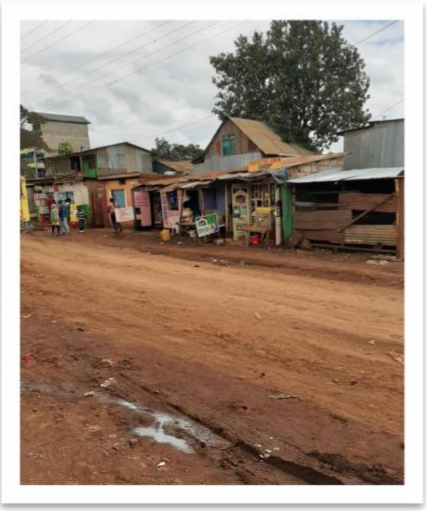
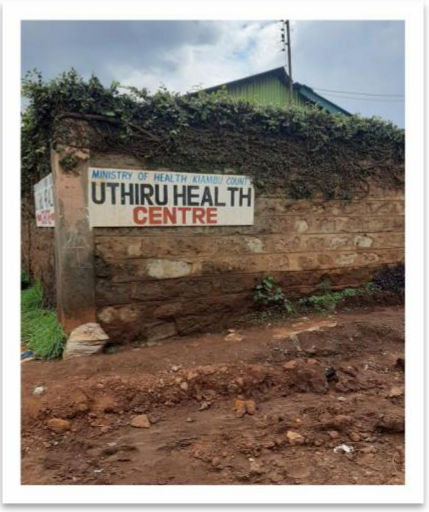
ENVIRONMENTALAND SOCIAL IMPACTASSESSMENT (ESIA) REPORT FOR THE PROPOSED UPGRADING OF 87- NDUMBUINI (2.25 KMS) ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING IN KIKUYU MUNICIPALITY





Proponent: **County Government of Kiambu** **P.O Box 2344- 00900** **Kiambu**	**NEMA Lead Expert:** **Esther N. Kaguima** **Registration No. 2529**

April 2020

DECLARATION

Declaration by Lead Expert

I **Esther Kaguima** do hereby certify that this Environmental and Social Impact Assessment (ESIA) report has been undertaken and submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 revised 2018 and Legal Notice No. 101 of Environmental (Impact Assessment and Audit) Regulations, 2003; and that all the information documented in this report is a truthful representation of all the findings related to the proposed upgrading of 2.25 kms of 87- Ndumbuini road to bituminous standards and street lighting in Kikuyu Municipality.

Signature: ……..... Date ……

PROPONENT

I, **John M Mutie** On Behalf of the **COUNTY GOVERNMENT OF KIAMBU,** declare that all the information contained in this ESIA Project report is an accurate and truthful representation of all findings as relating to the proposed project.

Signature: ……

Date and stamp: …….

Designation: Chief Officer- Municipal Administration and Urban Development

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FIGURES

ACRONMY

AIDS	Acquired Immune Deficiency Syndrome
CEC	County Environment Committee
CIDP	County Integrated Development Plan
DOSHS	Directorate of Occupational Safety and Health Services
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ESS	Environmental and Social Standards
FY	Financial Year
GIS	Geographic Information Systems
GCS	Graded Crushed Stones
HIV	Human Immunodeficiency Virus
ID	Internal Diameter
ILRI	International Livestock Research Institute
KUSP	Kenya Urban Support Programme
NLUP	National Land Use Policy
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NMT	Non- Motorised Transport
MDD	Maximum Dry Density
OHS	Occupational Health and Safety
OHSO	Occupational Health and Safety Office

OP	Operational Procedures
PCR	Physical Cultural Resources (PCR)
PSV	Public Service Vehicles
PPE	Personal Protective Equipment
POM	Programme Operations Manual
SES	Social and Environmental Standards
SDGs	Sustainable Development Goals
STI	Science Technology and Innovation
SGR	Standard Gauge Railway Line
TOR	Terms of Reference
UDG	Urban Development Grant
UNDP	United Nations Development Programme
WIBA	Work Injury Benefit Act
VAT	Value Added Tax

EXECUTIVE SUMMARY

The County Government of Kiambu proposes to upgrade 2.25 kms of 87- Ndumbuini road to bituminous standards and street lighting in Kikuyu Municipality under the Kenya Urban Support Programme (KUSP). The implementation of the project will be through the use of an Urban Development Grant (UDG) from World Bank whose main objective is to assist in the establishment and strengthening of urban institutions to deliver improved infrastructure and services in all designated municipal areas at the County level.

Since the proposed project falls under the categories of projects that should be subjected to the ESIA process as the per schedule two of EMCA, 1999, the County Government of Kiambu who is the proponent commissioned NEMA lead expert to undertake an environmental and social impact assessment (ESIA) and submit the report to NEMA for review and consideration for approval. The scope of the ESIA study entails an outline of the project's background, justification. and objectives. The report further highlights the aims, objectives, scope and rationale of the ESIA process, the project's design, technology, input and outputs. Chapter three gives a description of the project's baseline information regarding the physical, biological and social- economic environments. In chapter four, a description of relevant policies, legal and institutional framework guiding the ESIA process is presented. The report also presents an analysis of the potential positive impacts arising from the project and measures to enhance them. Equally the potential social and environmental negative impacts and the proposed measures to mitigate against them are presented in chapter five. A summary of the approaches used in gathering baseline information for the study and public participation process will also be presented and an assessment of the project's alternatives. The report will conclude with a highlight on Environment and Social Management and Monitoring Plan (ESMMP), conclusion and recommendations.

CHAPTER ONE: INTRODUCTION

1.0 Project Background and Justification

Despite Kenya's strong economic performance in the past decades, the development of infrastructure and service delivery still lags. The demand for basic needs such as water supply, waste management and improved roads infrastructure has not been adequately addressed due to the rapidly growing population. Owing to its proximity to Nairobi, Kiambu County has been experiencing a high influx of people who are settling and living in the County as they commute to and from Nairobi for work or undertaking of various business activities.

Ndumbuini and 87 areas where the proposed project will be executed, are among some of the areas with the highest population as it borders Nairobi town. Unfortunately, the road connecting the two areas is not paved thus posing a lot of challenges especially during the rainy season when it gets very muddy and generates dust which compromises the air quality in the area during the dry season. Besides there are no public service vehicles operating on that proposed development area and the only areas the residents have to board the vehicles are either Ndumbuini centre or along the Nairobi- Nakuru Highway which are quite a distance from the residential area making it tiresome and risky especially at night. To address this challenge the County Government of Kiambu proposes to upgrade 2.25 kms of 87-Ndumbuini road to bitumen standards and street lighting in Uthiru ward through the support of World Bank under the Kenya Urban Support Programme (KUSP). This is an Urban Development Grant (UDG) whose main objective is to assist in the establishment and strengthening of urban institutions to deliver improved infrastructure and services in all designated municipal areas at the County level. Sections of the project design are attached to this project as annex one. The proposed project is one of the projects that is to be implemented using the grant as it was prioritised by the Kikuyu Municipal Board and from the resolutions of the citizen fora held on 15th April 2019 at St Emmanuel ACK Church in Kikuyu.

1.2 Objectives of the Project

The main objectives of the project are to:

- Increase road connectivity and accessibility of Kinoo and Uthiru wards through upgrading of 2.25 kilometers of 87 - Ndumbuini roads to bituminous standards

- Improve pedestrian mobility through provision of walkways along the proposed roads corridor
- Enhance storm water management through the construction of lined storm water drainage system
- Enhance security and night visibility through installation of 55 integrated solar street lighting.

Figure 1 Current Status of the Proposed Development Project

1.3 Objectives and Scope of the ESIA

The main objective of the ESIA as per the NEMA guidelines and administrative procedures on the undertaking of Environmental Impact Assessment (EIA) is to ensure that all the social and environmental concerns are integrated into all proposed development activities with an

aim of contributing towards sustainable development. Specifically, the objectives of the study were to:

- Identify the potential environmental and social impacts (positive and negative) arising from the proposed development project
- Asses the significance of the identified impacts
- Evaluate the relative importance of the impacts of alternative plans, designs and sites
- Recommend measures to ameliorate the adverse impacts
- Generate baseline data that can be used in monitoring and evaluation of how mitigation measures are to be implemented throughout the project cycle
- Preparation of an ESIA report that would guide in making informed decision before issuance of license by NEMA
- Ensure compliance with the requirements of Environmental Management and Coordination Act, 1999 and Environmental (Impact Assessment and Audit), Regulations, 2003.

