 14 days from the date of undertaking. The consultant (Lead Expert) coordinated the day-to-day functions and any related institutional support matters. Otherwise, all formal communications were directed to NEMA through the proponent.

1.2.5 Reporting and documentation

The Environmental Impacts Assessment Project Report from the findings was compiled in accordance with the guidelines issued by NEMA for such works and was prepared and submitted by the proponent for consideration and approval. The consultant ensured constant briefing of the client during the exercise. Description plans and sketches showing various activities are part of the appendices.

1.2.6 Responsibilities and undertaking

The consultant undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The consultant arranged for own transport and travels during the exercise. On the site of the proposed improvement works, the proponent provided a contact person(s) to provide information required by the consultant. The proponent also provided site plan(s) showing roads, service lines, structure layouts and the actual size of the site, details of raw materials, proposed process outline and anticipated by-products, future development plans, operation permits and conditions, land-ownership documents and site history. The output from the consultant includes the following:

-

- An Environmental Impact Assessment report comprising of an executive summary, study approach, baseline conditions, anticipated impacts and proposed mitigation measures,
- An Environmental Management Plan outlines which also forms part of the report recommendations.

1.2.7 Methodology outline

Due to the magnitude of the proposed project activities, a project report was opted in order to ensure completeness of the assessment. The assessment was carried out through desk study and field surveys. Literature review related to project activities was also carried out to determine such aspects as the policy, legal and regulatory frameworks relevant to the project activities. The field survey included physical inspection of the proposed site of the project and surrounding areas, collecting information on biological and physical features such as vegetation, wildlife, geology, soils, hydrology and water resources, landscape, neighbourhood character, public perceptions and social considerations.

The methodology employed during the assessment complied with ESIA/EA regulations. The following steps were followed during the assessment:

- Environmental screening
- Environmental scoping to identify critical physical, biological, socio-economic and land use issues that the proposed project activities are likely to impact, either positively or negatively
- Desk studies and interviews
- Physical inspection of the project site and surrounding areas
- Impact analysis and analysis of project alternatives
- Public participation/consultation
- Data analysis
- Reporting.

1.2.7.1 Environmental Screening

This step was followed in order determine whether an ESIA was required and what level of assessment was necessary. This was done bearing in mind the requirements of the EMCA, 1999, and specifically the second schedule. Issues considered included the physical location, sensitive issues and nature of anticipated impacts.

1.2.7.2 Environmental Scoping

The step ensured that the expert remain focused on the most critical issues requiring more serious attention during the environmental impact assessment. On the basis of scoping exercise, the environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

1.2.7.3 Desk Study

This entailed review of documents related to the nature of the proposed project activities. The documents that were reviewed included project documents (showing the work plan, project activities, bills of quantities), engineering designs, relevant policy, regulatory and legislative frameworks, County Development Plans among others. It also included discussions with Project coordinator and design engineer at Mwingi project site.

1.2.7.4 Site assessment and public participation

Surveys were carried out on the proposed project site to capture baseline information. Site assessment essentially targeted establishment of the baseline environmental conditions as well as the ecological, physical and human components of the environment that will be impacted by the project. Public participation was ensured by having open discussions with key stakeholders at the project neighborhood, who will be impacted by the project. Structured questionnaires were administered to community members within the project area to capture local community's views of the project.

1.2.7.5 Data Analysis

Data analysis involved the analysis of data collected during the site investigations as well as data collected through interviewing of the local community members who may be impacted by the project activities. The data collected from both the primary and secondary sources was also analysed and applied in the report. The following sections present summaries of approaches that were applied.

1.2.7.5.1 Secondary Data

The relevant secondary data was obtained from published sources such as books, official government documents and statutes, plans, reports and documentation from various institutions. The analysis of secondary data was carried out using standard approaches.

1.2.7.5.2 Primary Data

Primary data was obtained through interviews, field observations, structured questionnaires and input from the project team. The analysis of the primary data was also carried out using standard approaches.

1.2.7.6 Reporting

In addition to constant briefing of the client, this environmental impact assessment project report was prepared. The contents were presented for submission to NEMA as required by law.

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Introduction

Kitui municipality is one among the municipalities selected to benefit from a World Bank funding to support infrastructural upgrade and dustless towns in municipalities under the Kenya Urban Support Program II (KUSP II). Under the program, the section between Kunda Kindu and KMTC Junction has been proposed for improvement on drainages and walkways for non-motorized traffic. Implementation of the project will restore the section to a motorable state while ensuring that the KUSP II objectives of infrastructural upgrade and dustless towns in municipalities are achieved.

2.2 Location of the project

The proposed project starts at Kunda Kindu GPS pickings of -1.365692 and 38.012037 latitude and longitudes respectively and terminates at -1.373529, 38.012618 at KMTC Junction. The road corridor has a general elevation of 1100-1150m a.s.l. Immediate neighbors and beneficiaries of the project are the many institutional, residential and business premises in the project environs.

2.3 Broad Goal and objectives of the project

The main objective of the project is to improve the drainages and walkways of the sections between the Kunda Kindu and KMTC junction as part of the projects under Kenya Urban Support Program II (KUSP II) to support infrastructural upgrade and achieve dustless towns in municipalities. This project is relevant to the project area and its environs since it will lead to a long term solution to the poor status of the walkways and drainages and ensure efficient service delivery.

2.4 Project design

The project design has the following key structures and utility features:

- ✓ Improved walkways and drainages:
  - Cabro Paved
  - Road kerbs and Channels
  - Culverts and cross over slabs
  - Drainage channels
  - Earthworks

2.5 Project budget

The budget for the construction of the proposed drainage works and walkway improvement is estimated to be about Kshs.27,618,889.29 Funds for the project will be provided by the County government of Kitui (Kitui Municipality) through a World Bank funding under the Kenya Urban Support Program II (KUSP II).

Table 1: Project budget

SUMMARY TO BILL OF QUANTITIES		
BILL ITEM	**DESCRIPTION**	**BILLED AMOUNT (KSHS.)**
1	GENERAL	1,225,000.00
4	SITE CLEARANCE AND TOP SOIL STRIPPING	336,295.00
5	EARTHWORKS	1,580,790.75
8	CULVERTS AND DRAINAGE WORKS	5,842,100.00
9	PASSAGE OF TRAFFIC	60,000.00
12	NATURAL MATERIAL FOR BASE AND SUBBASE	2,518,230.00
20	ROAD FURNITURE	11,231,140.00
25	CROSS CUTTING ISSUES	774,000.00
	Sub - Total 1	**23,567,555.75**
	Add 1% for contingency	235,675.56
	Sub-Total 2	**23,803,231.31**
	Add 16% of Sub-total 1 for Value Added Tax	3,808,517.01
	Add 0.03% for Procurement Capacity Building Levy	7,140.97
	GRAND TOTAL	**27,618,889.29**

2.6 Project raw materials

The main material input in the project includes: -

- 80mm heavy duty interlocking blocks
- Steel Bolards
- Cement
- High yield steel reinforcement
- Gabion mesh wire
- Guard posts
- Hard core
- Sand
- Shuttering timber
- Gravel
- Ballast
- Water
- Route markers amongst others

2.7 Description of the project's preparation activities

2.7.1 Sign board

As a legal requirement, erection of a clearly labelled sign post will be mandatory to inform the general public of the nature of project under construction. The project's sign board must be erected to make the public aware of the development and to keep away intruders, which will indicate the following:

- The developer's name and address
- The local authority approval number
- The project architect's details
- The project engineer
- The project quantity surveyor
- NEMA, NCA and Physical planning approval numbers
- Other professionals involved in the project.

2.7.2 Temporary site pit latrine

As required by environmental impact assessment and audit regulations, a temporary site pit latrine will be put up by the contractor prior to the commencement of the project. This facility is specifically made to ensure proper disposal of human wastes during construction and thereby ward-off health-related problems.

2.7.3 Site office

As required by law, the contractor will be required to put up a site office. Important documents such as project operational permits, project plans, designs among others should be kept in the office during the construction phase. The documents should be open for inspection by the government parties with interest in the project.

2.7.4 Provisions of workers with personal protective equipment (PPE)

The OSHA regulations and other pertinent legislations for workplaces require that the contractor provides workers with appropriate and fitting PPE. Such PPE include aprons, gloves, dust coats, gumboots, helmets, ear muffs amongst others. Depending on the work assignment, every worker at the project site is expected to be in full working gears to ward-off possible injury/accidents that may also result to liabilities to the proponent.

2.7.5 Preparatory work

The initial activity on the proposed project is the preparatory works for the site which will normally entail the provision of site office/camp site, light bush clearance and setting up of material store and storage yard. The initial preparatory work will involve minimal earthworks and vegetation clearance.

2.7.6 Materials testing and storage

As required under the general standards specifications and the contract documents, all materials to be used will be tested by accredited government institution. Construction materials will be stored in a temporary store within the site. Bulky materials such as bituminous mixes, ballast, sand and stones/hard-core will be carefully piled on site. To avoid

piling of large quantities of materials on site, the bulky materials such as bituminous mixes, sand, gravel and stones will be ordered in quotas. Materials such as cement (where applicable) among others will be stored in a temporary store.

2.7.7 Securing risky/sensitive sites

As a legal requirement, the contractor will be expected to secure risky and sensitive working sites with a danger tape to warn workers and the general public. This will avoid incidences of injuries and possible liability issues arising.

2.7.8 Signage's at the proposed project site

The law requires the contractor to post cautionary signage's at the proposed project site to warn the workers and the members of the public. The road corridor to be tarmacked should be clearly demarcated using route markers. Such signage's include among others "KEEP OFF CONSTRUCTION SITE, NO ENTRY TO WORK SITE WITHOUT PPE, BEWARE OF FLYING/FALLING ROCKS OR STONES, MEN AT WORK, HEAVY TRUCKS TURNING". Signage's to indicate flow of traffic and speed limit must be clearly posted at the site to avoid incidences of injury and possible liability issues arising.

2.7.9 Earthworks

This will be done as per the industry general standards specifications. Preparations prior to forming embankments will be done. This will be followed construction of the embankments and compaction up to the site engineer's specifications.

2.7.10 Quarries, borrow pits, stockpiles and spoil areas

The contractor will entirely be responsible for locating suitable sources of materials complying to standards and special specifications. Further, he will be responsible for the procurement, wining, haulage to site of the materials. Rehabilitation of quarries and borrow pits will be as per the agreement between the contractor and land owner.

2.7.11 Rock blasting and blasting permit

Though the road corridor proposed for tarmacking is not rocky hence chances of encountering rocky surfaces/basement that may warrant blasting are minimal. However, should the contractor encounter such surfaces and decide to carry out blasting, then the following will be required. Prior to commencement of the work, the contractor will be required by law to obtain a Rock blasting permit from Mines and Geological department. The permit will authorize the contractor to carry out controlled blasting in accordance with provisions of sub legislation 78(1) of explosives Act Cap 115 Laws of Kenya. The contractor can only be granted the permit on condition that a registered blaster is engaged to undertake the Rock blasting.

2.7.12 Noise permit

If blasting of the rock will be mandatory, the law requires that the contractor obtains a noise permit from the County Government Ministry of Environment and Natural Resources prior to Rock blasting. The permit stipulates conditions that must be observed by the blaster as per the noise regulations.

2.7.13 Excavation and filling for structures

All excavated surfaces in material other than hard material on which foundations for structures shall be compacted to 100% MDD immediately before structures are constructed. Other activities to be done will include: back filling for structures, excavation for drainage, stone pitching, gabions, rip-rap protection works and back-filling for below structures.

2.7.14 Culverts, gate slabs and drainage works

The contractor will adhere to specifications in the contractor document as well as the general and specific industry standards and the principles of best practices for projects of this nature and magnitude. Key activities will include excavation for culverts, gate slabs and drainage works, excavation in hard material, bedding and laying of pipe culverts, jointing concrete pipes, back-filling over pipe culverts, subsoil drains among others

2.7.15 Passage of traffic

The contractor shall be in charge of deviation. As such, the contractor, on instruction by the engineer will construct and complete deviations to the required specifications. The contractor will ensure there is passage of traffic through the works during construction whenever it is not practical to make deviations. Further, the contractor will be expected to put up signs, barriers and lights in sections where the traffic is being carried off the existing road. Sentries with red and green flags will be posted in critical zones to direct traffic.

2.7.16 Shoulders to pavements

As required by principles of best practices and the general and specific industry standards and specifications, shoulders shall be 1m wide on both sides and shall be formed of 150mm thick well compacted soft stone material and top soiled with red coffee soil and planted with grass.

2.7.17 Natural material sub-base and base

The contractor will carry out the following activities as per the site engineer's instructions: scarification and reprocessing of areas, pavement repairs, pavement widening among others.

2.7.18 60mm Heavy Duty Interlocking blocks

In line with industry standards and specifications, the contractor will be expected to prepare the subgrade and base for the installation of 80mm heavy duty interlocking concrete blocks along the proposed walkway. Surface preparation shall include clearing of debris, excavation to the required depth, compaction of the subgrade, and laying of an appropriate bedding layer of sand or quarry dust. The interlocking blocks shall then be carefully placed, aligned, and compacted to ensure a stable, durable, and even pedestrian surface.

2.7.19 Steel Bollards

As contained in the contract documents and in accordance with the relevant industry specifications, steel bollards shall be installed at designated points along the walkway to prevent unauthorized vehicle access while maintaining pedestrian movement. The bollards

shall be properly anchored in concrete foundations to ensure stability and durability. Their placement shall be as directed by the project engineer to enhance pedestrian safety and protect the integrity of the walkway infrastructure.

2.8 Description of the project's operational activities

2.8.1 Project administration and management

Once the project implementation is complete and operating satisfactory, the project will be handed over to proponent who will be responsible for day to day operation and maintenance of the project. Some of the important activities to be undertaken will include and not limited to:

- Carrying out routine maintenance
- Planning and participating in project monitoring and evaluations amongst other functions.

2.8.2 General repairs and maintenance

Once the tarmacking of the road is complete and operational, it will require repair and maintenance on regular basis. The proponent will take care of the regular repairs as required by the industry general standards.

2.9 Description of the project's decommissioning activities

2.9.1 Demolition works

Upon decommissioning, the project components will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste disposal company.

2.9.2 Site restoration

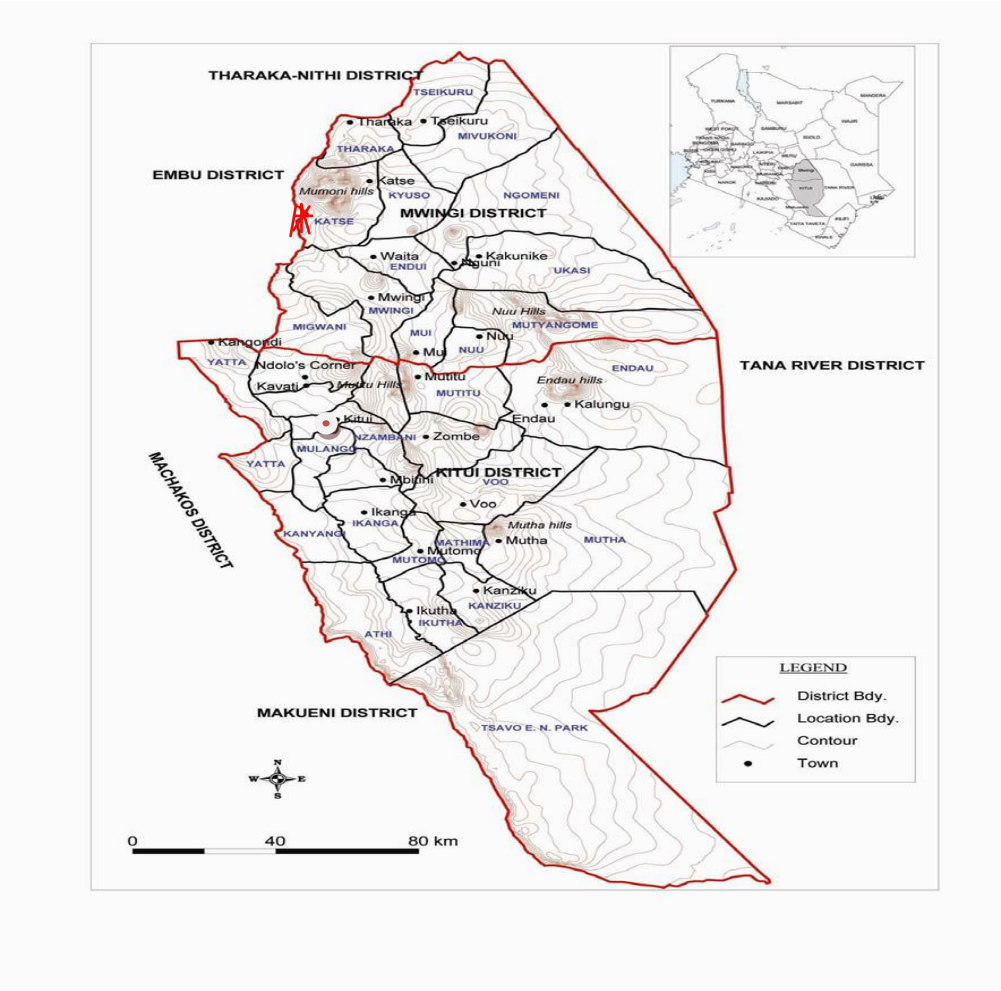
Once all the wastes resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the top soil and re-vegetation using indigenous plant species and other fast growing tree species.

CHAPTER THREE

3.0 BASELINE INFORMATION OF THE STUDY AREA

3.1 Location and size

The proposed project starts at Kunda Kindu GPS pickings of -1.365692 and 38.012037 latitude and longitudes respectively and terminates at -1.373529, 38.012618 at KMTC Junction. The road corridor has a general elevation of 1100-1150m a.s.l. Immediate neighbors and beneficiaries of the project are the many institutional, residential and business premises in the project environs. The road corridor proposed for upgrading measures approximately 1000m long and 2.2m wide.



3.2 Physical and Agro-Climatic Conditions

The terrain of the proposed project area is generally uneven with a general elevation of 1100-1150m above the sea level. Broadly, the topography of Kitui County can be divided into highland and lowland areas with altitude ranging from 400m and 1800m above sea level. The central part of the County is characterized by the hilly ridges separated by wide, low lying areas with an elevation of between 600m and 900m above sea level. The proposed project area is located to the west side of the district, where the main relief feature is the Yatta Plateau, which stretches from the north to the south separating the Athi and Tana River basins. The plateau is almost plain with wide shallow spaced valleys. This region receives moderate rainfall almost similar to the high altitude areas such as Kitui Central, Mutitu Hills and Yatta Plateau.

The climate in the County is arid and semi-arid with very erratic and unreliable rainfall. Most of the areas are generally hot and dry leading to high rate of evaporation. The County experiences hot temperatures for the greater part of the year. The maximum mean annual temperature ranges between 26º C and 34º C. The minimum mean annual temperatures in the county vary between 14º C and 22º C. The annual rainfall ranges between 500-1050mm with 40 per cent reliability. The long rains come in April/May and short rains in November/December. The short rains are more reliable while long rains are usually unreliable. The periods falling between June to September and January to March are usually dry. The topography of the landscape influences the amount of rainfall received. The high land areas of Mumoni Hills in Kyuso and Mutitu Hills) with an altitude of 1,747meters above sea level in the eastern parts of the county receive between 500-760mm of rainfall per year. The Nuu and Endau Hills receive 500-1050mm per year, while the drier eastern and southern areas receive less than 500mm. The county has two rainy seasons, i.e. March – May (long rains) and October – December (short rains). The short rains are more reliable than the long rains.

3.3 Biodiversity

A number of hills scattered in the County forms biodiversity icebergs. Such hills include Musengo, Mutitu, Nuu, Endiu, Endau, Mutha, Museve and Kavonge hills (Plate 1). Over 748 different vascular plant species in 116 families and 420 genera have been recorded in Kitui and Mwingi regions. Such high plant diversity is remarkable as it represents close to 15% of the dryland flora in Kenya, and way above the well-known Kakamega rainforest with about 420 plant species (Malonza *et al* 2006). The hills contribute greatly to this diversity with domineering families as Leguminosae (Mimosaceae, Papilionaceae, Caesalpiniaceae), Euphorbiaceae, Acanthaceae, Gramineae, Rubiaceae, Compositae, Malvaceae and Labiatae. Common genera include *Acacia, Ficus, Euphorbia, Hibiscus, Crotolaria, Commiphora* and *Combretum species.*

Plate 1: Sections of Kavonge hills in Kitui County near Kitui town

3.4 Vegetation

3.4.1 Urban tree planting

GPS pickings of -1.370583, 38.010902 latitudes and longitudes respectively are characterized by mango trees (*Mangifera indica*). The trees (Plate 2) are within the road reserve and will be cleared to pave way for the construction works. Sycamore Fig *(Ficus sycomorus)* has been

planted along the perimeter fence of the Kitui County Referral Hospital adjacent the proposed project site. The trees are likely to be affected by the spill-over effects of construction works. The urban forestry species contribute greatly to high diversity of plant species in the project area and its neighbourhood.

Plate 2: *Ficus sycomorus* (Sycamore Fig) within the corridor proposed for improvement

Multi-purpose tree and shrub species are common with benefits ranging from provision of fruits, shade, aesthetic value (urban landscaping), and fodder among others. Key component of urban forestry is the integration of assorted flower species (Plate 3) for urban landscaping.

Plate 3: Landscaping using ornamental species near the proposed project site

3.4.2 Farm forestry

Along the road corridor proposed for upgrading, small farmlands exist within the Kitui County Referral Hospital compound. For instance, small farmland characterized by agroforestry tree species (Plate 4) exists. The agroforestry tree species provide a wide range of benefits such as fruits, shade, fodder, live fence, nitrogen fixing, fuelwood, timber among others. Common species include fruit trees such as *Grivellea robusta, Musa acuminata*, *Mangifera indica, Morus alba, Psidium guajava, Carica papaya, Persea americana, Tamarindus indica, Vitex payos among* others. Tree species in the small farmlands will be affected by dust from construction works.

Plate 4: On-farm tree planting adjacent the corridor proposed for construction

3.4.3 Indigenous vegetation

Generally, the road corridor proposed for improvement is not rich in natural vegetation hence negligible impact expected. However, the periphery of Kitui town is rich in indigenous vegetation especially along Tyaa river. Key species include *Vangueria apiculata, Phoenix reclinata, Adansonia digitata, Acacia eliator, Ficus sycomorus, Grewia bicolour, Vangueria infausta, Garcinia livingstonei, Acacia tortilis, Acacia mellifera, Acacia seyal, Acacia senegal, Lannea alata, Vangueria madascariensis, Balanites eagyptica, Acacia xanthophloea,*

Caesalpinia volkensii, Ficus sur, Acacia seyal, Acacia nilotica, Rubus pinnatus, Caesalpinia decapetala, Maytenus senegalensis, Cocos nucifera, Rhus vulgaris, Sesbania sesban, Euphorbia candelabrum, Terminalia brownii, Plectranthus barbatus, Pappea capensis, Acacia tortilis, Premna resinosa, Zanthoxylum chalybeum, Vangueria apiculata, Vangueria madagascariensis, Cordia africana, Euphorbia turicali, Acacia brevispica among others. The indigenous species provide a range of benefits to the locals such as firewood, timber, poles, posts, vitos, fodder, shade, soil conservation, nitrogen fixing among others.

It is important to note that the vegetation has been negatively impacted by past and present anthropogenic activities in the project site and its environs. Some of the anthropogenic activities recorded include: vegetation clearance to pave way for construction of residential structures among others.

3.5 Hydrology and Water Resources

The entire road corridor proposed for tarmacking is well supplied with piped water from the Masinga-Kitui pipeline under KITWASCO. A network of subsidiary pipelines supply water to the project area and its environs. The assessment noted that some of the subsidiary pipelines pass within the road corridor proposed for tarmacking. Subsidiary water pipelines (Plate 6) lie within the area proposed for tarmacking. Such will need to be relocated before construction works start. This will avoid disruption of the service lines and service provision to the local residents.

Plate 5: One of the water pipeline across the corridor to be improved

An existing drain (Plate 6) along the corridor proposed for improvement. Culvert will be constructed across the stream to ease traffic passage. The stream acts as the main recipient of storm water from the entire Kunda Kindu and its environs. The stream flow is characterized by low base flow during dry seasons and very high flow during the rain seasons. The stream drains into Kalundu river at the neighbourhood of the proposed project site.

Plate 6: The existing drainage along the corridor proposed for improvement

The quality of water in the stream is poor due to contamination by effluent especially waste water (Plate 8) from the many residential premises in the project area. Liquid effluent from a residential building is directly discharged into the stream. As such, the waters in the stream is rarely used by the local residents in the project area. Construction works will directly affect the stream especially when construction waste makes its way into the stream.

Plate 7: Liquid effluent from the road adjacent to the corridor being discharged on road reserve

Kalundu river (Plate 9) is the only major water body which is located approximately 2km from the proposed project site. The river supplies water for different uses in the project area and its environs. The kalundu river flow in the in the municipality is characterised by very low flow (base flows) in dry season and high flow during rainy seasons, i.e. April-May and November-December.

Plate 8: Sections of Kalundu river about 2km from the proposed project site

Most of the ephemeral streams generally become dry within one month after the rainy season (Borst and De Haas, 2006). The flows are usually fast and turbid due to high sediment

concentration associated with soil erosion in the catchment area. Kalundu river is likely to be affected indirectly by the proposed project especially if Bondeni stream, which drains into the river, is contaminated by construction waste. Within the proposed project area neighbourhood, boreholes and shallow wells (Plate 10) exist.

Plate 9: A shallow well in the neighbourhood of the proposed project site

The rivers, sub-wells, earth dams, shallow wells, sand dams and boreholes play a significant role in providing water to the local community particularly during the dry seasons especially households that are not connected to the Masinga-Kitui water pipeline. However, most of the dams are small and dry up during the extended dry seasons due to the high water abstraction and evaporation rates. Roof catchment water harvesting and water storage in high level water tanks (Plate 11) are common at the proposed project environs.

Plate 10: Water storage at the proposed project environs

3.6 Geology

The project area is overlain by well drained sand-clay soils which have quartz and feldspar grains and felsic gravel rock fragments. A small section (Plate 12) of the proposed road corridor is characterized rocky surface. The soil depths (thickness) vary from between 1m (upslope) at the project site to nearly 2.0m at the downslope of Bondeni stream toward victors academy. Generally, soil types include nitisols which are well drained, porous, with high moisture and stable structure, vertisols characterized by black cotton, poor drainage, high organic matter and andosols which are well drained, porous and contain high organic matter.

The project site has a similar geology composed of high grade regional metamorphic granitoid granulites which are composed of quartz and feldspars (over 90%) and mafic hornblende and pyroxenes (about 10% or less). The rocks have good quality engineering properties comparable to those of granites which support any high rise engineering structures.

The project site is far from any active seismicity. Furthermore, the site has no geological structures such as faults, joints, foliation planes which can adversely affect the building structures. Hence, in conclusion the site is ideal for putting up the proposed road infrastructure.

Plate 11: A section of the road corridor which is rocky

3.7 Population and human settlements

The 1000m corridor proposed for improving cuts across the densely populated Kunda Kindu. The close vicinity of the estate to Kitui town CBD makes it's a preferred choice by local residents. The housing topology is characterized by permanent multi-dwelling units mainly high-rise buildings (Plate 13). Mwingi central ward, in which the project lies, has a population of 26,016. In general, the County has a population of 1,149,332 comprising of 48% Males and 52% and Females (KNBS, 2009). The County covers an area of 30,462 km² with population density of 33 people per km. Age distribution: 0-14 years (46.6%), 15- 64 years (48.2%), 65 and above years (5.2%). There are several religions represented in the town with varying Christian and Muslim denominations. The largest congregations are Catholics, Muslims and the Protestants. The area has high proportion of females to males (105:100) and a dependency ratio of 100:108. The labour force is robust (47%) with youth comprising 21% of the population. The life expectancy is 51 years as compared to 55 countrywide. More than 50% of the

population lives below absolute poverty level. Human activities such as clearing of land for residential structures, agriculture, settlements, charcoal making among others have resulted to land degradation.

Plate 12: High density residential buildings along the corridor proposed for improvement

3.8 Socio-economic activities

The proposed project is located along the perimeter wall of Kitui County Referral Hospital and involves the improvement of drainage systems and construction of pedestrian walkways along the corridor. The area surrounding the project site is primarily institutional, serving the hospital and adjacent public access routes.

At the time of the Environmental and Social Impact Assessment (ESIA) study, no businesses or commercial activities were operating within the project corridor. The area is largely characterized by the hospital boundary wall and pedestrian movement by patients, staff, and visitors accessing the facility. As such, there were no informal traders, temporary structures, or permanent business buildings within the corridor proposed for drainage and walkway improvement.