1.4 Rationale for the Environmental and Social Impact Assessment (ESIA)

The provisions of Environmental Management Coordination Act, 1999 revised 2018 and the Environmental Impact (Assessment and Audit) Regulations, 2003 require that Environmental Impact Assessments (EIAs) be undertaken on development projects in order to determine any impacts (positive and negative) that the project may have on environment and people in the surrounding area and propose measures to be adopted in order to minimize the identified negative impacts. The proposed development project falls under one of the categories of projects that require to be subjected to the ESIA process as per Second Schedule (Section 58 (1), (4).} which points out that projects related to transportation (including all major roads) should have an ESIA undertaken. It is against this background that the proponent commissioned NEMA lead Expert to carry out the study and prepare a report for submission to NEMA for review in consideration for approval and issuance of a license to proceed on with the implementation of the project.

1.5 Terms of Reference (ToR)

The preparation of this report was guided and informed by the following terms of reference as per the provision Environmental (Impact Assessment and Audit) Regulations (2003) and EMCA, 1999

- A detailed description of the proposed development project
- An evaluation of social-economic, biophysical and environmental impacts (positive and negative) of the proposed development project
- An outline of proposed measures aimed at minimizing or mitigating against adverse or negative impacts
- Brief review of the development policies, legal and institutional framework guiding the ESIA process and the identification of their application in the implementation of the proposed development
- An outline of the technologies, processes, procedures and materials that would be used in the implementation of the project
- A description of the products and by products that would result from the implementation of the proposed project
- Analysis of the project alternatives as regards the site, design, and technologies
- Formulation of an Environmental and Social Management and Monitoring Plan (ESMMP) that would be used in guiding the implementation of the proposed project throughout its project cycle.

1.6 Study Methodology

The undertaking of this study was in accordance with the guidelines on the ESIA process as per the provisions of EMCA, 1999, Environmental (Impact Assessment and Audit) Regulations, 2003 and World Bank Environment and Social Safeguards Policies and Procedures. The approach adopted in the undertaking of the study was guided by the following key ESIA steps:

- Environmental or site screening
- Environmental scoping
- Desktop studies
- Interviews
- Site visits
- Public participation and stakeholders' engagement
- Reporting

1.6.1 Site Screening

To ensure that social, economic and environmental issues are considered and factored into the project's decision-making process and design of the project ad to determine the proposed

project compliance with the eligibility criteria by the World Bank (the financier), a site screening assessment was carried out between 7th and 8th August 2019. The key screening activities undertaken entailed identification and rating of the potential risks and their significance upon which a decision had to be reached on whether the project should be subjected to a full ESIA or not. Other issues that were put into consideration were the width of the available road corridor, level of encroachments, connectivity to other road networks and whether the project requires acquisition of land. The checklist that was used in the screening exercise is attached to this project as appendix two.

Based on the type and scale of the project and the level of the associated risks and impacts the proposed project was categorized under *'Category B'* or '*medium risk'* project which refers to projects with potential limited adverse social and environmental risks hence no need for a full ESIA. It is on this basis that this study was undertaken in order to identify and analyse the potential negative impacts and propose appropriate measures that should be implemented to reduce or mitigate against the identified impacts as well as maximizing on benefits associated with the proposed development project. Besides the project was also identified as among those requiring an environmental impact assessment under schedule 2 of Environmental Management and Coordination Act, 1999 and its amendment of 2015.

1.6.2 Preliminary Meetings

After screening, preliminary meetings between the proponent and lead technical persons such as the surveyors, roads and electrical engineers, NEMA EIA lead experts and associates were held in which the procedures as regards the designs, ESIA, time lines and other logistical issues of the proposed project were discussed and arrived at.

1.6.3 Environmental Scoping

After a decision was arrived at to proceed on with the ESIA after the screening exercise, a scoping exercise aimed at identifying the key issues to be addressed was undertaken. At this point the following activities were carried out:

- Identification of critical social and environmental issues
- Description of the project in terms of the existing biophysical, social, economic, environment, land use and community related issues
- Identification of methodologies and approaches to be adopted in the collection of baseline data and type of information that would be useful in assessing the impacts of the project and its alternatives

- Evaluation of alternatives to the project's location, design, technology and waste management
- Collection of baseline data on social and environmental issues relating to the project
- Stakeholder engagement
- Development of a stakeholders' engagement plan
- Preparation of terms of reference (ToR) for the ESIA process

1.6.4 Desk Study

This is a process that entailed a review of literature and documents as relates to the proposed development. Some of the documents reviewed included the projects designs, reports on similar projects and existing legal and policy documents as discussed in chapter four of this report. This review was done in order to ensure compliance of the proposed project with regulations guiding planning and development processes.

1.6.5 Field Studies

Reconnaissance visits to the proposed sites were undertaken in order to gather baseline information of the area that would form a basis for predicting the potential impacts and proposed mitigation measures. The recording of the data was done through photography and notes taking

1.6.6 Public Engagement and Participation

The importance of public participation in the planning, management and other decision-making activities is acknowledged in EMCA, 1999, and Public Participation Act, 2018. In compliance with the above legislation the views of the public regarding the proposed project were sought through the administration of questionnaires and a citizen fora which was held on 15th April 2019 at St Emmanuel ACK Church in Kikuyu. The details and findings of the public participation will be discussed further in chapter six of this report.

1.6.7 Preparation of Project's Report

The inputs of the public were incorporated into the main report and after its completion it was handed over to the proponent for endorsement before submission to NEMA.

CHAPTER TWO: PROJECT DESCRPTION

2.1 Project Overview

This is one of the proposed projects that was found to be legible for financing through the Urban Development Grant (UDG) by the World Bank following a citizens' fora on development projects for the Financial Year (FY) 2019/2020 for Kikuyu Municipality held on 15th April 2019 at St Emmanuel ACK Church Hall. The proposed project is expected to increase connectivity and accessibility of Kinoo and Uthiru wards. The connectivity will start in Ndumbuini centre and end at 87 area at the border of Kinoo and Uthiru wards of Kiambu County as indicated on figure two .The project will also improve pedestrian mobility through the construction of walkways, improve storm water management and enhance security and night visibility in the area through installation of street lighting.

2.2 Project Site and Location

The proposed project is in Uthiru Ward, Kabete Sub County, within Kikuyu Municipality of Kiambu County.The proposed distance to be covered lies between GPS coordinates S-1.254508, E36.713249 and S-1.254273, E36.708954 as indicated on figure two below.

Figure 2 Map of the Project Site

2.3 Project Site Neighbourhood

The proposed project lies within the Nairobi metropolitan area due to its close proximity to Nairobi County. In that regard the area accommodates a significant number of people who work and carry out trading activities in the neighbouring areas of Kangemi, West lands and Nairobi City. The project site is within a mixed-use zone characterised by relatively modern and well-designed residential development, commercial premises and small scale agricultural areas practised mostly in parts of Kinoo and towards Kanyariri areas which border the project area as indicated on figure three.

Figure 3 Some of the Developments along the Project Area

The area lies between two major road corridors that are under construction namely the Waiyaki way that is currently being converted into a superhighway that starts from James Gichuru road junction and ends at Mai Mahiu turnoff on Nairobi- Nakuru highway and the Northern by pass that starts from Gitaru-Kikuyu junction passing through Wangige area and joins the Northern by pass at Ruaka area. The project area is in close Kangemi market and a number of commercial premises situated along the Waiyaki way and in upcoming business

centres in Uthiru and Kinoo areas of Kiambu and Nairobi. There are also a number of learning institutions such as Nairobi University College of Agriculture and Veterinary Services (Upper Kabete Campus), Wangari Maathai Institute for Peace and Environmental Studies, Uthiru Girls, Kabete high school, Kangemi high school, Uthiru polytechnic, Kabate National Polytechnic as well as International Livestock Research Institute (ILRI). The area is close to the Kabete police station and the Kinoo administration police post. There are also a few informal settlements in the area especially at the interchange towards ILRI and Ndumbuini area which is also popularly known as the Uthiru Junction and Shauri Yako informal settlement in Uthiru ward.

2.4 Project Design and Scope of Work

The design and scope of work for the proposed project shall entail:

a) Upgrading of 2.25 kilometres of 87- Ndumbuini road to bituminous standards
b) Construction of lined storm water drains
c) Establishment of pedestrian walkways
d) Installation of 55 integrated solar street lighting

2. 5 Project Technology

To ensure that the project is implemented within the stipulated time frame of one year, the execution of the construction activities will involve the use of heavy machinery and other mechanical equipment. The choice and selection of the machines and equipment will be based on their efficiency in terms of fuel or energy consumption, cost effectiveness and ease of use. Whereas the undertaking of the work will be heavily mechanized, human labour will also be utilized especially where the use of machinery will not be applicable.

2.5 Project Construction Materials

The construction materials will consist of alignment soils, sand, concrete stones, ballast, hard stones, bitumen, lime, cement, crashed and graded stones, timber, reinforcement steel and ancillary, gravel concrete poles, mono-crystalline solar panels and lighting. Water, paints, adhesives, glue, solvents and water will also be in use. It is recommended that all the construction materials where possible be sourced locally and be those that will be environmentally friendly.

2.6 Project's Inputs

For the proposed project to be successfully implemented the following inputs will be required

- Financial resources that will be used in the purchase of construction materials, payment for the works done and for the monitoring and evaluation activities of the project.
- Manpower both skilled and unskilled. The skilled workforce that comprises of roads engineers, surveyors, Geographical Information Systems (GIS) experts and NEMA Lead experts whose main responsibility is provision of professional skills such as preparation of designs, bills of quantities, production of GIS maps and undertaking of Environmental and Social Impact Assessments and preparation of the ESIA reports and executing of technical works. The unskilled workforce (comprising of casual labourers, supervisors and foremen) who should be sourced locally will be engaged in the undertaking of manual works.
- Licensed material sites such as quarries and borrow pits
- Construction materials such as cement, sand, gravel, aggregate, bitumen, ballast, crushed and graded stones, hard stones, concrete blocks, concrete poles, solar panels, water and timber for form works. It is recommended that where possible all materials should be sourced locally and should be of acceptable standards such as being environmentally friendly
- Machinery and equipment such as excavators, compactors, concrete mixers, poker vibrators and lorries, trucks and vehicles that will be used in the construction works and other associated activities such as quarrying in order to get construction materials and for hauling them to the construction sites.
- Energy to power to run machines either electrical and diesel or petroleum powered
- Water that will be used in mixing of the construction materials and watering of dusty surfaces.

2.7 Projects Output

The principle output of the project will be 2.25 Kms of bitumen road with pedestrian walkways, lined storm water drains and 55 integrated solar street lighting. Equally upon decommissioning the restored project site will be another major project output.

2.8 Project's by Products and Waste

It is anticipated that a significant amount of waste will be generated during construction and decommissioning phases of the project due to the level and magnitude of the activities that will be undertaken. Upon completion, it is expected that a limited amount of waste will be generated as a result of the use of the road and the routine repair and maintenance activities that will be carried out along the road. The classification of the waste will be dependent on the waste streams or its source such as construction waste, commercial and demolition waste.

Whereas a large amount of this waste is expected to be solid in nature, a proportional amount of liquid waste will be generated. This will emanate from site offices, flows from washing of vehicles and machinery that will be used in construction activities, roads sides drains, spillages and leakages of oils, lubricants and solvents and from the curing of concrete surfaces. Other byproducts will be emissions of exhaust fumes from vehicles and fossils fuels powered machines.

2.9 Project's Activities

The activities described in this section are those that will be undertaken throughout the project's life cycle starting from planning, design, construction, operation and decommissioning phases.

2.9.1 Project's Activities during the Planning Phase

These shall entail all the preliminary tasks that will be carried out by the team comprising of surveyors, roads engineers, environmentalists/NEMA lead experts/associates and procurement officers. The tasks shall comprise of:

- Site surveys or visits aimed at gathering the baseline data that would be useful in informing the design of the proposed project
- Project site screening
- Preparation of the designs
- Project cost estimates (BOQs)
- Public participation and stakeholder's engagement
- Environmental and social impact assessment (ESIA) of the proposed project
- Preparation of tender documents, advertisement for bids, pretender site visits, evaluation of bid documents and awards of tenders
- Preparation and signing of contractual documents

- Securing of relevant permits by the contractor such as water abstraction permits, waste collection licenses and noise permits if needed
- Identification of materials sites such as borrow pits and quarrying sites and acquisition of licence for exploitation of the material
- Mobilization of machinery and equipment for use by the contractor
- Recruitment of the workers
- Establishment of project site office and storage facility for the construction machinery and equipment.

2.9.2 Project's Activities during Construction Phase

The tasks that will be undertaken in this phase shall comprise of:

- Surveying of the alignment, pegging and taking of cross section
- Setting out to determine the extent of the corridor or the road reserve and to mark the structures that need to be moved away
- Site clearance activities which will involve the removal of any vegetation such as shrubs, grass, hedges, trees and any other deleterious materials
- Stripping of topsoil which will be done to a maximum depth of 200 millimeters along the alignment or material sites. Once removed the soil should be stockpiled for reuse.
- Removal or demolition of any obstruction that may be on the road reserve
- Creation of alternative routes or diversions and erection of the necessary signages for warning road users of the ongoing works. In case it will not be possible to make any deviations, the contractor shall plan for the passage of traffic through and around the works which will be reimbursed as per the standard specifications
- Sourcing, extraction and transportation of construction materials which will be done from quarry sites, borrow pits, and manufacturers or distributors
- Crushing, mixing and treatment of construction materials such as cement and bituminous materials
- Earthworks which shall entail cutting of the benches, filing of sub grade layer, watering and compaction
- Excavation, filling for structure, watering and compaction
- Road sub base works
- Culverts, drainage, protection and concrete works
- Development of the road pavement
- Carriage way construction

- Road bituminous surfacing or dressing
- Road furniture and ancillary work which shall comprise of preparation of road surfaces , approved reflectorised thermoplastic white paint and application of road markings on a 450m^2 surface area. There will also be erection of permanent road signs namely six 750 mm warning signs, five priority prohibitory and mandatory signs (750 mm x 600 mm), six (400 mm x 300 mm) standard informatory signs and five non standard informatory signs.
- Provision of 3,938 meters of straight kerb
- Excavate 125 mm x 100 mm of straight channels which are 2,813 meters long
- Provision and erection of 30 concrete edge marker posts with two reflectors per post
- Erect standard speed bumps using AC type 1 along a distance of 48 meters
- Prepare ground , provide, plant, water and look after approved 225 tree seedlings and maintain till well established to the approval of environment officer
- Provide and install 1.2 diameter x 1.5m high steel grill fencing round the tree seedlings to the approval of environment officer.
- Street lighting activities which shall entail preparation of foundation works, provision of 55, 10 meters round pre-pressed reinforced concrete poles with earthing ferrule, provision of brackets for fitting the lighting systems and software to control illumination levels remotely and switch on and off the system automatically c/w short messaging services notifying system.
- Mainstreaming of HIV and AIDS issues into the project whereby HIV and AIDs awareness and prevention campaigns shall be undertaken among the workers and individuals affected by the project for the duration of the contract
- Implementation and monitoring of social and environmental safeguards

2.9.3 Project's Activities during the Operation Phase

These refers to the activities that will be undertaken once the construction activities are completed. Upon completion, the works will be inspected, and completion certificate will be issued. The contractor will be expected to undertake various activities aimed at restoring all degraded sites to almost their original status. Some of the expected activities to be undertaken include dismantling and demolition of the project site office, site clean-up, landscaping, beautification of the road reserves, rehabilitation of quarry sites and borrow pits, demolition of the project site office and environmental conservation. Thereafter the rest of activities will mainly be on operation and maintenance of established infrastructure such as the routine

maintenance of the road through street cleaning, repair of damaged or worn out sections of the roads, clearing of storm water drains and maintenance of street lighting.

2.9.4 Project's Activities during Decommissioning Phase

Should the project be deemed not to be viable, the project will be decommissioned. This will entail the undertaking of demolition of road pavements and storm water drains, and dismantling of fixtures, structures and equipment. Removal of all materials, structures and waste that will be generated as a result of demolition and dismantling activities will be carried out. Finally, site restoration activities will be carried out to ensure that the area is rehabilitated and restored to almost its original status.

2.10 Project Cost

The total cost of the proposed project is estimated to be Kenyan shillings one hundred and fifty five million, two hundred and fifty three thousands, five hundred and fifteen shillings and sixty two cents (155, 253, 515.62) as per the attached summary Bills of Quantities (BoQ) attached to this report as annex three.