Consequently, the proposed project will not require relocation of businesses, demolition of commercial structures, or displacement of traders, since none existed within the project area

prior to the proposed improvements. The works will therefore focus solely on enhancing pedestrian safety and improving storm water management along the hospital boundary

Few industries are located within and outside Kitui town. Key among them is a ginnery where cotton farmers from around the County can deliver their harvest. It is the only major industry in the County that was set up way back in 1935. Kitui is a semi-arid region and not many crops fare well apart from cotton, hence the ginnery plays a major role of creating income for the farmers in the district. In the outskirts of Kitui town is the Kitui County Multi- processors factory in Musengo. The factories provide employment opportunities to the locals through fruits collection, delivery, processing and distribution of finished products. Other factories include maize milling factories in Kitui and Mwingi towns. Mwingi has three such milling factories while Kitui has only one located within the Kalundu area. A honey processing factory in Mwingi town add to the number of other smaller cottage industries in Kitui County. These cottage industries provide employment to the locals as well as value addition to such produces as maize, fruits and honey. The many institutions, commercial premises, jua kali workshops amongst others in the neighbourhood of the project site provide employment opportunities to local residents.

Subsistence farming activities take place at the periphery of Kitui town. The main crops are maize, beans, peas, millet, sorghum, sweet potatoes and cassava among others. Small scale horticultural farming take place along streams and rivers within the project neighbourhood. Dairy farming is also undertaken both for subsistence and commercial purposes. The main livestock in the area are cows, goats, sheep and donkeys. Poultry is also undertaken with main players here being chicken, ducks, and turkey etc. However, the maximum potential in this sector is not fully exploited.

3.9 Infrastructure development

3.9.1 Roads

The proposed pedestrian walkway and drainage improvement project is located adjacent to the B7 Kitui–Kibwezi Road. This road serves as a key transport corridor linking Kitui town with Kibwezi and forms part of the broader regional road network facilitating the movement of people, goods, and services.

The project corridor runs along the perimeter wall of Kitui County Referral Hospital and directly borders the B7 road. Due to the significant pedestrian traffic generated by patients, visitors, and staff accessing the hospital, the construction of a dedicated walkway and improvement of drainage infrastructure will enhance pedestrian safety and accessibility along this section of the road.

Plate 13: A section of the B7 Kitui – Kibwezi Road

The proximity of the project to the B7 Kitui–Kibwezi Road makes the proposed improvements important for separating pedestrian movement from vehicular traffic, thereby reducing potential conflicts and improving overall road safety within the area.

3.9.2 Electricity

The project area along the perimeter wall of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road does not have overhead electricity distribution lines or utility poles within the corridor proposed for the drainage and walkway improvements. As such, no electricity poles or power lines will require relocation during the implementation of the project.

Plate 14: Street lighting along the corridor proposed for improvement

However, the corridor currently has solar-powered street lighting installed along sections of the road. Some of these solar street lighting units fall within the proposed construction alignment and will therefore require temporary removal and relocation to suitable positions to allow for the construction of the drainage channels and pedestrian walkway. The relocation will be undertaken carefully to avoid damage to the lighting infrastructure and to ensure that street lighting services along the road are maintained after completion of the works.

3.9.4 Liquid Wastes Management

The proposed project, located along the perimeter wall of Kitui County Referral Hospital, involves the improvement of existing drainage systems and construction of pedestrian walkways. The nature and scale of the works are limited to civil improvements within the existing corridor and do not involve activities that generate liquid effluents.

During the Environmental and Social Impact Assessment (ESIA) study, it was established that there are no existing sources of liquid waste within the project corridor that will require management during the construction phase. The area is mainly characterized by the hospital boundary wall and pedestrian access paths, and no facilities such as food vendors, workshops, or sanitation installations that generate liquid waste are present within the project site.

As a result, no liquid waste will be generated or require management as part of the project activities. The works will strictly involve drainage improvement and walkway construction, which are not expected to produce wastewater or other liquid effluents. Therefore, liquid waste management measures are not anticipated to be necessary for the project.

3.9.5 Solid Wastes Management

The entire road corridor proposed for tarmacking faces a serious challenge of solid waste management. A lot of waste is generated at the proposed project site and its environs. Despite the existence of a designated garbage collection points, incidences of solid waste being dumped in open spaces are common.I.e. garbage dumpsites exist (Plate 15).

Plate 15: One of the solid waste transfer stations adjacent to the corridor

CHAPTER FOUR

4.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.1 Introduction

This EIA has been prepared to fully comply with environmental legislations and Procedures as outlined in the various Regulations by National Environment Management Authority, in Kenya.

4.2 KENYA'S ENVIRONMENTAL LEGISLATION

The preparation of this EIA has taken into account the requirements for Environmental Assessment under Kenyan laws, mainly under Section 58 of the Environmental Management and Co-ordination Act, 1999. The section also requires project proponents to obtain an EIA License before the implementation of a project. Some of the relevant laws in Kenya are:

4.3 National Environment Management Authority (NEMA) Environmental Laws

4.3.1 Environmental Management and Co-ordination Act (EMCA)

The Environmental Management and Co-ordination Act, 1999, is the legislation that governs Environmental Impact Assessment (EIA) studies. The proponent carried out an Environmental Impact Assessment (EIA) as per the second schedule of this act. This schedule lists the projects required to undergo EIA studies in accordance with section 58 (1-4) of the act.

The Act provides for the National Environmental Management Authority (NEMA) whose objective and purpose is to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government in the implementation of all policies relating to the environment.

The introduction of Environmental Impact Assessment and Audit Regulations, 2003 issued through Kenya Gazette Supplement No. 56 of 13 June 2003, the submission of environmental reports became mandatory. According to these regulations no proponent shall implement a

project likely to have a negative environmental impact or for which an Environmental Impact Assessment has been concluded and approved in accordance with these regulators.

4.3.2 The Environmental (Impact Assessment and Audit) Regulations, 2003

Environmental and Social Impact Assessment (ESIA) is a critical examination of the effects of a project on the environment. The goal of an ESIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the significant negative impacts of the project on the environment.

The EMCA, 1999 requires that during the ESIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity through posters, newspaper, radio and hold at least three public meetings with the affected parties and communities. The Project proponent pays for the entire ESIA process. The fee payable to NEMA is 0.05% of the project cost.

Environmental Audit (EA) is the systematic documentation, periodic and objective evaluation of activities and processes of an ongoing project. The goal of EA is to establish if proponents are complying with environmental requirements and enforcing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures a safe and healthy environment at all stages of project operations and decommissioning.

An initial environmental audit and a control audit are conducted by a qualified and authorized environmental auditor or environmental inspector who is an expert or a firm of experts registered by the Authority. In the case of an ongoing project the Authority requires the proponent to undertake an initial environmental audit study to provide baseline information upon which subsequent environmental audits shall be based.

Self-Audits are carried out after the environmental impact assessment study report has been approved by the Authority or after the initial audit of an ongoing project. The proponent shall take all practical measure to ensure the implementation of the environmental management plan by carrying out a self-auditing study on a regular basis.

4.4 The Kenya Roads Act

An Act of Parliament to provide for the establishment, powers and functions of the Kenya Roads and for connected purposes. The Act provides for Kenya National Highways Authority) Regulations, 2013. The following Regulations apply under the Hire services for bridges.

(1) The Authority may, on request by a person, hire out to the person a modular bridge for temporary crossing.

(2) A person who hires a modular bridge from the Authority for temporary crossing shall pay to the Authority hiring charges at the rate of twenty-five thousand per meter per month or any amount not exceeding twenty-five thousand per meter per month.

(3) The hirer shall execute a bank guarantee equivalent to ten percent of the total hire amount which shall be refundable on delivery of the bridge in a good condition to the Authority at the end of the lease period.

(4) The hirer shall be responsible for the repair or replacement of the bridge in case of any damage occasioned to the bridge for the duration of the lease period,

(5) The Authority shall determine the extent of damage that may require replacement by the hirer.

Under the Hire of service ducts in a bridge the regulations provide that:

(1) The Authority may, on application by a person, hire out to the person a steel pipe culvert for temporary crossing.

(2) The Authority shall charge for the hire of a steel pipe culvert for temporary crossing at the rate of seventeen thousand five hundred shillings per meter per month.

(3) Any period less than twelve months shall be charged on a pro rata basis at a rate of not less than seven thousand six hundred and seventy per meter per month.

(a) The hirer shall execute a bank guarantee equivalent to ten percent of the total hire amount which shall be refundable on delivery of the culvert in a good condition to the Authority at the end of the lease period.

(5) The hirer shall be responsible for repair or replacement of the culvert, in case of any damage occasioned to the culvert in the duration of the lease period.

(6) The Authority shall determine the extent of damage that may require replacement by the hirer.

Under Use of road reserves and abutting areas the regulations provides the following:

(1) A person who wishes to make use of any portion of a road reserve on a class A, B or C road, shall make an application to the Director-General.

(2) A person who wishes to erect a structure on a road reserve or on land located on the abutting areas of the road reserve shall apply to the Director-General, and shall attach designs prepared by a registered engineering consultant.

(3) The Authority shall examine and approve the designs of any structure required to be established on a road reserve or on abutting areas before granting the approval to establish a structure on the road reserve or abutting areas, subject to the works being supervised by a registered engineer.

(4) The payment of the fees specified in Part I A of the Schedule shall be made on approval by the Authority.

(5) The fees shall be payable in advance and non-payment shall attract a penalty of not more than one thousand shillings for each month of the delay.

(6) The placement, removal or relocation of any services or structures to or from the road reserve, shall be done under the supervision of a registered engineer and at the owner's expense.

(7) The removal or relocation of services or structures from or within the road reserve, shall be effected within thirty days after issue of notice to that effect by the Authority.

(8) A person shall not place any service or structure on a road reserve without the permit issued by the Authority.

(9) The structures not permitted by the Authority shall be removed by the owner, or if removed by the Authority or its authorized agents, the owner shall reimburse the Authority for the cost of the removal.

(10) If the Authority, on its own, removes a structure placed on a road reserve contrary sub regulation (6), the person responsible for placing the structure on a road reserve shall be liable to pay to the Authority an additional fifty percent charge in addition to the cost of removal.

(11) The Authority shall not be responsible for storage or safety of any items removed or relocated from the road reserve.

Under Excavations for pipes, ducts or cable crossings under road pavement the regulations provide the following provisions:

(1) A pipe, duct or cable crossing under the road pavement shall be placed using the micro tunneling method, where possible, and any excavations made pursuant to the placement of the pipe, duct or cable shall be restored to the original ground state at the owners' expense.

(2) Where micro-tunneling is not possible, open excavations of road pavement may be permitted by the Authority, subject to pavement of the amount set out in Part I B of the Schedule being paid to the Authority per meter length of the road carriageway excavated.

(3) The applicant shall execute a bank guarantee equivalent to ten percent of the total hire amount which shall be refundable on restoration of the road pavement to good condition upon completion of laying of pipes, ducts or cable crossings.

(4) A person who, for the purpose of building a road, wishes to excavate building material from any of the Authority's quarries shall seek the approval of the Authority and pay the prescribed fees at the rate of fifteen percent of the value of blasted and crushed stone at the quarry gate.

(5) Where a crusher produces more than ten thousand meters cubic per month, as evidenced by certificates authenticated by the Authority's representative, the quantity over ten thousand meters shall be charged pro rata at the rate of two hundred per cubic meter:

(6) Where a crusher produces less than ten thousand meters of stone per month a fee of fifteen percent of the value of blasted and crushed stone shall be payable at the quarry gate.

4.5 The National Construction Authority Act, 2011, No. 41 Of 2011

AN ACT of Parliament to provide for the establishment, powers and functions of the National Construction Authority and for connected purposes. The Act provides the following:

(1) The object for which the Authority is established is to oversee the construction industry and coordinate its development.

(2) Without prejudice to the generality of subsection (1), the Authority shall— 2011 *National Construction Authority* No. 41 7: -

(a) Promote and stimulate the development, improvement and expansion of the construction industry;

(b) Advise and make recommendations to the minister on matters affecting or connected with the construction industry;

(c) Undertake or commission research into any matter relating to the construction industry;

(d) Prescribe the qualifications or other attributes required for registration as a contractor under this act;

(e) Assist in the exportation of construction services connected to the construction industry;

(f) Provide consultancy and advisory services with respect to the construction industry;

(g) Promote and ensure quality assurance in the construction industry;

(h) Encourage the standardization and improvement of construction techniques and materials;

(i) Initiate and maintain a construction industry information system;

(j) Provide, promote, review and co-ordinate training programmes organized by public and private accredited training centers for skilled construction workers and construction site supervisors;

(k) Accredit and register contractors and regulate their professional undertakings;

(l) Accredit and certify skilled construction workers and construction site supervisors;

(m) Develop and publish a code of conduct for the construction industry, and

(n) Do all other things that may be necessary for the better carrying out of its functions under the act.

4.6 Planning and Building Regulations, 2009

These Regulations cover provisions for national, regional and local physical planning, siting, site operations, building design, building and infrastructure services, disaster risk management on construction sites and maintenance of all buildings as contained in these Regulations. The regulations have the following provisions:

(a) An application shall be made to The Authority by the land owner for authorization to commence land planning and or plot sub-division.
(b) No person shall design or cause to be designed any building on land where land development plans have not been approved in accordance with these Regulations.
(c) Any person who contravenes the provisions of this Regulation shall be guilty of an offence

4.7 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects

These Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects are issued primarily for constructing roads and bridges on Federal Highway projects under the direct administration of the Federal Highway Administration.

Under the Legal Relations and Responsibility to the Public, this section requires the involved to:

(a) Comply with all applicable laws, ordinances, safety codes, regulations, orders, and decrees. Protect and indemnify the Government and its representatives against any claim or liability arising from or based on the alleged violation of the same.

(b) Comply with all permits and agreements obtained by the Government for performing the work that is included in the contract. Obtain all additional permits or agreements and modifications to Government-obtained permits or agreements that are required by the Contractor's methods of operation. Furnish copies of all permits and agreements.

Under the Protection and Restoration of Property and Landscape, the standards require the involved to:

(a) Preserve public and private property, and protect monuments established for the purpose of perpetuating horizontal, vertical, cadastral, or boundary control. When necessary to destroy a monument, reestablish the monument according to applicable state statute or by the direction of the agency or individual who established the monument.

(b) Do not disturb the area beyond the construction limits. Replace trees, shrubs, or vegetated areas damaged by construction operations as directed and at no cost to the Government.

(c) Remove any damaged limbs of existing trees by an approved arborist.

(d) Do not excavate, remove, damage, alter, or deface any archeological or paleontological remains or specimens. Control the actions of employees and subcontractors on the project to ensure that protected sites are not disturbed or damaged. Should any of these items be encountered, suspend operations at the discovery site, notify the CO, and continue operations in other areas. The CO will inform the Contractor when operations may resume at the discovery site.

(e) When utilities are to be relocated or adjusted, the Government will notify all utility owners affected by the relocations or adjustments. The relocations or adjustments will be performed by others or will be included in the contract work.

(f) Before beginning work in an area, the Contractor shall have all utility owners locate their utilities. Protect utilities from construction operations. Cooperate with utility owners to expedite the relocation or adjustment of their utilities to minimize interruption of service and duplication of services.