CHAPTER THREE: PROJECT'S BASELINE INFORMATION

3.1 Physical Environment

The description of the physical environment of the proposed development is derived from the larger Kiambu County physiographic and natural conditions as outlined in the subsequent sections

3.1.1 Climatic Conditions

The project site is in Uthiru Ward of Kabete Sub County which generally experiences a cooler climate due to its high altitude. The area experiences a bi-modal type of rainfall with the long rains experienced between mid March to May and the short rains falling between mid October to November. Whereas the rainfall varies throughout the year, the average amount of rainfall recorded in the area is approximately 1,200 mm. The area experiences a cool climate due its high altitude with the highest temperatures recorded between the months of January to March whilst the lowest temperatures are experienced between the months of July and August a season that is normally characterised by drizzles and frost. The mean annual temperatures range between 10 -28 degrees celsius.

3.1.2 Topography and Drainage

The project site lies within the lower highland topographical zone of the larger Kiambu County which lies between 1,500- 1800 metres above sea level. The area is characterised by hills, plateaus and higher elevation plains. Whereas the project area is within the Athi river basin, the project area is devoid of any major rivers but has a high ground water potential from which the residents have drilled boreholes for use at household levels.

3.1.3 Geology and Soils

The area has high level upland type of soils derived from volcanic rocks making them very fertile and ideal for livestock keeping and growth of cash and food crops.

3.1 Biological Environment

3.2.1 Flora and Fauna

In view of the fact that the project area is in a densely populated area the natural vegetation in the area is almost nonexistent. Most of the vegetation in the area has been cleared to pave way for development projects that are coming up to meet the ever rising demand for

residential and commercial premises in the area. That notwithstanding, the area is characterised by planted vegetation comprising of exotic species mainly Grevillea Robusta (locally known as Mukima) eucalyptus, cypress and fruit trees such as avocadoes and bananas. There are also species of flowers and vegetation hat have been planted along the roads and around residential premises to serve as hedges as indicated on figure four below. Equally, the area has less habitation of wildlife characterised by several species of birds, rodents, microorganisms and insects. There are also few domesticated animals such as dairy cows, pigs, sheep, poultry and pets such as dogs and cats.

Figure 4 Existing Vegetation type in the Area

3.3 Social Economic Environment

3.3.1 Existing Infrastructure and Services

The project area has good communication, telecommunication and road networks. As pointed out in chapter two, the project site is close proximity to the Waiyaki way that is being converted into a super highway and the Kanyarari Ndumbuini road that joins the Northern by pass that is being constructed at Rukubi shopping centre. The use of mobile phones is common in the area. To enhance the network connectivity in the area, a booster has been installed along the proposed road corridor. Equally the area has good connection to electricity power supply as indicated on the figure five below.

Figure 5 Power and Communication Connectivity in the Area

The main mode of transport in the area is by public service vehicles (PSVs) either by bus or Nissan matatus whose main terminus is Ndumbuini. Private vehicles are also in use as well as motorbikes. In that regard the residents have either to walk or take motor bikes to get to their residential areas which may be far away from the main bus terminus. Hence the execution of the project would open up the area and make it more accessible.

The water supply in the area is by Kikuyu water and sewerage company which is supplemented by us borehole and shallow wells that are sunk in the area.

There are also a number of recreational facilities in the area such as hotels, pubs and clubs. The areas is also served by a number of learning, health and religious institutions both public and private such as Uthiru health centre, Uthiru girls school, Mama Ngina primary school,

Kinoo primary, Uthiru Genesis school and Uthiru polytechnic as well as administrative offices. Figure six below shows some of the facilities available in the area.

Figure 6 Some of the Basic Infrastructure and Services in the Area

3.3.2 Liquid and Solid Waste Management

Solid waste management in project area is the responsibility of the County Government of Kiambu. All the municipal waste (which refers to all the waste generated from the market areas and all commercial premises) is normally collected by the County Government of Kiambu whilst all the domestic waste from residential areas is collected by private garbage

collectors licensed by the County Government. All the waste collected is transported to Kang'oki dumpsite in Thika for safe disposal. It is expected that any waste generated throughout the project cycle should be managed as per the guidelines of the County Government and NEMA waste regulations.

The area has no conventional sewer line and thus the use of septic tanks and pit latrines are the major types of sanitation facilities in the area.

3.3.3 Economic Activities

Apart from those in formal employment, the rest of the residents in the area engage in different forms income generating activities such as small scale farming where they sell their farm produce to markets such as Kangemi and Wangige or to the green grocers. There are convenient shops, kiosks, salons and barber shops, Mpesa shops, hardware retailers, timber yards, hawkers, property management and *boda boda* services as indicated on figure seven.

Figure 7 Some of the Economic Activities in the Area

CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

In recognition of the need to promote environmental conservation and sustainable development, the Kenyan Government has been pursuing policies and formulated regulations aimed at coordinating and achieving reasonably high levels of development (NEMA, 2002). In the subsequent sections a highlight of policies, legal and institutional framework that will guide and inform the implementation of the proposed project will be presented.

4.2 Relevant Policy

4.2.1 National Environmental Action Plan (NEAP)

This is a tool for integrating environmental concerns into development planning as per the provision of the Environmental Management Coordination Act (EMCA, 1999). The NEAP addresses environmental issues in a cross sectoral and an integrated way hence provides a broad framework for the coordination of environmental activities by all actors i.e. private sector and Government to guide the course of development activities.

Relevance

The plan points out the need to have environmental concerns integrated into programmes, projects and activities, a concern that this study seeks to address through the undertaking of ESIA process which is regarded as a tool for integrating social and environmental considerations into project decision-making and design according to the UNDP guidance note on the social and environmental standards (SES).

4.2.2 The National Land Use Policy (NLUP)

This is statement of intent that sets out the long-term goals of land use management. Its principle objective being the provision of legal, administrative, institutional and technological framework for optimal utilization and productivity of land and land related resources in a sustainable and desirable manner at National, County and Sub-County and other local levels. Relevant to this project are the principles and guidelines provided for:

- Proper management of land use resources to promote public good and general welfare
- Land use planning to enhance sustainable development

- Mitigation of problems associated with poor land use
- Promotion of environmental conservation and preservation

Relevance

The implementation of the proposed project will be informed and guided by the provisions of this policy especially as regards the use of construction materials that will be extracted from the land borrow pits and quarrying sites

4.2.3 Kenya Vision 2030

This is the Country's development blueprint for the period 2008 to 2030 which aims at transforming Kenya into an industrializing and middle-income country that will provide a high quality of life to all its citizens by the year 2030. The vision has its basis on three pillars namely economic, social and political. The three pillars are anchored on macroeconomic stability, continuity in governance reforms, enhanced equity and wealth creation opportunities for the poor, infrastructure, energy, science, technology and innovation (STI), land reforms, Human resources development, security and public sector reforms.

Relevance

By ensuring that social and environmental concerns are mainstreamed in the project, the proponent will be contributing towards creation of a just and cohesive society in a sustainable way. The project will also contribute towards the improvement of infrastructure, security through the upgrading of the roads, construction of storm water drains and installation of integrated solar street lighting hence contribute towards social and economic development as envisaged in the policy document. Though on temporal basis, the execution of the proposed project will create jobs and business opportunities which will empower them economically.

4.2.4 The Sustainable Development Goals (SDGs)

The concept of Sustainable Development Goals (SDGs) was conceived during the United Nations Conference on sustainable development in Rio in 2012. This was occasioned by the need to come up with a set of universally acceptable goals that would balance the three pillars of sustainable development namely environmental, social, and economic. As a result, 17 goals were adopted by all United Nations Members states in 2015 as an urgent call for all to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

Relevance

The upgrading of the road and construction of the storm water drains will contribute towards realization of the SDG 9 of building resilient infrastructure. The contractor should ensure that the materials used in construction activities are extracted and used in a sustainable way that will minimize wastage and have minimal environmental impact.

4. 2.5 HIV and AIDS Policy, 2009

The policy was developed to act as a guide in the fight against HIV and Aids in workplace as it establishes a coherent approach in addressing the issues associated with the pandemic. The policy emphasizes the need for HIV and AIDS activities to be mainstreamed into the core activities of the Ministry's Departments, Semi-Autonomous Government Agencies (SAGAs) and Institutions. The policy further outlines employee's rights, responsibilities and expected behaviour in the workplace.

Relevance

To ensure compliance with the policy, the contractor shall ensure that all the workers are sensitized on spread of HIV and Aids and its management. He shall also ensure that condoms are availed to workers to protect themselves against infection.

4.2 6 National Climate Change Action Plan (NCCAP) 2018- 2022

This is a five year plan aimed at steering Kenya's climate change action. The plan is derived from the Climate Change Act No. 11 of 2016 which requires the government of Kenya to develop action plans that will guide the mainstreaming of climate change into sector functions. County governments in their functions are also expected to mainstream climate change in their operations, planning, and budgetary processes according to the Climate Change Act, 2016 and NCCAP 2018- 2022. The plan provides mechanisms and measures to achieve low carbon climate resilient development in manner that prioritize adaptation, and encourages the essence of enhancing climate resilience of vulnerable groups. The plan identifies priority climate change action thematic areas as:

- Disaster risk (floods and drought) management whose main objective is the reduction of risks that result from climate related disasters such as droughts and floods to communities and infrastructure

- Food and nutrition security whose objective is increase in food and nutrition security through enhanced productivity and resilience of agricultural systems, in as low carbon manner as possible
- Water and blue economy whose focus should be on enhancing resilience of the water sector by ensuring access to and efficient use of water for agriculture, manufacturing, domestic, wildlife and other uses
- Forestry, wildlife and tourism whose focus is on increasing forest cover to 10% of total land area, increase the resilience of wildlife and tourism sectors, and rehabilitation of degraded lands including range lands
- Health, sanitation, and human settlements whose objective is reduction in incidences of malaria and other diseases that are projected to increase because of climate change , encourage climate resilient solid waste management and promote climate resilient buildings and settlements including urban centres, ASALs and coastal areas
- Manufacturing whose focus will be improvement of energy and resource efficiency in the manufacturing sector
- Energy and transport whereby the focus is on climate proofing energy and transport infrastructure, promote renewable energy development, increase uptake of clean cooking solutions and develop sustainable transport systems.

Relevance

The proposed project falls under the energy and transport priority climate change thematic area identified in the plan. The implementation of the project will be contributing towards development of sustainable transport systems. The construction of the drainage system will result in improved storm water management and thus contribute towards reduction of disasters that may be caused by floods. Renewable energy will be mainstreamed in the project through the installation of integrated solar street lighting.

4.2.7 World Bank Policies and Standards

4.2.7.1 World Bank Environmental and Social Safeguard Policies

These policies are a demonstration of the bank's commitment to poverty eradication in a sustainable way according to World Bank, (2002). They are aimed at providing guidelines for the Bank and borrowers in identification, preparation and implementation of programmes and projects. Their application ensures that any undue harm to people or environment that may be associated with any development process is prevented and mitigated. Safeguards policies also

provide a platform for stakeholders to participate in the designing of the project. In that regard they have been an important tool for building a sense of project ownership among the local communities. Basically, they ensure that environmental and social issues associated with a proposed project are incorporated in the decision-making process and provide a mechanism for consultation and information disclosure.

The safeguards policies and their policy objectives are:

- **OP/BP 4.01 Environmental Assessment** which aims at ensuring that environmental and social aspects of the project are incorporated in the decision-making process so that the projects are implemented in a sustainable manner.
- **OP/BP 4.04 Natural Habitats** which promotes the protection, conservation, maintenance and rehabilitation of natural habitats and their functions
- **OP/BP 4.09 Pest Management** whose objective is the minimization and management of environmental and health risks associated with pesticides use and support safe, effective and environmentally sound pest management
- **OP/BP 4.11 Physical Cultural Resources (PCR),** this is a policy that addresses physical cultural resources defined as moveable or immovable objects, sites, structures, group of structures, and natural features that have archaeological, pale ontological or other cultural significance.
- **OP/BP 4.12 Involuntary Resettlement** which aims at avoiding or minimizing involuntary resettlement and , where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher
- **OP/BP4.20 Indigenous Peoples** which ensures that projects are designed and implemented in a way that fosters full respect for indigenous peoples' dignity, human rights and cultural uniqueness and so that they (1) receive culturally compatible social and economic benefits, and (2) do not suffer adverse effects during the development process
- **OP/BP 4.36 Forests** whose main objective is realization of the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital and local and global environmental services and values of forests

- **OP/BP 4.37 Safety of Dams** aims at ensuring quality and safety in the design and construction of new dams and the rehabilitation of existing dams and in carrying out activities that may be affected by an existing dam
- **OP/BP7.50 Projects on International Waterways** this aims at ensuring that the international aspects of a project on an international waterway are dealt with at the earliest possible opportunity and that riparians are notified of the proposed project and its details
- **OP/ BP 7.60 Projects in Disputed Areas** the policy objective for this safeguard is to ensure that other claimants to the disputed area have no objection to the project or that the special circumstances of the case warrant the bank's support of the project notwithstanding any objection or lack of approval by their claimants.

Relevance

The relevant policy safeguard for this project is OP/BP 4.01 Environmental Assessment which aims at ensuring environmental and social soundness and sustainability of investment project. As a demonstration of compliance to this safeguard the project was subjected through the ESIA process as per the safeguard policy which is in harmony with NEMA's EIA regulations and provisions of EMCA Cap 387 of 1999. To also ensure that the views of public were incorporated in the design and implementation of the project as per the policies guidelines, stakeholders' consultations were undertaken as discussed in chapter six of this report.

4.2.7.2 World Bank Environmental and Social Standards (ESSs)

This refers to a set of ten standards designed to assist borrowers manage the risks and impacts of a project, and improve their environmental and social performance, through a risk and outcomes based approach. The application of the ESSs according to World Bank, 2017 will assist borrowers to:

- Achieve good international practice relating to environmental and social sustainability
- Fulfil their national and international environmental and social obligation
- Enhance non-discrimination, transparency, participation, accountability and governance
- Enhance the sustainable development outcomes of projects through ongoing stakeholder engagement.

The ten ESS as identified in the World Bank's Environmental and Social Framework are highlighted in the subsequent sections.

4.2.7.2.1 ESS1 Assessment and Management of Environmental and Social Risks and Impacts

ESS1 sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing, in order to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs).

Relevance

To comply with this standard, the project has been subjected to ESIA process in order to ensure that the environmental and social issues arising from the project are Incorporated in the project's design so that the project can be sustainable. The ESIA process will also be useful in identifying mitigation measures that should be adopted in addressing the risks and negative impacts associated with the project.

4.2.7.2.2 ESS2 Labour and Working Conditions

The standard recognises the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. It advocates for fair treatment of workers, equal employment opportunities and discourages all forms of forced labour

Relevance

To demonstrate compliance to this standard the contractor shall ensure that engagement of the workers is done on an equal opportunities principle and the workers are paid on time for the work done, Equally the contractor shall ensure that the workers are provided with a clean and safe environment to work in.

4.2.7.2.3 ESS3 Resource Efficiency and Pollution Prevention and Management

The ESS 3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle.

Relevance

The implementation of the project shall be guided by this standard as it will be heavily mechanized and will entail the use of vehicles that will be transporting construction materials to the project site which are likely to emit fumes that may end up polluting the air or causing spillage and leakage of oil and petroleum products that may end polluting the land. In that regard the contractor has an obligation of ensuring that preventive measures to void any form of pollution are adopted as outlined in the ESMMP. Besides, a significant amount of raw materials, water and energy will be used as main inputs of the project and in that regard the principle of efficient use of raw materials will be encouraged as well as adoption of water and energy conservation measures as stipulated in chapter five of this report.

4.2.7.2.4 ESS 4 Community Health and Safety

The standard addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable.

Relevance

The proponent shall ensure that the mitigation measures proposed in the ESMMP to address the negatives impacts that may affect the lives of the communities in the project area such as noise and air pollution, increased road accidents are addressed. A grievance redress mechanism shall be put in place by the proponent to ensure any complaints that may be reported by the affected persons are addressed in order to reduce risks to the affected project persons.

4.2.7.2.5 ESS 5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

It points out that involuntary resettlement should be avoided while implementing projects. Where involuntary resettlement is unavoidable, it will be minimized and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

The standard is not applicable in this case as the project does not involve any involuntary re settlements.