Under the prosecution and progress section, the standards demand that

(a) A preconstruction conference will be held after the contract is awarded and before beginning work. Seven days before the preconstruction conference, furnish three copies of the preliminary construction schedule according to Section 155.

(b) Subcontracting does not relieve the Contractor of liability and responsibility under the contract and does not create any contractual relation between subcontractors and the

Government. The Contractor is liable and responsible for any action or lack of action of subcontractors.

(c) Within 14 days of subcontract award, submit an SF 1413 with Part I completed. Complete other forms that may be provided by the Government to clearly show the work subcontracted and the total dollar amount of the subcontract. For subcontracts involving on-site labor, require the subcontractor to complete Part II of the SF 1413 and complete

Under Determination and Extension of Contract Time the standards provide that:

(a) Only delays or modifications that affect critical activities or cause noncritical activities to become critical will be considered for time extensions.

(b) When Critical Path Method schedules are used, no time extension will be made for delays or modifications that use available float time as shown in the current construction schedule required by Section 155.

Under the measurement and payment of work, the standards demand that

(i) Take and record measurements and perform calculations to determine pay quantities for invoicing for work performed.

(ii) Unless otherwise specified, measure when the work is in place, complete, and accepted.

(iii) Measure the actual work performed, except do not measure work outside the design limits or other adjusted or specified limits (staked limits). Measure structures to the lines shown on the plans or to approved lines adjusted to fit field conditions.

(iv) Take measurements as described in Subsection 109.02 unless otherwise modified by the Measurement Subsection of the Section controlling the work being performed.

(v) Re-measure quantities if it has been determined that any portion of the work is acceptable but has not been completed to the lines, grades, and dimensions shown on the plans or established by the CO.

(vi) Submit measurement notes to the CO within 24 hours of completing the work. For ongoing work, submit measurement notes weekly. When work is not complete, identify the measurement as being an interim measurement. Submit the final measurement when the installation is completed. Measurement notes form the basis of the Government's receiving report. For lump sum items, submit documentation to support invoiced progress payment on a monthly basis.

(vii) Use an acceptable format for measurement records. As a minimum, include the following information in all records of measurement:

(a) Project name and number;

(b) Contract item number;

(c) Date the work was performed;

(d) Location of the work;

(e) Measured quantity;

(f) Calculations made to arrive at the quantity;

(g) Supporting sketch and details as needed to clearly define the work performed and the quantity measured;

(h) Names of persons measuring the work;

4.8 Streets Adoption Act, Chapter 406, Revised Edition 2012 [1984]

An Act of Parliament to regulate the construction and improvement of streets in certain local authority areas; to provide for the adoption by certain local authorities of streets of a satisfactory standard; and to provide for matters connected with the foregoing and incidental thereto [Act No. 5 of 1963, L.N. 256/1963, L.N. 2/1964, L.N. 374/1964, Act No. 21 of 1966, Act No. 10 of 1969.]. the Act has the following provisions:

(1) Any person who intends to lay out, form, construct, widen, extend or alter an unadopted street, whether or not to the standard required for adoption under section 7 of this Act, shall make written application to the local authority for its sanction so to do and shall, with the

application, submit plans, longitudinal sections, cross-sections and specifications showing the following particulars, that is to say—

(a) the intended levels, gradients, direction and width of the street;

(b) the street alignment, the building lines and the lines of carriageway and footways and the lines or spaces (if any) to be reserved for the planting of trees, grass or shrubs or other flora;

(c) the mode of construction and the materials proposed to be used;

(d) the proposed position of any access to plots fronting on to the street;

(e) the intended lines, levels, gradients and dimensions of the proposed sewers and drains or means of drainage;

(f) the levels of the street and its sewers and drains relative to the levels of the adjacent land;

(g) the means of drainage of the buildings erected or to be erected fronting or abutting thereon;

(h) if required by the local authority, the estimated volume, expressed in cubic feet per second, of sewage and rainwater to be conveyed by the proposed sewers and drains and the carrying capacity of those sewers and drains;

(i) the proposed method of disposal of the sewage and rainwater conveyed by the proposed sewers and drains;

(j) all ancillary works necessary for bringing the street into conformity with any other street and for connecting the sewers or drains thereof to a sewerage or drainage system.

(2) Any person who makes application as aforesaid shall furnish such additional plans, sections, specifications, levels and information as the local authority may require.

(3) Unless within two calendar months after the submission of an application under subsection (1) of this section, or within two calendar months after the submission of any further plans, sections, specifications, levels or information requested, the local authority has sanctioned the application, the application shall be deemed to have been refused.

(4) An application under this section shall be refused—

(a) if the proposed street would conflict with any plans which have been made, or which are, in the opinion of the local authority, likely to be made, for carrying out a general scheme of street improvement or town planning; or

(b) if the requirements of this Act are not complied with; or

(c) if the requirements of the local authority under this section are not complied with.

4.9 Water Quality Regulations

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources.

The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment.

The regulations provide for the creation of a buffer zone for irrigation schemes of at least fifty (50) metres in width between the irrigation scheme and the natural water body.

Standards for irrigation water are given in schedule nine of the regulations.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings

4.10 Waste Management Regulations

The Minister for environment and natural resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment.

Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

4.11 Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements. Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

The regulations stipulate that controlled substances must be clearly labelled with among other words, “Controlled Substance-Not ozone friendly’’) to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, “Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer.”

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet.

Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

4.12 Conservation of Biodiversity

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

Kenya has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning.

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4.14 Air Quality Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

- ✓ Back-burning to control or suppress wildfires;
- ✓ Firefighting rehearsals or drills conducted by the Fire Service Agencies
- ✓ Traditional and cultural burning of savannah grasslands;
- ✓ Burning for purposes of public health protection;

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

4.15 Noise and Excessive Vibration Pollution Control Regulations, 2009

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 1999. The regulations provide information on the following:

- Prohibition of excessive noise and vibration
- Provisions relating to noise from certain sources
- Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and
- Noise and excessive vibrations mapping

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source. Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

The Proponent shall observe policy and regulatory requirements and implement the measures proposed in this documenting an effort to comply with the provisions of the Regulations.

4.16 Wetlands, River Banks, Lake Shores and Sea Shore Management Regulation, 2009

This Act applies to all wetlands in Kenya whether occurring in private or public land. It contains provisions for the utilization of wetland resources in a sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services.

The project traverses several rivers and streams. The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and Siltation in rivers.

4.17 The Wildlife (Management and Conservation) Act

This Act was enacted to consolidate and amend the law relating to the protection, conservation and management of wildlife in Kenya, and for purposes connected therewith and thereto. Section 9 of the Act states that 'the Director of Wildlife Conservation shall, through the officers of the service, control, manage and maintain all national parks'. It also states that within the National Park, the Director may:

- Reserve or set aside any portion of the park as a breeding place for animals or as nurseries for vegetation;
- Authorize the construction of such roads, bridges, airfields, buildings and fences, the provision of such water supplies, and the carrying out of such other works, as may be necessary for the purposes of the park;
- With the approval of the Minister, let sites for the erection of hotels, or other accommodation for the visitors to the park Provided that nothing in any document connected with the letting shall be construed as in any manner abridging the overall control of the Park by the Service, or as preventing the Director from giving directions as to the manner in which the premises concerned shall be managed.

4.18 The Agricultural Act

Legislative control over soil conversation and land development are mainly controlled within this Act, and many of the provisions can be generally applied beyond those lands suitable for agriculture.

The Minister administering the Act, after concurrence with the Central Agricultural Board and consultation with the District Agricultural Committee, can impose land conservation orders on lands to control cultivation, grazing and clearing. These controls may be necessary to protect the land against soil erosion, to protect fertility, and to maintain catchments. Local authorities are generally empowered to administer these sections of the Act, and the District Agricultural Committee is entitled to make regulations relating to these controls. Agricultural Rules are prescribed under the Act, whereby vegetation clearing in steep slopes areas or adjacent watercourses, without authorization, is controlled.

4.19 The Occupational Safety and Health Act, 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175.

4.20 Public Health Act 1986 Revision

The public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. Although the Act is primarily concerned with domestic water supplies and sources of water used for human consumption, its regime may be extended to

cover rivers, streams, lakes and underground water resources since these are the basic water sources for the majority of Kenya's population.

It also outlines the standards of construction of various facilities of any place. In terms of air pollution thermal plants are said to emit a variety of gases, volatile organic compounds and particulate matter depending on the amount and type of fuel used and method used for burning. It is therefore necessary to monitor the air pollution. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injuries or dangerous to human health. Section 116 requires that

Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injuries or dangerous to human health.

On responsibility of the Local Authorities Part XI, section 129, of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes. Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129. This provision is supplemented by section 126A that requires local authorities to develop by laws for controlling and regulating among others private sewers, communication between drains, power lines, and sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter. Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in the matter provided by this Act.

4.21 The Water Act, 2002

The water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage
- Plans for the extension of water services to underserved areas
- The time frame for the plan; and
- An investment programme

4.22 The Constitution of Kenya

The provisions of Chapter V (Protection of Fundamental Rights and Freedoms of the Individual) shall have effect for the purpose of affording protection to those rights and freedoms subject to such limitations of that protection as are contained in those provisions, being limitations designed to ensure that the enjoyment of those rights and freedoms by any individual does not prejudice the rights and freedoms of others or the public interest. The constitution protects citizens from deprivation of property. No property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where it is necessary for public interest.

4.23 Forests Act 2005

The Act highlights the integration of the community on the management, utilization and conservation of forests and its resources. It prohibits wanton destruction of the forests. The proponent is expected to observe the provisions of this Act.

4.24 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to Subject to section 4, this Act shall apply to:

(a) Registration of interests in all public land as declared by Article 62 of the Constitution;
(b) Registration of interests in all private land as declared by Article 64 of the Constitution; and
(c) Registration and recording of community interests in land.

Section 24 states that: (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; and (b) the registration of a person as the proprietor of a lease shall vest in that person the leasehold interest described in the lease, together with all implied and expressed rights and privileges belonging or appurtenant thereto and subject to all implied or expressed agreements, liabilities or incidents of the lease.

4.25 The Environment and Land Court Act, 2011

This Act is in place to give effect to Article 162(2) (*b*) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes.

4.26 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1): -

(*a*) to manage public land on behalf of the national and county governments;

(*b*) to recommend a national land policy to the national government;

(*c*) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;

(*d*) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;

(*e*) to initiate investigations, on its own initiative. or on a complaint, into present or historical land injustices, and recommend appropriate redress;

(*f*) to encourage the application of traditional dispute resolution mechanisms in land conflicts;

(*g*) to assess tax on land and premiums on immovable property in any area designated by law; and

(*h*) to monitor and have oversight responsibilities over land use planning throughout the country.

4.26 The Land Act, 2012

This is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. Part viii of this Act provides procedures for compulsory acquisition of interests in land. Section 111 (1) states that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination. The proponent has acquired land for the proposed project in accordance with this Act.

4.27 Employment Act No 11 of 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.

4.28 Labour Institutions Act No. 12 of 2007

The purpose of the Act is to establish labour institutions and to provide for their function, powers and duties. The Act provides for the establishment of National Labour Board, which provides advice to the Minister on all matters concerning employment and labour.

4.29 Traffic Act Cap 403

This Act specifies that motor vehicles use proper fuel. The Traffic regulations promulgated under the Act specifies that every vehicle is required to be so constructed, maintained and used so as not to emit any smoke or visible vapour.

4.30 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons/institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

4.32 Building Code 1997

The Local Government By-Laws include Building By-Laws that give the Municipalities or County Councils powers to approve building plans. Such plans are expected to provide for public buildings and factories among others. The By-Laws covers factory chimney shafts, stairs, lifts, rain water disposal, refuse disposal, ventilation of buildings, drainage, sanitary conveniences, sewers, septic and conservancy tanks, fire and means of escape in case of fire. Compliance with this Act in up scaling of power supply is necessary. Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the wastewater must be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines and under power lines.

The Proponent shall comply with the provisions of the Code in seeking the required authorizations from the Local Authorities as stipulated.

4.33 Kenya Mining Act

Legislation is a key instrument in the mining industry. Just like in any other country, searching and exploitation of mineral resources in Kenya is regulated by, the Mining Act Cap. 306 established in 1940 and revised in 1986, together with the Environmental Management and Co-ordination Act of 1999 of the Laws of Kenya. Section 2 of the Mining Act define minerals as precious metals, precious stones or non-precious minerals, but does not include mineral oil, clay, murram, limestone, sandstone, mineral water, brine, dolomite, kaolin, gravels, dimension stones, Kisii stone (pyrophyllite), sodium and potassium compounds except those forming part of Lake Magadi saline deposit and ornamental stones. The principle (—all minerals belong to the government‖) of the ownership of the minerals is vested in the Government of Kenya and includes minerals found within Kenya ‘s Continental Shelf, Territorial waters and the Exclusive Economic Zone. Currently, the Government policy in mineral resources development is to ensure that the private sector takes the leading role in mineral development while it assumes a promotional, encouragement and regulatory role by providing basic geological data and necessary fiscal incentives. The Government of Kenya undertakes reviews of policies, mineral

legislation, promotion measures and publicizes the mineral investments in Kenya through the Mines & Geology Department in the Ministry of Environment and Natural Resources.

This Department also undertakes regional mapping and exploration, encouragement of industrial mineral prospecting and exploitation to local miners, evaluation and investigation of mineral deposits using drilling rigs, rehabilitation of disused mines and quarries among other things. Over 90% of the country has been geologically surveyed (Kariuki 2002).

4.34 OSHA's General Industry Standards

A number of occupational activities performed in drift construction fall under OSHA's General Industry Standards. Contractors must be aware of the following regulations in order to stay compliant.

4.34.1 The Right-To-Know Law

The Right-To-Know Law, officially known as The Hazard Communication Standard. Its purpose is to ensure that hazards in the workplace are identified and evaluated, and that the information concerning these hazards is communicated to both employers and employees. This transfer of information is to be accomplished by means of a comprehensive hazard communication program that includes container labeling and other forms of warning including Safety Data Sheets (SDSs) and employee training.

4.34.2 Personal Protective Equipment (PPE) Standards

A key component of the PPE Standard is the hazard assessment of the work area as required under the General Requirements. According to OSHA, Hazard Assessment and Equipment Selection states that the employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment. If the assessment determines that hazards are present, or likely to be present, the employer shall:

- Select and have each affected employee use PPE that will protect from the identified hazards

- Inform each affected employee of the selection decision
- Select PPE that properly fits each affected employee
- Document that the hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment

In addition, the employer is also required to train the affected employees on the proper use of the selected PPE

4.34.3 Respiratory Protection Program

This program ensures that all employees are properly protected from respiratory hazards. Creating and maintaining an individualized written respiratory protection program is the responsibility of all employers who provide respirators to their employees. The program must be administered by a suitably trained program administrator.