4.2.7.2. ESS 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources

It points out that protecting and conserving biodiversity and sustain-ably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. ESS6 also addresses sustainable management of primary production and harvesting of living natural resources, and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples, whose access to, or use of biodiversity or living natural resources may be affected by a project.

Relevance

The contractor shall ensure that construction activities are restricted within the project corridor to avoid further habitat destruction.

4.2.7.2.7 ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

The ESS7ensures that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities. ESS7 is also meant to avoid adverse impacts of projects on Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts.

Relevance

The proposed project area has no indigenous people or underserved traditional local communities thus the standard is not applicable in this case.

4.2.7.2.8 ESS8 Cultural Heritage

This recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. In that regard, it echoes out the need to protect cultural heritage from the adverse impacts of project activities and support its preservation.

Relevance

No specific cultural sites were identified within the project site hence its applicability in this case is not relevant

4.2.7.2.9 ESS 9 Financial Intermediaries

The ESS 9 recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. This standard is not applicable in this case as there is no financing that will be accorded to this project by the local financial institutions.

4.2.7.2.9 ESS10: Stakeholder Engagement and Information Disclosure

This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. It also identifies stakeholders involvement as a process that can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Relevance

Stakeholders engagement and consultation was an integral aspect of the ESIA process for the proposed project as demonstrated by the stakeholders engagement in the identification of projects to be implemented in Kikuyu Municipality during the Citizen fora at the ACK Church hall as discussed in the chapter six of this report and through the administration of the public participation questionnaires for the ESIA process. The proponent shall also ensure that stakeholders are informed of any relevant information regarding the proposed project through the appropriate mechanisms.

4.3 Legal Framework

4.3.1 Constitution of Kenya, 2010

Promulgated on 27th August 2010, the Constitution of Kenya, 2010 is the supreme law of Kenya which forms the basis of all national and legislative documents. In regard to the environment, Article 42 of Chapter four on Bills of Rights states that 'Every person has the right to a clean and healthy environment, which includes the right to (a) have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and (b) to have obligations relating to the environment fulfilled under Article 70.'

Part two of chapter five outlines the state's obligations in respect to the environment and the natural resources as:

(a) Ensuring sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensuring the equitable sharing of the accruing benefits
(b) Encourage public participation in the management, protection and conservation of the environment
(c) Protection of genetic resources and biological diversity
(d) Establishment of systems of environmental impact assessment, environmental audit and monitoring of the environment
(e) Eliminate processes and activities that are likely to endanger the environment

Relevance

To ensure that the entitlement of every individual to a clean and healthy environment is not violated and that the state fulfills its obligation as outlined above, the undertaking of all activities associated with the proposed project should be in conformity with the provision of the Constitution of Kenya, 2010.

As a demonstration of its commitment to protecting and conserving the environment and ensuring ecologically sustainable development and use of natural resources, the proponent commissioned NEMA lead expert to undertake an environmental and social impact assessment (ESIA) in order to identify and analyse potential impacts and propose mitigation measures to protect the environment as provided for in the constitution. Besides, the ESIA process ensured that the views of the public were considered before the implementation of the project as discussed in chapter six of this report

4.3.2 The Environmental Management & Co-ordination Act, 1999, (Amendment, 2015)

This is an act of parliament that provides for the establishment of a suitable institutional and legal framework for the management of the environment related matters. Second schedule of the Act requires that all development projects that are likely to have adverse impacts on the environment be subjected to an Environmental Impact Assessment (EIA) while existing projects should undertake an Environmental Audit (EA). The act requires that all EIA and EA reports be submitted to NEMA giving all the prescribed information, in the prescribed format.

Relevance

- Since the proposed project falls under the category of projects that are to be subjected to the ESIA process as per the second schedule of the Act, the proponent has commissioned NEMA Lead Expert Registration No. 2529 to undertake an Environmental and Social Impact Assessment (ESIA).
- The undertaking of the ESIA for the proposed project has been guided by the provisions of the Act and the preparation of the ESIA report is as per the prescribed format

4.3.3 Environmental Impact (Assessment and Audit) Regulations, 2003

Given under legal notice no. 101 of 13th June 2003, the regulations give guidelines on how Environmental Impact Assessments and Audits should be undertaken and stipulates all the requirements that must be complied with. The regulations require that the proponent seeks the views of all persons who will be affected by the project.

Relevance

- The undertaking of the ESIA and preparation of the ESIA have been undertaken in compliance with the provisions of these regulations.
- In compliance with the regulation the proponent commissioned a licensed EIA expert to undertake the ESIA and prepare the report for submission to NEMA.
- Public participation was also undertaken in compliance with the regulations

4.3.4 Environmental Management and Co-ordination (Waste Management) Regulations, 2006

Given under Legal Notice No.121 of 29th September 2006, the regulations give guidance on management of waste (solid, industrial, hazardous, biomedical) and pesticides and toxic substances). Of major concern is the storage, transportation, treatment and disposal of waste and their requirements. Relevant to this project is part 2 (1-3) of the regulations which states that: -

1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.
2) (2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these regulations.

3) (3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility.

Relevance

To ensure compliance with these regulations, the contractor is obliged to ensure that any waste generated from the project site throughout its life cycle is transported and disposed of appropriately in designated disposal sites by engaging a licensed garbage collector as per the provisions made.

4.3.5 Environmental Management and Co-ordination (Noise and Excessive Vibration) Regulations 2009

These are regulations aimed at giving directions on management of noise and excessive vibrations emanating from different sources such as radios, TVs, social events, touting, hawking, motor vehicles, construction at night and quarrying sites. Part 2 (2 a-f) of the regulations sets out the criterion that should be used in determining whether the noise is loud, unreasonable, unnecessary or unusual as:

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

Part 2 (3,1) prohibits any person from making 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. Regarding excessive vibration, part 2 (4,1 a) stipulates that no person shall 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. Schedules two and three of the regulations outlines the maximum permissible noise levels for construction sites, mines and quarries. Of significance is Article15(a-c) which spells out that any person intending to carry out construction, demolition, mining or quarrying work shall, during the Environmental Impact Assessment studies be able to:

a) Identify the natural resources and land use or activities that may be affected by noise or excessive vibration from the construction site
b) Identify the measures to be included in the plans in order to minimize the adverse impacts emanating from noise or vibrations
c) Integrate the needed abatement measures in the plans and specification.

Relevance

Since the execution of the proposed project shall entail the use of machinery, equipment and vehicles which will generate noise or excessive vibration, the contractors has an obligation to ensure that any noise emanating from execution of any activity does not exceed the permissible levels as stated in schedules two and three of the regulations.

As a demonstration of compliance with Article 15 (a-c) that gives guidance on issues that need to be put into consideration when undertaking an EIA for any construction, demolition of quarry works, the proponent commissioned a lead expert to carry out an ESIA for the proposed project in order to assess the impacts of any noise and excessive vibration associated with the implementation of the project. To ensure that any noise generated while implementing the project does not exceed the permissible levels, the contractor shall adopt the mitigation measures for abating the noise levels as highlighted in sections 5.5.1.3 and 5.5.1.3.1 of this report.

Should demolition activities or any activities likely to generate loud noise or excessive vibration be undertaken then relevant permits and licenses should be acquired as provided for in fifth and sic schedules of the regulations.

4.3.6 Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations, 2006

Regulations aim at eliminating or reducing emissions generated by internal combustion engines to acceptable standards. They provide guidelines on use of clean fuels and use of catalysts and inspection procedures for engines and generators

Relevance

The implementation of the proposed project will entail the use of mechanical equipment that will be using fossil fuels. In that regard, the contractor will need to comply with the regulations by ensuring that the vehicles and equipment use the fuels that meet the required standards in order to reduce the emissions levels.

4.3.7 Environmental Management and Co-Ordination (Air Quality) Regulations, 2013

The regulations provide guidelines for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. Part 11 section 5 (1) states that no person shall act in a way that directly or indirectly causes or is likely to cause immediate or subsequent air pollution. Regarding particulates from material handling and demolition works and stockpiling of materials, the regulations in section VIII (33- 35) point out that

- No person operating construction equipment or handling construction material shall allow emission of particulate matter to exceed the limits set out in the First schedule.
- No person shall cause or allow emission of particulate matter during the demolition of structures, buildings, or parts of buildings in such a manner as to exceed the limits set out in the First Schedule.
- No person shall cause or allow stockpiling or other storage 'of material in a manner likely to cause ambient air quality levels set out under the First Schedule to be exceeded.

Relevance

The execution of the project shall entail the handling and stockpiling of large quantities of construction materials and undertaking of demolition works which are likely to generate a lot of dust that may end up compromising air quality within the project area. To ensure that the quality of the air in the area is not compromised, the proponent shall ensure that all the proposed measures to address air pollution as outlined in the Environmental and Social Management and Monitoring Plan (ESMMP) are adopted.

4.3.8 Children Act (CAP.141) Rev. 2012

- This is an Act of Parliament that makes provision for parental responsibility, care and protection of children. Part 11 of the Act addresses issues on safeguards for the rights and welfare of the child. Relevant to this project is section 10 whose focus is on protection from child labour and armed conflict. Of interest is section 10 (1) that states that every child shall be protected from economic exploitation and any work that is likely to be hazardous or interfere with the child's education, or to be harmful to the child's health or physical, mental or social development.

Relevance

It is the responsibility of the proponent and the contractor to ensure that no child under the age of 18 is engaged in the undertaking of any construction activity.

4.3.9 Work Injury Benefits Act, (WIBA 2007)

This is an Act of parliament that gives guidelines on compensation of employees for work related injuries or diseases contracted in the course of their employment and for connected purposes. Of significance to this project is part 3 {10 (1- 3)} on Right to Compensation, which state that:

- An employee who is involved in an accident leading to the employee's disablement or death is subject to provisions of the Act, and is entitled to the benefits provided for under this Act
- An employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.
- An employee is not entitled to compensation if an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee.

The Act further points out that in case of any accident or disease that may occur or be contracted during employment, the employee shall report the incident to the employer and in case of a fatal accident, a verbal or written notice shall be sent to the Director of Occupational Safety and Health Services (DOSHS) within 24 hours of its occurrence.

Part {2 (7,1) states that every employer shall obtain and maintain an insurance policy, with an insurer approved by the Labour Minister in respect of any liability that the employer may incur under this Act to any of his employees.

Relevance

The contractor shall ensure that he acquires an insurance cover for all his employees. In case of any accident, the compensation of the workers should be guided by the provisions of this Act. A record of all accidents that may occur while at work should be kept and all incidents be reported to the employer immediately. All employees should be responsible for their own safety in order to avoid any accidents that may be caused by their own carelessness or misconduct.

4.3.10 Occupational Safety and Health Act, 2007

This is an ACT of Parliament which provides for the safety, health and welfare of workers and all persons lawfully present at workplaces, and that provides for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

Part four emphasises the need to have all workplaces kept clean at all the time and provision be made for suitable sanitary conditions at workplace. The need to have all workers provided with personal protective equipment (PPEs) for use while working in any process involving exposure to wet or to any injurious or offensive substance is pointed out in section 101 (1) of the Act in order to prevent any injuries or accidents at place of work. The PPEs to be provided include adequate, effective and suitable protective clothing and appliances, suitable gloves, footwear, goggles and head coverings.

Regarding the use of machinery and equipment at work, section 99 (1) states that no person shall be employed at any machine or in any process, being a machine or process liable to cause ill health or bodily injury, unless he has been fully instructed as to the dangers likely to arise in connection therewith and the precautions to be observed. The Act further states that anyone who operates the machine should have received enough training, in order to work at the machines or in the process or be under the supervision of someone with thorough knowledge and experience of the machine or the process. Part 2 of section 99 points out that the training to be given should be carried out during recruitment, transfer of job and whenever a new introduction of new work equipment or materials or change in equipment or materials. The need to have employees report any incident or situation that is likely to pose any risk to the health and safety to the workers to the supervisor is also highlighted in section 14 (1). The Act also requires that all workplaces display abstract of Acts, rules and notices stating the danger or ill heath that may be caused and precautionary measures to be observed in areas where persons are exposed to injurious or offensive substances. The abstract shall be in English and in such other vernacular languages as an occupational safety and health officer may direct, and if a form has been prescribed.

Relevance

The Act shall be applicable to this project considering that there will be a large workforce that will be engaged in the undertaking of the construction activities whose safety and welfare need to be safeguarded and taken care of. The contractor shall be obliged to ensure that all the workers are provided with PPEs and that they are working under clean, safe and healthy

environment. Since the implementation of the project will be highly mechanised, it will be important for the contractor to ensure that anyone operating any mechanical equipment has the relevant knowledge or is given the necessary training. He/she shall also ensure that the mitigation measures proposed in the ESMMP is complied with in order to address work related risks and accidents.

4.3.11 Public Participation Act, 2018

The Act sets out a general framework for effective public participation and effects the constitutional principles of democracy and participation of people. Part four of the Act points out the principles that should guide the process of public participation as:

a) Right to consult and involve in the decision-making process all those that will be affected by a decision

b) Provision of an effective mechanism for involvement of all members of public that would be interested in a decision

c) Equitable access to information needed to participate in a meaningful manner

d) Consideration of views of public in decision making process

e) Development of appropriate feedback mechanism

f) Adherence to the principles of public participation as may be prescribed in any law

g) Promotion of sustainable decisions recognizing the needs and interest of all participants and decision makers

Relevance

In compliance with the provisions of this Act, the proponent sought the views of public about the proposed project which have been incorporated into this project report as discussed in chapter six of this report.The undertaking of the public participation were as per the guiding principles outlined in section four of the Act.

4.3.12 Urban Areas and Cities Act, 2011

An Act of parliament that gives effect to Article 184 of the Kenyan Constitution that provides for the classification, governance and management of urban areas and cities. The Act also sets the criteria for establishment of urban areas and provides for the principles of governance and participation of residents and for connected purposes. Significant to this study is section

9 (1) that states that the County Governor may, on resolution of the County Assembly, confer status of a municipality or twin that meets the criteria set out in subsection (3) by grant of a charter in the prescribed form. The set criteria for conferment on a municipal status as outlined in sub section 3 (a- i) will be dependent on a town's population (at least 250), availability of integrated development plans, ability to collect revenue and sustain its operations, capacity to effectively and efficiently deliver essential services such as water and sanitation, waste management, recreational facilities and organized public transport etc as outlined in first schedule of the Act and has sufficient space for expansion. Section 20 gives guidelines on how the residents of a municipality should be engaged in the administration and management of the affairs in the municipality through citizen fora.

Relevance

The proposed project will be implemented in Kikuyu Municipality which was conferred its municipal status having met the criteria outlined in section three of the Act. in that regard, the implementation of this project will be as per the provision of this Act.

In compliance with section 22 (2) of the Act, the municipal board of Kikuyu invited petitions and representations regarding proposed investment plans for the FY 2019/2020 from a citizen fora held on 15th April 2019 at the ACK church in Kikuyu. During the meeting the members of public gave their submissions on project priorities that would be funded by KUSP as per the Programme Operations Manual (POM).

4.3.13 Traffic Act (CAP. 403) Rev, 2015

The Act gives guidelines on procedures for registration and licensing of vehicles. Section 42 (1) of the Act points out that no person shall drive, being the owner or person in charge of a vehicle, cause or permit any other person to drive, a vehicle on a road at a speed greater than such speed as may be prescribed as the maximum speed for that class of vehicle. Section 42 (3) sets out the speed limit that should be allowed on roads within the boundaries of any trading centre, township, municipality or city as not exceeding fifty kilometres per hour. The subsequent section (43) points out the penalties that are associated with noncompliance with speed regulations. The Act in section 52 (1) point out that the driver of a vehicle shall always:

a) Obey the directions given, whether verbally or by signal, by a police officer in uniform, in the execution of his duty

b) Conform to the indications given by traffic sign

c) Stop his vehicle on being so required by a police officer in uniform

d) When any person in charge of any cattle raises his hand or in any manner gives as signal to stop, forthwith stop his vehicle and keep it stationary for as long as it is reasonably necessary.

Relevance

This Act will be applicable to this project considering that it will entail the use of motor vehicles that will be moving in and out of the project site while transporting construction materials. In that regard the drivers of the vehicles will be expected to comply with the Act especially in regard with speed limits and obey all road signals and signs. Besides any vehicle and machinery that will be in use should be operated by only those people who are licensed. Any driver using the road should will be expected to observe the speed limit within the project area not exceedingly more than 50 kilometres as per the provision of the Act.