When establishing a Respiratory Protection Program, the blaster must first identify what airborne contaminants are present. The SDS required under the Hazard Communication Standard contains this important information. Once the contaminants are identified, the blaster will need to conduct air monitoring to determine whether employee exposures exceed OSHA's permissible exposure limit (PEL) for the identified contaminant(s). The established PEL(s) are also printed on the SDS.

If, after conducting the air monitoring, the employer determines contaminant concentrations are above the PEL, the employer must implement engineering controls (ventilation systems) or administrative controls (job rotations) to reduce the employee exposure. If neither of these options are feasible, the employer must then provide appropriate respiratory protection to the employee. Assigned respiratory protection must be approved by National Institute of Occupational Safety and Health (NIOSH) for the contaminant(s) present

4.34.4 Eye/Face and Wash/Shower Requirements

When it comes to emergency eye/face wash and shower requirements, OSHA has two different types of regulations, general and specific. Blasters fall under the general requirements that are located in OSHA's First Aid Standard. This standard states where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the area for immediate emergency use.

4.34.5 Medical and First Aid Regulations

In 1998, OSHA revised its Medical Services and First Aid regulation. The revision states; In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies shall be readily available. Included in the revision was Appendix A, a non-mandatory guideline that contains examples of minimal contents for first aid kits.

Minimum Requirements for Industrial Unit-Type First Aid Kits; it identifies the fill content that should be adequate for small worksites. The employer is responsible for determining the need for additional first-aid kits, quantities and the types of supplies at the worksite for large/larger worksites

CHAPTER FIVE

5.0 PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of the public consultation followed to identify the key issues and impacts of the proposed project. Views from the local residents, surrounding institutions and development partners who in one way or another would be affected or rather interested in the proposed project were sought through interviews as stipulated in the Environment Management and Coordination Act, 1999.

5.2 Objectives of the Consultation and Public Participation

The objective of the consultation and public participation was to:

1) Disseminate and inform the stakeholders about the project with special reference to its key components and location.
2) Gather comments, suggestions and concerns of the interested and affected parties.
3) Incorporate the information collected in the ESIA study.

In addition, the process enabled:

1) The establishment of a communication channel between the general public and the team of consultant, the project proponent and the Government.
2) The concerns of the stakeholders to be known to the decision-making bodies at an early phase of project development.

5.3 Methodology used in the CPP

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on

Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. The environmental assessment exercise which was conducted in January, 2019. The exercise was conducted by experienced registered environmental expert in three ways, namely, (i) one on one discussion, (ii) field surveys and observations and (iii) filling questionnaires which captured the concerns of the people especially the neighbours to the proposed project. The identification of the specific issues from the stakeholders' response which provided the basis upon which the aspects of the Environmental and Social Impact Assessment were undertaken.

The purpose for such discussions was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

5.4 Background

From the field work, it was apparent that the majority of the stakeholders were aware of the proposed project. However, the consultant, on behalf of the proponent, explained to the public and relevant stakeholders that the proposed improvement of drainages, pedestrian walkways and car parking areas between Kunda Kindu and KMTC junction. The consultant also responded to the queries that the public sought to know about the project.

The local communities' members independently gave their views, opinions, and suggestions as in the best of their interest and in the interest of the factors that affected the circumstances, influences, and conditions under which they exist in. **See appendix** for the list of participants in the CPP by public forums, one on one discussions and through questionnaires. However, all the environmental issues which were raised can be adequately mitigated as exhaustively explained in chapter seven of this report.

5.1 Issues raised by community

This Sub-Section covers the views and opinions of the community, key stakeholders (local leaders, surrounding, institutions/organizations, interested persons or groups). It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the development. This is followed by suggested mitigation measures that the project proponent should incorporate to minimize environmental degradation and promote sustainable development. The section ends by highlighting the opinions and expectations of the stakeholders. However, these notwithstanding, some issues of concerns were raised as outlined below.

5.1.1 Loss businesses

During the public consultation process, concerns relating to the possible loss of businesses due to relocation or demolition of kiosks and temporary business structures were considered. However, it was established that there are no small-scale traders, kiosks, or business sheds located within the project corridor proposed for improvement. Therefore, the project is not expected to cause any negative impacts on local businesses, as none operate within the area earmarked for the proposed improvements.

5.1.2 Disturbances to water and sewer lines

Some respondents expressed concern over the likelihood of construction works affecting some service lines such as water pipelines and sewer systems. They were of the opinion that the contractor carries out the construction works with care to avoid destruction of such lines.

5.1.3 Dust generation

The local community raised concern over dust generation during the road construction phase. Excavation of channels for gabions and culverts will also generate dust. Haulage of murram soil from excavation site to construction area will generate a lot of dust. They proposed that the contractor should always sprinkle water on dusty surfaces.

5.1.4 Solid wastes

The local community raised the issue of solid wastes. They stressed the need of ensuring that wastes such as cleared vegetation, excavated soil, rocks among others are properly disposed during construction.

5.1.5 Risk of accidents

Heavy traffic to be caused by construction trucks was a key concern by the residents. They suggested that the developer installs speed limits within the project area as well as ensures that traffic is controlled to avoid accidents.

5.1.6 Disruption of businesses

Several small scale businesses such as shops and groceries exist along the road corridor proposed for upgrading. Business owners had issues with the disturbances that will arise during construction phase. They were of the opinion that the contractor minimizes such disturbances as possible. Further, they suggested that construction activities are restricted on mandatory areas to reduce disturbances. They also suggested that the contractor should execute the project within the specified contract period and avoid any delays.

5.1.7 Infrastructure development

The community members were of the opinion that the project will enhance infrastructure development in the area. Upgrading of the drainages and walkways within the corridor will provide long term solution to current status. This is critical for the locality which has been characterized by poor walkway status.

5.1.8 Passage of service lines on private land

The community members had no problems with passage on private land of service lines such as drainage channels among others. They, however, stressed the need to ensure the lines

adhere to the standard guidelines as stipulated by the local authorities and other relevant state agencies.

5.1.9 Scheduling of project activities

It was suggested that transportation of construction materials and construction activities be undertaken during the day. This will reduce disturbances to the residents at night. Transportation vehicles should also limit traffic to designated areas to avoid unnecessary disturbances to the residents.

5.1.10 Noise reduction

The residents raised the issue of noise pollution especially noise from construction machinery. The community members were of the opinion that the proponent should strictly observe minimum noise levels to avoid disturbance to the local residents. Drivers of transportation vehicles and construction machine operators should also be sensitized on maintenance of minimum noise levels.

5.1.11 Employment opportunities

During the construction phase, job opportunities that will require skilled and unskilled labour will arise. Locals were opposed to the idea of employing outside people to offer services which they can offer. They suggested that the proponent gives the locals first priority on employment matters to curb unemployment especially among the youth in the area.

5.1.8 Socio-economic data analysis

5.1.12 Spatial Community-Based distribution of human settlement

The proposed project area is densely populated due to its vicinity to Kitui CBD. The human settlements along the road corridor proposed for upgrading are permanent multi-dwelling units and high rise buildings. Generally, Kitui town has a high population. The members have migrated to the area from other parts of the larger Kitui County and its environs, creating

heterogeneity in terms of enterprise and innovation. The heterogeneity has created an atmosphere of competition that is healthy for development activities. The population is expected to keep on increasing in future.

5.1.13 Socio-economic characteristics

The primary objective of this section is to present a comprehensive representation of the socio-economic characteristics of the household population likely to benefit by the proposed project. The collected data would be useful in socio-economic analysis of the project at large. Interviews were conducted on randomly selected representatives of households who are resident's/business owners within the project site. Household heads gave information on the demographic characteristics.

The age of respondents ranged from 19-55 years, with a mean age of 36 years. This implies that the respondents who gave information were mature and conversant with the socio economic conditions of the area under study.

The average household size is approximately 5.3 persons which is below the national household size in Kenya which is 5.8. There are, however, variations between individual household size ranging from 2 to 8 persons.

5.1.14 Public health

The main causes of mortality in the project area according to the respondents are Malaria and typhoid. The two can be greatly reduced if Public health enforces laws on solid and liquid wastes disposal in the project area.

5.1.15 Main occupation or source of income

During the field survey, it was established that 51.3% of the heads of households were engaged in a variety of small-scale businesses, 13.3% were employed in the neighbourhood facilities such as the jua kali workshops, construction sites, shops, hotels, guest houses, among others while 35.4% were tenants within the project area. Small scale businesses ranged from jua kali workshops, clothing sheds, shops, hotels, groceries among others.

5.1.16 Education level

Information provided by the respondents showed that 14.5% have acquired primary education, 41.6% secondary education, 44.8% college/university and 1.1% has not been to school at all. Currently, the range of children undergoing studies range between 1-5 per household.

5.1.17 Water source and utilization

Piped water from the Masinga-Kitui pipeline by KITWASCO is used for most of the domestic activities in the project area. Some residential and business premises are well connected to the Masinga-Kitui water pipeline though the supply is not reliable. Some residents within the neighbourhood have shallow wells and roof catchments that provide water for domestic uses. The nearby rivers such as Kalundu provide water for a number of activities such as construction, livestock and irrigated agriculture. The roof catchment approach should be encouraged in order to alleviate environmental degradation caused by surface runoff from the iron sheet roofs especially in urban settings.

5.1.18 Water demand

Water demand is the volume of water required by a targeted population for domestic purposes per year and is a direct function of the size of the population and the daily water consumption rate per capita. Currently, the supply of water in the project area is not adequate. Livestock increases the water demand in a household substantially. Currently, the locality has water demand of approximately 50m^3/day.

5.3.8 Source and utilization of construction materials

Construction materials such as blocks/building stones, sand, ballast among others were found to originate from different sources. The main source of sand for construction within the project area is tyaa and kivou rivers. Ballast is sourced from Kithimani in Matuu while blocks are obtained from Juja in Thika and Kyasioni in Matuu. Bricks are locally sourced.

CHAPTER SIX

6.0 ENVIRONMENTAL IMPACTS OF THE PROJECT

6.1 Introduction

This Section identifies both positive and negative impacts associated with the proposed improvement of drainages and walkways. These impacts are hereby identified at three distinct phases of the project i.e. - Construction Phase, Operation Phase and Decommissioning Phase.

Scale used to quantify the impacts/issues raised

The magnitude and significance of impacts were gauged using an objective scale that took into consideration the following:

- Temporal – short term or long term.
- Spatial – Transboundary/local.
- Severity – Reversible/irreversible, temporary/permanent.

The scale that was applied in the analysis of impacts is shown in the following table.

Table 2: Levels of Scale used in the Project

Value	Description	Scale Description
0	No impact	This means that to the best knowledge of the expert, the particular activity/action will not have any known impact on the environment. Such an impact will not in any way affect the normal functioning of either the human or the natural systems and does not therefore warrant any mitigation.
1	Minimal impact	Any activity with little impact on the environment calls for preventive measures, which are usually inexpensive and manageable. Such activities have minimum impacts on either natural or human environment or both.
2	Moderate impact	A moderate impact will have localized effect on the environment. If the effect is negative and cumulative, action in form of mitigation measures needs to be put in place to ensure that it doesn't become permanent and /or irreversible.
3	High impact	An impact is high if it affects a relatively high area (spatial), several biological resources (severity) and/or the effect is felt

		for a relatively long period (temporal) e.g. more than one year. In case the effect is negative, such an impact needs to be given timely consideration and proper mitigation measures put in place to prevent further direct, indirect or cumulative adverse effects.
4	Very high impacts	Such an activity rates highly in all aspects used in the scale i.e., temporal, spatial and severity. If negative, it is expected to affect a huge population of plants and animals, biodiversity in general and a large area of the geophysical environment, usually having transboundary consequences. Urgent and specialized mitigation measures are needed. It is the experts' opinion that any project with very high negative impacts **MUST** be suspended until sufficient effective mitigation measures are put in place.
5	Not known	There are activities for which impacts are not yet known e.g. some chemicals are suspected to produce carcinogenic effects but this has not yet been confirmed.

6.2 Construction Phase Impacts

6.2.1 Positive impacts during the Construction phase

6.2.1.1 Improved pedestrian safety

The proposed construction of pedestrian walkways along the perimeter wall of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road will significantly enhance pedestrian safety during the construction phase and after completion. The project will introduce designated walking paths that separate pedestrians from vehicular traffic, thereby reducing the risk of accidents.

6.2.1.2 Improved pedestrian infrastructure

The project will improve pedestrian infrastructure in the project area through the construction of well-defined walkways and supporting drainage systems. This will contribute to improved

accessibility and mobility for pedestrians, particularly patients, visitors, and staff accessing the hospital.

6.2.1.3 Improved storm water drainage

The project will involve the improvement of drainage channels along the project corridor. This will enhance storm water management by directing runoff away from pedestrian areas and preventing water accumulation that currently affects movement along the corridor during rainy periods.

6.2.1.4 Improved accessibility

The construction of walkways will improve accessibility for pedestrians, including vulnerable groups such as the elderly, persons with disabilities, and patients visiting the hospital. The improved infrastructure will make movement along the corridor more convenient and safer

6.2.1.5 Improved emergency access

Improved pedestrian walkways and drainage systems will facilitate easier and safer movement around the hospital area. This will support emergency response by ensuring that access routes around the hospital remain clear and safe for patients, visitors, and emergency service providers.

6.2.1.6 Creation of employment opportunities

The construction phase of the road will result to employment of local people directly or indirectly. These people will work in various capacities ranging from the project engineers, masonry, welders, painters, carpenters, artisans, casuals, security men among others. This goes a long way in empowering the local people who will be involved and improving their living standards. This will also reduce the level of unemployment and will enhance income generation within the community.

6.2.1.7 Improved local incomes

The project staff listed above will need food, water and other consumables during the construction stage. The small scale businesses within the project area such as shops, hotels, restaurants, groceries among others will benefit from increased customer base. This will definitely improve the household income during the construction phase.

6.2.1.8 Provision of market for supply of materials

The project will require supply of large quantities of construction materials such as cement, sand, ballast, steel etc, many of which will be sourced locally. This will provide a ready market for building material suppliers such as women and youth groups, quarrying companies, hardware stores and individual suppliers.

6.2.1.7 Increased cash flow in the project area

Through the use of locally available materials during the construction phase of the project including cement, structural steel, concrete, timber, sand, ballast, etc, the project will contribute towards growth of the local economy. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue. In addition, the cost of these raw materials will be payable directly to the producers.

6.2.1.8 Transfer of skills

During construction of the road, many people from within and without the area will be employed to provide different services. As such, the local people will learn new skills from the civil engineers, welders, masons and other employees that come from outside. This impact will be moderate hence a value of **2**.

6.2.1.9 Improved security

The proposed road project will lead to an improvement of security in the project area. There will be deployment of security guards at the camp and material sites. This impact will greatly benefit the local people.

6.2.1 Negative impacts during the Construction phase

6.2.2.1 Removal of street lighting poles

Some electricity poles are within the corridor proposed for improvement. Such poles will need to be relocated to pave way for the construction works. Since the number of such poles to be affected is small, the impact will be minimal (value of 1).

6.2.2.2 Disturbances to sewer and water lines

Some sewer and water lines lie along the road corridor proposed for upgrading. Some sections of these service lines will be removed and reinstated or relocated to pave way for the construction works. However, this should be done as per the provisions of the Kenya Roads Act 2013.

6.2.2.3 Disruption of business activities and delays in transportation

During construction of roads, normal business in the locality will be affected. Dust generation and noise pollution will be a major menace to the business people. Creation of diversions will cause further disturbances to the business people. During construction phase, the road traffic will be controlled and in some cases complete road closure will be necessary. This will entail disruption to traffic flows resulting in delay to transport of people and goods. There will be also delays caused by diversion during construction. This impact will however be low hence a value of 1 due to the current low traffic in the region and mitigation measures to be put in place.

6.2.2.4 Loss of vegetation cover and biodiversity

During the construction phase of the project, there will be clearance of vegetation along the corridor to pave way for the proposed road. The project area has scarce vegetation and therefore there will be minimal clearance of vegetation. It is expected that the project will require huge quantities of materials such as ballast, murram, stones, conglomerates / aggregate, sand, gravel, and soil, among others. In addition, the contractors will install material camp site as well as a batching plant that will impacts on the environment, especially smothering vegetation around the camp site. The proponent is going to ensure that campsite and quarries are constructed in areas that are not high in vegetation density due to the need to clear vegetation existing for quarries and building of campsite. All borrow pits and quarries will need to undergo a separate Environmental and Impact Assessment Study to ensure there will be no major negative impacts from them. This impact will be moderate hence a value of 2.

6.2.2.5 Noise and vibrations

Because of excavation, construction and demolition works, there will be high noise and vibration levels in the project area. Noise and vibrations will emanate from transportation vehicles, construction machinery, metal grinding and cutting equipment, and among others. Excavation works will also cause vibration and noise. Quarries and borrow pits that will be used for sourcing of road construction material will also result to noise emissions. However, the proponent is expected to take appropriate steps to minimize noise pollution through provision of appropriate personal protective equipment to construction workers, minimizing the frequency of transport of construction materials and ensuring that all construction machinery is well maintained, all quarries and borrow pits will be subjected to independent Environmental Impact Assessment (EIA) studies. This impact will be moderate hence value of 2.

6.2.2.6 Increased soil erosion risk and soil quality degradation

Construction of the road will involve creation of a large impervious surface that restricts the infiltration of rainwater. This leads to high generation of surface runoff that flows on the sides of the road in drainage ditches. Where the surface runoff is channeled directly to bare steep slopes with loose soil, it can lead to serious soil erosion problems. This can undermine the stability of the road including associated facilities such as culverts, bridges. Sediment and erosion from construction activities and storm water runoff may also increase turbidity of surface waters. This impact will be moderate (value of 2) in view of the gentle nature of the landscape through which the road will pass.

6.2.2.7 Risks of Accidents and Injuries to Workers

Workers might be hurt by construction materials or equipment during construction phase of the proposed project. It is also expected that construction workers are likely to encounter occupational health hazards as a result of coming into contact with and handling hazardous waste. Because of the various construction activities including rock and metal grinding and cutting, concrete work, steel erection and welding, among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations; injuries from hand tools and construction equipment; cuts from sharp edges of rocks, steel and electrical cables among others. This impact will however be minimal (value of 1).

6.2.2.8 Increased water use

Both the workers and the construction works will create additional demand for water in addition to the existing demand within the project site. Water will mostly be used in the creation of concrete for construction works and for wetting surfaces or cleaning completed structures. This impact will however be minimal (value of 1) since there are very few existing water resources that will be directly impacted.

6.2.2.9 Solid waste generation

Volumes of solid wastes will be produced during the different phases of the project development. Solid waste materials will be generated during demolition works as well as from various packaging materials. Significant quantities of rock and soil materials will be generated from earth moving during construction activities. Solid waste generation during operation and maintenance activities will include road resurfacing waste (e.g. removal of the old road surface material), road litter, illegally dumped waste, or general solid waste from campsites; vegetation waste from the clearance of road reserves; and sediment and sludge from storm-water drainage system. The contractor would need to ensure that all solid wastes are collected and disposed appropriately to promote a clean and healthy environment along the transport corridor, a storm-water management plan that has been provided in this report should be adhered to. The contractor shall comply with recommendations provided in the ESMP, to be enhanced by a Solid Waste Management Plan that is detailed, effective and compliant. The plan shall be developed within the provisions of an Integrated Solid Waste Management approach, facilitating in implementation of the Three (3) R Principles of Solid Waste Management; Reduce (Source Reduction), Recycle and Reuse. This impact will be moderate hence a value of 2.

6.2.2.10 Air pollution due to dust and exhaust emissions

In the construction phase, the excavations, demolitions, and transportation of building materials will result in the emissions of large amounts of dust within the project site and surrounding areas. Asphalt, concrete and batching plants are also possible sources of dust and air pollution within the project area. The diversion of traffic in the construction phase will also contribute to dust emissions. The contractor is expected to monitor the dust levels periodically as stipulated in the Environmental Monitoring Plan, he will also minimise this through sprinkling water on daily basis on the areas that transport trucks use, excavated areas and the diversion routes. This impact will be moderate hence value of 2.

6.2.2.11 Increased energy use

The project will consume fossil fuels (mainly diesel) to run vehicles and construction machinery. Fossil fuel is non-renewable and its excessive use has environmental implications on its availability, price and sustainability. The project construction phase will also use diesel to run generators. Since direct energy consumption during and after the construction of the project is minimal, this impact will be minimal (value of 1).

6.2.2.10 Discharge of wastewater, sewage and degradation of water quality

There will be an increase in the generation of wastewater and sewage during the construction phase of the project. There will be impact due to oil spillage, disposal practices of used oil, oil filters during the construction of the project. Interference with sewer system along the corridor may result to spillage/leakage of liquid effluent. This impact will be moderate hence a value of 2.

6.2.2.11 Water abstraction and consumption

During the construction, there will be increased abstraction of water from seasonal streams and from groundwater resources. This may reduce the flow of the few available streams in an area which is generally arid and semi-arid. This may further reduce availability of water to the local communities including possibility of degrading aquatic ecosystems due to reduction in base flows. This impact will be minimal hence a value of 1.

6.2.2.12 Modification of hydrology

The increased water abstraction from nearby streams may modify the hydrological characteristics of these water bodies. Also, quarries and pits for extraction of road construction materials (ballast, soil, etc.) may provide localized areas for surface water infiltration with the possibility of recharging groundwater aquifers. However, water collecting in such open pits may also provide a large surface for the evaporation of water. Surface runoff may also

accumulate along the sides of the highway preventing direct flow to river channels. This impact will be low hence a value of 1.

6.2.2.13 Generation of storm water and impact on drainage

Construction or widening of sealed roads increases the amount of impermeable surface area, which increases the rate of surface water runoff. The project will also impact on the drainage during the construction phase of the road. There will be increased generation of surface runoff on the road. The increased or excess runoff could overwhelm local drainage system including streams with potential for increasing downstream flooding, damage to property and crops. Flooding downstream can also become a health hazard (e.g. breeding ground for mosquitos, etc.). Good drainage design and construction in the development of roads is critical to the success of road construction. Also, storm water generated on the road may be contaminated with oil and grease, metals (e.g. lead, zinc, copper, cadmium, chromium, and nickel), particulate matter and other pollutants released by vehicles on the highway. Storm water may also contain nutrients and herbicides used for management of vegetation in the rights-of-way. This impact will be moderate hence a value of 2.

6.2.2.14 Occupational safety and health

The Occupational safety and health issues associated with the construction and operation of the proposed road will include; physical hazards, chemical hazards and noise hazards. Chemical hazards in road construction, operations, and maintenance activities will principally be associated with exposures to road construction materials, dust during construction; exhaust emissions from heavy equipment and motor vehicles during all construction activities. Road construction and maintenance personnel can be exposed to a variety of physical hazards from operating machinery and moving vehicles but also working at elevation on bridges and overpasses. Other physical hazards include exposure to weather elements, noise, work in confined spaces, trenching, contact with overhead power lines, falls from machinery or

structures, and risk of falling objects. There is also a possibility of accidents when transporting workers to the construction sites. This impact will however be low hence a value of 2.

6.2.2.15 Community health and safety

Community health and safety issues will emerge during construction of the road. The impacts will include dust, noise, and vibration from construction vehicle movements and communicable diseases associated with the influx of temporary construction labor. Significant community health and safety issues associated with the proposed road project will include pedestrian safety, traffic safety, and emergency preparedness.

Pedestrians and motor cyclists are at the greatest risk of serious injury from collisions with moving vehicles. Children will generally be the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behavior while at play, and their small size making them less visible to motorists. Collisions and accidents can involve a single or multiple vehicles, pedestrians or motor cyclists and animals. Many factors contribute to traffic accidents. Some are associated with the behavior of the driver or the quality of the vehicle, while others are linked to the road design, or construction and maintenance issues. Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians, and/or the release of oil or hazardous materials.

The night glare from vehicles will cause disturbances to local communities at night and interfere with their sleep. This problem is likely to be greater in the future as vehicular traffic is set to increase several folds. Mitigation measures will however be put in place to prevent further direct, indirect or cumulative adverse effects. The impact scale is considered high hence a value of 3.

6.2 Operation Phase Impacts

6.2.1 Positive Project impacts during Operation phase

6.2.1.1 Contribution to the achievement of KUSP objectives

Improving of drainages, pedestrian walkways and car parking areas between Kunda Kindu and KMTC junction will contribute greatly to the achievement of the KUSP II objective of infrastructure upgrade and dustless towns in municipalities.

6.2.1.2 Creation of employment opportunities

Employment opportunities are one of the long-term major impacts of the project that will be realized during the operation and maintenance of the project. It is estimated that this project will create numerous jobs such as caretakers, cleaners, waste handlers, repairs and maintenance etc. Other indirect sources of employment will also arise.

6.2.1.3 Optimal use of land

The establishment of the tarmac road will ensure that the land is used as a factor of production. Land is a precious resource in Kenya and proper utilization of idle land is encouraged. Such utilization will not only benefit the proponent but also the local residents, local authority in the Mwingi town among others.

6.2.1.4 Provision of a safer and more convenient pedestrian movement

During the field survey, respondents expressed positive views that the proposed pedestrian walkway project will provide a safer, more convenient, and reliable means of movement for pedestrians within the project area. Currently, pedestrians are forced to walk along the road shoulder, which exposes them to traffic risks and becomes difficult during rainy seasons due to poor drainage and water accumulation. The proposed walkway and improved drainage system will therefore enhance accessibility, ensure safer pedestrian movement, and provide a more reliable passage for patients, visitors, and staff accessing the hospital throughout the year.

6.2.1.5 Reduction in particulate matter emissions (dust)

The current carriage way is made of earthen material. Dust is a major concern as vehicles plying the route makes the area along the road quite dusty. Considering the locality is in an arid area, the received rainfall is low, meaning that hot, dry and dusty conditions prevail. Paving of the road surface with bitumen will eliminate dusty conditions experienced by users and villages located along the proposed road project.

6.2.1.6 Increased security

The road will make it easier for road patrols and security operations to be conducted in the area. In case of emergence cases that may require security personnel, response will be fast and prompt.

6.2.1.7 Improved pedestrian safety

Pedestrian walkway projects can significantly reduce accidents and enhance safety when they provide a clearly defined route separated from vehicular traffic, with adequate signage, proper drainage, and unobstructed pathways. The proposed walkway along the perimeter wall of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road will improve pedestrian safety and comfort in several ways, including:

- Clear sightlines and visibility along the walkway to allow pedestrians to safely navigate the corridor.
- Signage and markings for pedestrians, including warning and directional signs where necessary.
- Proper drainage and unobstructed surfaces to ensure safe walking conditions during rainy seasons.
- Defined separation from vehicular traffic along the road edge, reducing conflicts between pedestrians and vehicles.

These measures will enhance overall safety for pedestrians, particularly patients, hospital visitors, and staff, while improving accessibility and comfort along the project corridor.

6.2.2 *Negative Environmental Impacts during Operation Phase*

6.2.2.1 Noise and disturbance to pedestrians

During the operation phase, the improved pedestrian walkway is not expected to generate noise from vehicles or machinery. However, minor disturbances may arise from increased pedestrian activity, such as foot traffic, use of bicycles, or maintenance activities along the walkway and drainage channels.

This impact is considered low to moderate (value of 1–2), as the corridor serves primarily hospital visitors and staff, and any noise generated will be temporary, localized, and unlikely to cause significant disruption to the surrounding environment or users of the walkway. Proper design, maintenance, and signage will ensure that pedestrian movement remains orderly and safe, minimizing disturbances.

6.2.2.2 Dust and minor air disturbances

The operation of the pedestrian walkway is not expected to generate vehicle emissions; however, minor dust may arise from pedestrian movement, maintenance activities, or cleaning operations, especially during the dry season. These impacts are localized and minor, with negligible effect on the surrounding environment, and are considered low (value of 1).

6.2.2.3 Impacts on livestock

The project area is primarily institutional along the perimeter of Kitui County Referral Hospital, and very few livestock traverse the corridor. Therefore, the improved walkway is unlikely to affect livestock movement or access to water and pasture. This impact is negligible (value of 0).

6.2.2.4 Increased consumption of fossil fuel

Since the walkway project does not involve vehicular traffic or motorized transport, no additional consumption of fossil fuels is expected during the operation phase. This impact is therefore not applicable (value of 0).

6.2.2.5 Storm water and impact on drainage

The project includes improvement of drainage along the walkway corridor. The introduction of paved walkways and impermeable surfaces may slightly increase surface runoff in the immediate vicinity. However, since proper drainage channels will be constructed as part of the project design, the risk of flooding or waterlogging will be minimized. Maintenance of the drainage system will be required to prevent blockages, but overall, this impact is low to moderate (value of 2).

6.2.2.5 Community health and safety risks

While the walkway is designed to enhance pedestrian safety, potential operational risks include slips, trips, or falls, especially during rainy conditions if drainage is temporarily blocked or surfaces become slippery. Night-time use may also pose minor safety risks if lighting is inadequate. These risks can be mitigated with proper walkway maintenance, signage, and lighting. This impact is considered moderate (value of 2).

6.2.2.6 Generation of solid waste

Solid waste generation along the walkway during operation will be minimal and may include litter from pedestrians or debris from routine maintenance activities. No significant commercial or construction-related waste is expected. The proponent should ensure regular collection and proper disposal to maintain cleanliness along the walkway. This impact is considered low (value of 1).

6.3 Decommissioning phase impacts

6.3.1 Negative Environmental Impacts

6.3.1.1 Solid waste generation

Decommissioning of the pedestrian walkway and associated drainage structures may generate small quantities of construction-related waste, including concrete, paving stones, metals from guardrails or railings, drainage pipes, and other minor construction materials. While this waste is largely inert, improper disposal could affect local aesthetics or cause minor environmental contamination. This impact is considered low to moderate (value of 1–2).

6.3.1.2 Noise pollution

Decommissioning activities, such as removal of walkway surfaces or drainage structures, may generate temporary noise and vibrations from hand tools or light machinery. This impact is expected to be short-term and minimal (value of 1).

6.3.1.3 Loss of community benefits

The walkway and improved drainage provide benefits such as enhanced pedestrian safety, accessibility, and storm water management. Decommissioning would result in the **loss of these benefits**, potentially reducing safety and convenience for pedestrians. However, this impact is **minimal (value of 1)**, as the project corridor is primarily institutional and alternative pathways or solutions may be available.

6.3.1.4 Occupational hazards

Workers involved in decommissioning may be exposed to minor occupational risks, such as cuts, slips, trips, or injuries from light equipment and materials handling. This impact is low (value of 1) and can be mitigated through the use of proper personal protective equipment (PPE) and safe work practices.

6.3.1.5 Dust generation

Removal of walkway surfaces and drainage components may create small amounts of dust, which could affect workers or nearby pedestrians temporarily. Since heavy machinery and vehicle traffic are minimal, exhaust emissions are negligible, and this impact is considered low (value of 1).

6.3.2 Positive Environmental Impacts of Decommissioning Phase

6.3.2.1 Site Aesthetics and Rehabilitation

Decommissioning will allow restoration of the project corridor. Replacing removed materials with topsoil, re-vegetation, or landscaping will improve the visual quality of the area and may enhance the hospital perimeter environment. Alternative uses of the cleared space can also be explored.

6.3.2.2 Employment Opportunities

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

6.4.2.3 Reduced environmental disturbances

During the operational phase, minor disturbances such as pedestrian congestion, noise from maintenance, or localized dust may occur. Decommissioning will eliminate these operational disturbances, improving the environmental quality of the site.

6.4.2.4 Reduction of operation risks

Decommissioning removes the walkway and drainage infrastructure, thereby eliminating risks associated with operation, such as slips, trips, or localized flooding if drainage were blocked. While the walkway provides benefits during operation, its removal will naturally reduce any negative impacts associated with its use

CHAPTER SEVEN

7.0 MITIGATION MEASURES

7.1 INTRODUCTION

On the basis of the anticipated impacts of the proposed project activities, several mitigation measures are suggested in this report. It is important that the suggested mitigation measures are fully implemented in order to significantly reduce the adverse impacts of the project during the construction, operational and decommissioning phases of the project. The summary of anticipated adverse environmental impacts and proposed mitigation measures is given in Table 3.

7.2 MITIGATION MEASURES DURING THE PROJECT CYCLE

7.2.1 Reduction of demolition of business sheds and building

The proposed project involves the improvement of pedestrian walkways and drainage along the perimeter wall of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road.

During the Environmental Impact Assessment (EIA) and public consultations, it was confirmed that there are no small-scale businesses, kiosks, or commercial structures located within the project corridor. Consequently, the project will not affect any local businesses, and there will be no need for relocation, demolition, or compensation related to business activities.

This ensures that the walkway and drainage improvements can be implemented without causing economic disruption or loss of livelihoods to traders or business owners in the area.

7.2.2 Reduction of disturbances to solar powered street lighting

Along the project corridor adjacent to the perimeter wall of Kitui County Referral Hospital, there are solar-powered street lighting poles that fall within the area designated for the walkway and drainage improvements. These poles will need to be temporarily removed and relocated to allow for construction, and subsequently reinstated to their original or suitable positions.

The impacts will be mitigated through:

i. Coordination with the responsible authorities to ensure proper handling and relocation of the solar-powered street lighting.

ii. Providing adequate notice to the relevant authorities and service providers about the relocation schedule.

iii. Careful removal, storage, and reinstatement of the lighting poles to avoid damage to the infrastructure.

iv. Ensuring that street lighting services are restored promptly after construction to maintain safety along the walkway corridor.

This approach ensures minimal disruption to lighting services and preserves safety and visibility along the pedestrian walkway during and after construction.

7.2.3 Reduction of disturbances to water and sewer lines

Some water and sewer lines are within the corridor proposed for improvement. These service lines may be disturbed by construction works. The lines will be removed or relocated and reinstated (where applicable).

The impacts will be mitigated through:

i. Strict adherence to the provisions of the Kenya Roads Act provisions
ii. The proponent and the contractor to sensitize the owners of the service lines on the provisions of the Kenya Roads Act
iii. Give adequate notice to owners of the structures to demolish or relocate them
iv. Where applicable, the proponent and the contractor to assist the owners of the service lines to remove, relocate and reinstate them

v. Put in place precautionary measures to avoid any incidences of leaks/spills of water or sewer waste occasioned by destruction of the lines

7.2.4 Reduction of disturbances of septic tanks/soak pits

Some septic tanks/soak pits are within the road corridor proposed for upgrading. The following will be undertaken to reduce the impact:

i. Strict adherence to the provisions of the Kenya Roads Act provisions on removal of structures in road reserve
ii. The proponent and the contractor to sensitize the owners of the structures on the provisions of the Kenya Roads Act
iii. Give adequate notice to owners of the structures to demolish or relocate them
vi. Where applicable, the proponent and the contractor to assist the owners of the structures to remove, relocate and reinstate them
vii. Put in place precautionary measures to avoid any incidences of leaks/spills of sewer waste occasioned by destruction of such structures

7.2.5 Occupational Health and Safety

Incidents, accidents and dangerous occurrences to workers will be mitigated through:

i. Ensure that construction works do not contaminate waters in a stream crossing the road corridor
ii. Provision of education and awareness on health and safety issues, complete with health and safety procedures.
iii. Enforcement and adherence to safety procedures and preparation of contingency plan for accident response.
iv. Strict adherence to the building plans and building code to avoid collapse of the structures and consequential injury.
v. Provision of adequate drinking water and onsite sanitation facilities to avoid waterborne/water-based diseases.

vi. Employment of only trained and authorized persons to operate construction equipment.

vii. Use of Personal Protective Equipment (PPE) during the construction and operation phases of the project. These shall include working boots, overalls, dust coats, helmets, dust masks, goggles, earmuffs and gloves depending on the individual worker's assignment.

7.2.6 Noise and Vibrations

Noise and vibrations shall be mitigated by:

i. Sensitizing construction vehicle drivers and machinery operators to switch off engines or machinery that are not being used.

ii. Ensuring that construction machinery is kept in good condition to reduce noise generation.

iii. Ensuring that workers wear ear muffs and other personal protective gear/equipment if working in noisy sections.

iv. Ensuring machines are switched off when not in use, and;

v. Undertaking loud noise and vibration level activities during off-peak hours (between 8.00 am and 5.00 pm).

7.2.7 Dust Generation

Dust generation shall be mitigated through:

i. Erection of dust screens.

ii. Sprinkling of water on dry/dusty surfaces regularly.

iii. Reuse of waste water to sprinkle at the site so as to reduce excessive dust.

iv. Adherence to personal protective clothing such as dust masks.

v. Ensuring strict enforcement of onsite speed limit regulations, and

vi. Planting grass during the operation stage.

7.2.8 Exhaust Emission

To mitigate exhaust emissions, it will be mandatory to:

i. Ensure machines and vehicles are properly and regularly maintained.
ii. Discourage plant operators and drivers from unnecessary revving and idling.
iii. Limit construction traffic movement and operations to efficient and necessary activities.
iv. Sensitize construction drivers and machinery operators to switch off engines when not being used.

7.2.9 Excess soils and rocks from excavation

i. This will be used in landscaping the disturbed site after construction.

7.2.10 Disruption of business activities during construction of roads

The contractor will put in place the following to minimize the impact:

i. Sensitize the local people on the kind of project taking place
ii. Restrict earthworks on mandatory areas
iii. Restrict traffic to designated routes
iv. Drivers to switch off engines and avoid unnecessary revving and engine idling
v. Carry out some construction activities at night to avoid disruption
vi. Secure sensitive areas with a danger tape
vii. Execute the project as per project schedule to avoid delays

7.2.11 Clearance of Vegetation

i. Plant a diversity of plants (ornamental and indigenous) around the buildings once the project is complete.
ii. Limit vegetation clearance on mandatory areas only during construction phase
iii. Avoid vegetation disturbance along the small stream

7.2.12 Water Consumption

i. Use water efficient dischargers

ii. Recycle waste water

7.2.13 Water Quality

i. Plant grasses and other plants to eliminate soil erosion/sediment transport from the site.

ii. Avoid water contamination in the adjacent small and seasonal stream

7.2.14 Debris and other Solid Wastes

i. During and after construction, a contracted waste handler will collect solid wastes regularly and dispose off in an approved manner.

ii. The proponent will provide waste collection bins.

Table 3: Summary of Impacts and Mitigation Measures

Project Phase	Possible Impacts	Mitigation Measures
Construction Phase	**Reduction of demolition of business sheds and building**	• Strict adherence to the provisions of the Kenya Roads Act provisions • The proponent and the contractor to sensitize the owners of the sheds and buildings on the provisions of the Kenya Roads Act • The proponent and the contractor to give the owners of the sheds and buildings adequate notice to relocate or demolish, whichever is applicable • The proponent and the contractor to assist the owners of the sheds and buildings to relocate or demolish where applicable
	Reduction of disturbances to Solar powered street lighting	• Coordination with the responsible authorities to ensure proper handling and relocation of the solar-powered street lighting. • Providing adequate notice to the relevant authorities and service providers about the relocation schedule. • Careful removal, storage, and reinstatement of the lighting poles to avoid damage to the infrastructure. • Ensuring that street lighting services are restored promptly after construction to maintain safety along the walkway corridor.

	Reduction of disturbances to water and sewer lines	• Strict adherence to the provisions of the Kenya Roads Act provisions • The proponent and the contractor to sensitize the owners of the service lines on the provisions of the Kenya Roads Act • Give adequate notice to owners of the structures to demolish or relocate them • Where applicable, the proponent and the contractor to assist the owners of the service lines to remove, relocate and reinstate them • Put in place precautionary measures to avoid any incidences of leaks/spills of water or sewer waste occasioned by destruction of the lines
	Reduction of disturbances of septic tanks/soak pits	• Strict adherence to the provisions of the Kenya Roads Act provisions on removal of structures in road reserve • The proponent and the contractor to sensitize the owners of the structures on the provisions of the Kenya Roads Act • Give adequate notice to owners of the structures to demolish or relocate them • Where applicable, the proponent and the contractor to assist the owners of the structures to remove, relocate and reinstate them • Put in place precautionary measures to avoid any incidences of leaks/spills of sewer waste occasioned by destruction of such structures

	Disruption of business activities and delays in transportation	• Control traffic • Provide diversions • Post sentries with red and green flags to control traffic • Ensure passage of traffic through works through out • Post cautionary signage's where traffic is carried off the road • Complete the project within the contract period and avoid delays
	Soil erosion	• Control earthworks • Install drainage structures properly • Ensure management of soil extraction activities • Landscaping of surrounding area
	Air Pollution	• Stockpiles of earth be sprayed with water or covered during dry seasons • Provide dust masks for the personnel in dusty areas • Sensitize construction workers • Avoid hauling stock piles of soil with water

	Noise pollution	• Machines to be installed with noise silencers • Sensitize workforce including drivers of construction vehicles • Place signs to indicate construction activities • Maintain/properly service all equipment • Workers in the vicinity of high level noise to wear safety and protective gear
	Dust generation	• Spray stock piles of earth with water • Avoid pouring dust materials from elevated areas to the ground • Cover all trucks hauling soil, sand, and other loose materials • Provide dust screens where necessary
	Exhaust emissions	• Vehicle idling be minimised • Alternatively fuelled construction equipment be used where feasible • Equipment be properly serviced and maintained
	Loss of vegetation	• Restrict construction activities to designated areas • Restrict traffic to designated and mandatory routes • Spare trees of high cultural value and plant grass, indigenous and exotic trees.

		• Carry out landscaping of the area. • Avoid vegetation clearance along the seasonal stream
	Water abstraction and consumption	• Management of water usage. • Avoid unnecessary wastage of water (encourage reuse of wastewater) • Avail water storage tanks • Use water efficient dischargers
	Discharge of waste water, sewerage and water quality degradation	• Practice waste water recycling • Avoid draining waste water in nearby streams
	Modification of hydrology	• Avoid excessive water abstraction from nearby water sources • Practice waste water recycling • Use water efficient dischargers
	Generation of storm water and impact on drainage	• Minimize creation of impervious surfaces • Reuse storm water • Minimize creation of expansive open pits in quarries and borrow pits

	Community health and safety	• Minimize dust pollution • Minimize noise pollution • Post adequate cautionary signage's to warn members of the public • Execute the project within the contract period and avoid delays
	Site cleanliness and sanitary facilities, Road safety	• Put up a site pit latrine • Pay special attention to sanitary facilities on site • Garbage should be disposed off periodically • Install road signs on the main roads • Enforce speed limits for construction vehicles
	Increased Water Consumption	• Install water storage tanks • Promote water recycling • Use water efficient dischargers
	Noise Pollution and excessive Vibrations	• Put speed limit for vehicles • Install speed bumps at road corridor
	Air pollution from dust and exhaust emissions	• Put speed limit for vehicles

		• Install speed pumps at along the road corridor
	Risk to livestock and wildlife	• Put speed limit for vehicles • Install speed pumps at along the road corridor • Put signage's especially in areas where livestock crosses the road
	Storm water and impact on drainage	• Ensure the road drainage is in good working condition • In case of failure, unblock drainage system e.g. piped culverts • Ensure safe disposal of storm water from the tarmacked road to avoid flooding incidences
	Increased risk to community health and safety	• Put speed limit for vehicles • Install speed pumps at along the road corridor • Post road signage's to indicate pedestrian crossing points • Provide pedestrian walkway
	Generation of solid waste	• Dispose appropriate waste resulting from road routine maintenance • Remove and dispose waste accumulating in drainage system

Decommissioning Phase	**Solid Waste Generation**	• Engage the services of a solid waste handler • Recyclable waste to be sold to waste recyclers • All unrecyclable waste to be disposed in an offsite dump site • Landscaping and Rehabilitation of the area by planting appropriate plants
	Noise pollution	• Undertake demolition within the shortest time possible • Reduce noise generation at the source point
	Loss of economic livelihood and economic ruin	• Sensitize workers (if any) at the project site of the demolition exercise • Assist workers to get other livelihood alternatives
	Occupational hazards	• Close the demolition area • Secure the demolition area with a fence and danger tape • Post cautionary signage's
	Dust and exhaust emissions	• Minimize dust pollution by sprinkling water on dusty surfaces • Undertake demolition within the shortest time possible

CHAPTER EIGHT

8.0 ANALYSIS OF PROJECT ALTERNATIVES

8.1 Introduction

The Environmental Impact Assessment Study also involved the examination of the alternatives to the proposed project. This is essential since it allowed the project proponent to make an informed decision regarding not only the location of the project, but also technologies that will be applied during the construction phase. This process also ensured that the project activities are located in suitable locations and are cost effective. The following sections provide the analysis of alternatives that were considered in the case of the proposed road construction.

8.1.1 The Existing Scenario

Currently, pedestrians accessing Kitui County Referral Hospital and moving along the corridor adjacent to the B7 Kitui–Kibwezi Road use informal paths or walk along the road shoulder. This exposes them to safety risks, waterlogging during rainy periods, and difficulty in movement, particularly for patients, visitors, and hospital staff.

At present, the absence of designated walkways and adequate drainage means pedestrian movement is unsafe and inconvenient. The proposed construction of formal pedestrian walkways and improved drainage systems represents the most sustainable and effective solution to ensure safe, accessible, and reliable movement along this corridor.

8.1.2 The No Action alternative

In the case of the no-action alternative, which means that the proposed walkway and drainage improvements would not take place, several negative consequences and foregone opportunities would arise:

i. Financial losses to the proponent – The project proponent has already invested resources in planning, professional services, and statutory approvals. Failure to implement the project would result in these investments being unutilized.

ii. Continued pedestrian safety risks – Pedestrians, including patients, visitors, and hospital staff, would continue to navigate unsafe informal paths along the perimeter of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road, exposing them to accidents, waterlogging, and mobility challenges.

iii. Loss of community benefits – The local community would miss the opportunity to benefit from a safe, accessible, and well-drained pedestrian corridor, which contributes to overall wellbeing and convenience.

iv. Foregone employment opportunities – The project would provide temporary jobs for local laborers, artisans, and service providers during construction. Choosing the no-action alternative would deny these income-generation opportunities.

v. Lost opportunities for local suppliers and professionals – Statutory bodies, consultants, and suppliers involved in the project would forgo potential revenue associated with supplying materials, services, and professional expertise for the project.

8.1.3 Technology and Procedures

The project team will employ recommended technologies and best practices during the design, construction, and operation phases of the pedestrian walkway and drainage improvement project along the perimeter of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road. The project will adhere to all relevant specifications and standards, ensuring quality, safety, and sustainability.

Construction will combine medium-level mechanized methods with manual techniques, appropriate for the scale of the project. Equipment such as concrete mixers, compactors, and small rollers will be used for the construction of hard surfaces, walkways, and drainage beds. Manual work will complement mechanized activities in areas where equipment access is limited, ensuring precision and efficiency.

Alternative approaches, such as fully manual construction, would be slower and potentially more costly. Locally available materials—including sand, gravel, cement, and paving stones—will be used to ensure cost-effectiveness and accessibility, while complying with quality standards.

The EIA project team is confident that the technology and procedures selected are appropriate and efficient for the proposed walkway and drainage improvements. Detailed descriptions of construction methods, equipment, and materials are provided in the project description section.

8.1.4 The proposed project alternative

The proposed alternative by the proponent is to construct a pedestrian walkway and improve drainage along the perimeter of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road. This option is considered the most appropriate for long-term safety, accessibility, and sustainable management of storm water. It provides a designated, safe route for pedestrians while reducing waterlogging and erosion along the corridor. Therefore, this alternative is the most feasible and sustainable option for the project area.

8.1.5 Alternative project site

The project will be undertaken within the hospital perimeter and the adjacent public right-of-way, which is under the jurisdiction of the proponent. The current site experiences poor pedestrian accessibility, safety risks, and inadequate drainage, making it the most appropriate location for the proposed improvements. There are no other feasible alternative locations that provide the same level of access and service to hospital visitors and staff

8.1.6 Construction Materials and Equipment

Construction equipment

These will include Lorries and pickups

Other equipment includes: -

- Small-scale compactors and rollers for walkway surfaces and drainage beds
- Concrete mixers for pavement and drainage works
- Excavators and hand tools for minor earthworks and trenching

- Pumps for dewatering or handling water during drainage works

Construction materials

Main materials will include: cement, sand, gravel/ballast, paving stones, concrete pipes, steel for reinforcement, and solar lighting components. All materials are locally available and will be sourced from authorized vendors, manufacturers, or wholesalers. Estimated quantities will follow the bill of quantities to minimize waste and ensure efficiency.

The EIA project team confirms that these materials and equipment are appropriate and suitable for the proposed pedestrian walkway and drainage works. Further details are provided in the project description section.

8.1.7 Construction specifications of for walkway and drainage works

Construction will be carried out according to approved design specifications and industry best practices. The contractor will be required to:

Follow contract documents and technical drawings strictly

Adhere to national construction and environmental standards

Ensure a qualified site engineer supervises all construction operations

The construction will combine mechanized and manual methods to achieve the required quality and safety standards for walkways, drainage beds, and associated infrastructure.

8.1.8 Solid waste management alternatives

Construction activities will generate minor quantities of solid waste, including concrete offcuts, sand, gravel, packaging materials, and debris from trenching or paving. An integrated solid waste management approach will be applied:

1. Waste reduction at source – Workers will be trained to minimize waste generation, and notices for proper waste handling will be posted at the site.
2. Reuse and recycling – Recyclable materials (e.g., metal, concrete pieces) will be separated and sold or reused where feasible.

3. Safe disposal – Non-recyclable waste will be safely collected and disposed of in sanitary landfills approved by local authorities.

This approach ensures a clean, safe, and environmentally responsible construction site.

8.1.9 Alternative mode of transportation

The proposed walkway serves pedestrian movement, which has no direct alternative in the project area. Other modes of transport such as rail, water, or air are not viable for short-distance pedestrian movement along the hospital corridor. The walkway is therefore the only practical and safe means to enhance pedestrian accessibility, safety, and drainage management in this section.

CHAPTER NINE

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This Section presents the Environmental and Social Management Plan (ESMP) that will need to be implemented by the Proponent to prevent or reduce significant negative impacts to acceptable levels. Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done.

EMP is a vital output of an Environmental Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined in the sections below has addressed the identified potential negative impacts and mitigation measures of the proposed Residential premises, based on the findings presented in Chapters on Environmental and Social Impacts and Mitigation Measures of the expected Negative Impacts.

9.1 Construction and Operation Phases Environmental and Social Management Plan

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase of the proposed project are outlined in Table 4 below: -

Table 4: Environmental and Social Management Plan

Project Phase	Environmental/Social Issue	Potential Impact	Mitigation Measures	Monitoring indicator	Frequency	Cost Estimates (KSH)	Responsible
During construction	Dust generation	• Air pollution • Health complications	• Regular watering of site roads and working areas • Cover trucks transporting loose materials • Limit earthworks during windy conditions	Reduced dust levels	Daily	100,000	Contractor
	Noise and vibration	• Disturbance to residents	• Restrict working hours to daytime • Maintain equipment regularly • Provide PPE (ear protection) Sensitize workers and drivers	Noise level compliance	Weekly	50,000	Contractor
	Disturbance to vegetation and sensitive areas	• Loss of biodiversity	• Limit clearing to designated areas • Protect existing trees and vegetation • Restore disturbed areas after works	Minimized disturbance to vegetation	Daily	70,000	Contractor
	Public and Worker safety	• Injuries • Accidents	• Provide and enforce use of PPE • Safety training	PPEs usage, incident reports	Daily	80,000	Contractor

			• Regular safety inspections				
	Workers' health, safety and HIV awareness training	• Accidents • HIV infections	• Workers' Trainings	Training records	Once	50,000	Contractor
	Soil excavation	• Soil erosion and sedimentation	• Embrace proper excavation methods • Backfilling • Provide drainage channels	Presence of erosion control measures	Weekly	80,000	Contractor
	Waste generation	• Land pollution	• Provide waste bins • Ensure proper disposal at designated sites	Clean site Waste records	Daily	50,000	Contractor
	Traffic disruption	• Congestion • Accidents	• Traffic management plan • Signage • Diversion	Traffic flow observation	Daily	60,000	Contractor
	Employment	• Local dissatisfaction	• Prioritize local labour	Employment records	Monthly	-	Contractor
	Gender and social risks	• GVB, Harassment	• Sign code of conduct • Awareness training	Reported cases	Monthly	50,000	Contractor
	Drainage works	• Blockage of drainage • Flooding	• Proper design • Regular cleaning	Free flowing drains	Weekly	50,000	Contractor
	Cabro works	• Surface runoff • Flooding	• Install proper slope and drainage	Functionality of drainage	Weekly	-	Contractor

		• Erosion					
Decommissioning	Site degradation and poor reinstatement	• Land degradation	• Reinstate all disturbed areas after works • Backfill excavations and compact • Landscape where necessary	Restored site condition	Once	-	Contractor
Operational Phase	Poor maintenance	• Blocked drainage	• Routine inspection and maintenance	Maintenance records	Quarterly	100,000/Yr	Kitui Municipality
	Waste accumulation	• Unsanitary conditions	• Install bins • Regular collection	Cleanliness of the area	Weekly	60,000/Yr	Kitui Municipality

CHAPTER TEN

10.0 DECOMMISSIONING PLAN

Although the proposed project involves the construction of pedestrian walkways and drainage improvements, it is necessary to outline basic rehabilitation measures that will be undertaken once the walkway and drainage structures reach the end of their service life and decommissioning becomes inevitable. These measures should be implemented in conjunction with all operational-phase actions to ensure that the site is restored to a condition equivalent to or better than its original state.

The following measures should be undertaken:

i. Landscaping and surface restoration – Open areas along the walkway and drainage corridor should be levelled, pits and depressions filled, and quality vegetation planted to improve aesthetics and prevent erosion.

ii. Waste clearance – All materials generated from decommissioning, including concrete offcuts, paving stones, metals, plastics, and wood, should be properly collected and disposed of or recycled.

iii. Rehabilitation of excavated areas – Any trenches or areas disturbed during decommissioning should be refilled, compacted, and planted with suitable vegetation to restore the landscape.

iv. Cleaning of decommissioned structures – Walkway surfaces, drainage beds, and related structures should be cleared of dust, debris, and loose materials before removal.

v. Equipment removal – All construction equipment and tools used for decommissioning should be removed from the site, repaired, reused, or sold to scrap dealers.

vi. Public and worker notification – Workers and the public should be informed in advance of the decommissioning activities, and any necessary assistance or compensation provided for temporary disruptions.

Other details of decommissioning plan are given in Table 5.

Table 5: Details of Decommissioning Plan

Activity/ Issue	Action Required	Responsible Party	Frequency
ESIA	Decommissioning of walkways and drainage structures	Proponent and NEMA	Once-off
Design	Decommissioning design for walkways and drainage	Appointed decommissioner	Once-off
Excavation	Excavation of the entire structures	Appointed decommissioner	Once-off
Disposal	Disposal of materials	Appointed decommissioner	Once-off
Clean up	Clean up and rehabilitation of the site	Appointed decommissioner	Once- off
Rehabilitation	Areas under rehabilitation must be demarcated with danger tape to prevent vehicular and human access. Refill the site and re-vegetate the land	Appointed decommissioner	Once-off
Removal of materials	All materials to be removed in an appropriate manner	Appointed decommissioner	Once-off
Monitoring	Post decommissioning monitoring	Proponent/ NEMA	Once-off

CHAPTER ELEVEN

11.0 CONCLUSIONS AND RECOMMENDATIONS

The proposal by the County Government of Kitui to construct pedestrian walkways and improve drainage along the perimeter of Kitui County Referral Hospital and adjacent to the B7 Kitui–Kibwezi Road has been subjected to the Environmental and Social Impact Assessment (ESIA) process, as required by existing legislative and regulatory frameworks for projects of this nature. Assessment findings indicate that the proposed project is highly appropriate and timely, as it will enhance pedestrian safety, accessibility, and storm water management, while contributing to the overall wellbeing of hospital visitors, staff, and the surrounding community. The ESIA consultant has fulfilled the Terms of Reference (TOR) through literature review, field surveys, baseline environmental assessment, impact evaluation, development of mitigation measures, and preparation of an Environmental and Social Management Plan (ESMP). The report presents the key ecological, social, and infrastructural characteristics of the project area along with the potential impacts of the proposed walkway and drainage improvements.

The assessment has established that the proponent has adequately surveyed and designed the walkway and drainage systems. The contractor is advised to strictly adhere to project design specifications and material standards to ensure the durability and safety of the structures. All materials must be tested by accredited agencies before construction begins, and all project activities should comply with general and specific industry standards and the contract documents unless otherwise directed by the project engineer.

Field observations confirm that the project corridor currently lacks formal walkways, adequate drainage, and safe pedestrian access. No businesses or commercial activities exist within the corridor, and only solar-powered street lighting poles will require temporary relocation during construction. No electricity poles, water pipelines, or sewer infrastructure will be significantly affected. This ensures minimal disruption to the surrounding area while enhancing pedestrian safety and comfort.

The assessment has determined that the proposed project will generate significant positive impacts, including:

- Improved pedestrian safety and accessibility along the hospital perimeter
- Effective storm water drainage, reducing waterlogging and erosion
- Employment opportunities for local community members during construction
- Improved aesthetics and public health through better infrastructure

- Long-term social benefits for hospital visitors, staff, and nearby residents

Although the project is expected to have overwhelmingly positive impacts, minor environmental concerns may arise during construction. These include temporary dust generation, minor noise, small amounts of construction waste, and localized disturbances related to the relocation of solar-powered street lighting. These impacts are manageable and can be mitigated through the implementation of the ESMP developed in this report.

The mitigation measures provided in the ESMP are designed to minimize negative impacts at every stage—construction, operation, and eventual decommissioning—while optimizing the positive benefits of the project. The proponent and contractor are advised to ensure that the EMP is implemented fully and translated into practical actions throughout the project life.

Taking into account the importance of the proposed walkway and drainage improvements and the fact that all likely negative impacts have been identified and addressed, it is recommended that NEMA approves the project and grants an ESIA license. This will enable the proponent to proceed with construction and realize the benefits of safe pedestrian access, improved drainage, and enhanced public health and safety in the project area.

In the interim, the proponent and contractor should familiarize themselves with the identified impacts and corresponding mitigation measures to ensure full compliance and effective project implementation.

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APPENDICES

- ✓ Environmental Expert Practising License
- ✓ Site map
- ✓ Project BQ
- ✓ Sample of Questionnaires used in Public Consultations