4.3.14 County Government Act, 2012

This is an Act of parliament that effects Chapter Eleven of the Kenyan Constitution to provide for County Governments' powers, functions and responsibilities to deliver services and for connected purposes. Section 5 (1) of part II of the Act points out that a county government shall be responsible for any functions assigned to it under the Constitution or by an Act of parliament. One of the responsibilities assigned to the County Government is planning and coordination of all development activities within their areas of jurisdiction. The principles that should inform the planning and coordination of development activities is outlined in section 102 of the Act. Significant to this study are sub section 104 (two and four) which point out the need for:

- Integration of economic, physical, social, environmental and spatial planning into the county planning framework
- Promotion of public participation and engagement of non-state actors in the planning process by all authority

Section 115 (1) makes it a mandatory requirement to have public participation in the county planning processes. Section 115 {1 (b ii} points out that a clear environmental impact assessment report should be used as one means of providing the public with information on any matter under consideration in the planning process.

Relevance

As a demonstration of compliance to this Act, the County Government of Kiambu, which is the project proponent, has commissioned NEMA lead expert to undertake an Environmental and Social Impact Assessment (ESIA) in order to ensure that the social, economic and environmental issues are integrated into the county planning frame work.

4.3.14 Employment Act, 2007

This is an act of parliament that defines and declares the fundamental rights of employees and provides basic condition of engaging employees. The Act also regulates the employment of children and provides for matters connected with the foregoing. Relevant to this project are issues pointed out in the following sections.

- Section 4 (1) which points out that no person shall use or assist any other person in recruiting, trafficking or using forced labour.
- Section 5(2) which states that an employer shall promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice.

Sections 5(3a- b) addresses issues of discrimination in employment by pointing out that no employer shall discriminate directly or indirectly any employee or prospective employee based on race, colour, gender, religion, nationality, political affiliation, disability, mental status and HIV status. The Act also emphasises the need for employer to pay his employees equal remuneration for work of equal value. Equally the employer should not overwork his staff instead he/she should ensure that the working hours are in accordance with the provisions of the Act and that workers are given one day for rest within a week. Finally, the Act prohibits the engagement of children in any form of forced labour.

Relevance

The contractor should be guided by the provisions of this Act especially as regards recruitment of workers which should be done fairly and in the payment of wages which should also be done on time and equal to the work done. The contractor shall also ensure that no child will be engaged in any form of labour at the project site.

4.4 Institutional Framework

4.4.1 National Environmental Management Authority (NEMA)

This is a semi-autonomous government agency established under the Environmental Management and Co- ordination Act (EMCA) of 1999 as the principal instrument of the government that ensures the implementation of all environmental policies. The authority was established with an aim of exercising general supervision and co-ordination of all matters relating to the environment as stipulated in section 9 (1) of EMCA, 1999. Section 9 (2, j) points out that NEMA shall identify projects and programmes or types of projects, programmes, plans and policies for which environmental audit or monitoring must be conducted under EMCA, 1999. The authority is also mandated with the responsibility of reviewing ESIA reports and undertaking site visits in order to ascertain the information in the report before issuance of licensees.

Relevance

Since the proposed project falls under one of the categories of projects for which ESIA should be undertaken, the proponent has commissioned a lead expert licensed by NEMA to carry out an ESIA and prepare a report to be submitted to the Authority in conformity with the provisions of EMCA, 1999 after which, if contented with the report, the authority shall issue the proponent with a license to implement the project.

4.4.2 Directorate of Occupational Safety and Health Services (DOSHS)

This is one of the departments within the Ministry of Labour and Social Protection whose core mandate is ensuring that health and welfare of all workers in all workplaces is guaranteed. The directorate takes cognizant of the fact that unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth.

The Directorate enforces Occupational Safety and Health Act, 2007 (OSHA, 2007) with its subsidiary legislation which aims at prevention of accidents and diseases at work. It also administers the Work Injury Benefits Act, 2007 (WIBA, 2007) which provides for compensation of workers who have been injured or have suffered a disease out of and in the course of employment.

Relevance

It is anticipated that there will be a high risk of injuries an accident which will be associated with the implementation of the proposed project. In that regard, it will be the contractor's responsibility to ensure that the safety of all the workers is guaranteed and any accidents that may arise at workplace are reported and recorded as per the DOSH format or incident report.

4.4.3 The County Government of Kiambu

This is the project proponent and the project's implementation agency. The County through the directorate of Municipal Administration and Urban Development (MAUD) shall supervise all the works done and ensure that the project is implemented as per the relevant legal requirements locally, international and as per World Bank standards.

4.4.4 County Environment Committees (CEC)

This is a committee that is established under the provisions of Environmental Management and Coordination (Amendment) Act, 2015. The Committee as per section 29 of the Act is mandated to undertake the following functions:

- Be responsible for the proper management of the environment within the county for which its appointed
- Develop a county strategic environmental action plan every five years
- Perform such additional functions as are prescribed in the Act.

Relevance

To ensure that environmental issues are mainstreamed in the project the CEC shall be involved in reviewing of the ESIA report and submitting its comments to NEMA before Approval. The Committee shall also conduct site visits to monitor and evaluate the implementation of social and environmental safeguard issues during project implementation phase and handle any grievances that may be reported to the committee.

4.4.5 World Bank Environmental and Social Framework

This a framework that gives guidelines to World Bank and borrowers on how to better manage social and environmental risks associated with development projects so that the projects beneficiaries and the environment are protected. The framework sets out the World Bank's commitment to sustainable development through a Bank policy and a set of Environmental and Social standards that are designed to support the borrowers' protect the

projects beneficiaries and the environment with the aim of ending extreme poverty and promoting shared prosperity. The framework contain:

- A vision for sustainable development which sets out the Bank's aspirations regarding the environmental and social sustainability.
- The Bank's Environmental and social policy for investment project financing in which the mandatory requirements that the Bank must follow regarding the projects it supports through investment project financing.
- Environmental and Social Standards (ESS) with their annexes which set out the mandatory requirements for borrowers relating to identification and assessment of environment and social risks and impacts associated with projects supported by World Bank through investment project financing

The framework consolidates and clarifies the Bank's environmental and social policies and harmonizes them with those of other development institutions. The framework also focuses on transparency, accountability, non discrimination and public participation issues.

Relevance

Considering that the project is being financed by the World Bank, the implementation of the project shall be as per the guidelines of the framework. This will ensure that the project is implemented in a way that any risks and impacts that will be associated with the execution of the project are addressed in order to protect the project's beneficiary and the environment. Compliance to the guidelines stipulated in this framework will also contribute significantly to the County's improvement in its environmental and social performance.

CHAPTER FIVE : IMPACTS ANALYSIS AND MITIGATION MEASURES

5.1 Introduction

In this chapter an analysis of both the positive and negative impacts that will be associated with the proposed project throughout its life cycle will be presented. Equally, proposed measures to enhance the positive impacts and mitigate against and ameliorate any negative impacts arising from the implementation of the proposed project will also be highlighted. The identification of the impacts was based on an analysis of the baseline information gathered through various methods such as observation made during site visits, public consultations and literature review of approved ESIA reports of similar roads projects. The classification of the impacts is based on the type of environment that will be impacted namely:

- Biophysical Environment such as the atmosphere, biodiversity, terrestrial/soils, and water resources
- Social-Economic Environment such as health and safety issues, security, aesthetic, employment and income generating activities and transport and communication.

5.2 Anticipated Positive Impacts

5.2.1 Positive Impacts during Construction Phase

5.2.1.1 Creation of Employment Opportunities

The execution of the proposed project will demand the engagement of both skilled and unskilled labour force in order to undertake various construction activities. For instance, though on temporal basis, the local community will be employed as casual labourers hence contribute towards solving unemployment problems at the County. The project will also create employment opportunities indirectly especially for the food vendors who will be supplying food and drinks to the workers on site. There will also be indirect employment in transport sector as the owners of vehicles will engage drivers, loaders and conductors who will be engaged in the transportation of construction materials

5.2.1.2 Creation of Business Opportunities

The commencement of the work will create and enhance business opportunities for several people who will be engaged in activities such as the supply of construction and transportation

of materials. Those who will be offering support services such as the food vendors, shop keepers, insurance services and transport operators such as the *boda boda* and matatu owners will also be beneficiaries of the project as their businesses will also benefit from the project as they ferry workers to and from the construction site.

5.2.1.3 Provision of a Ready Market for Goods and Services

Since a large amount of materials will be required during the construction phase, the project will provide a ready market for the different materials and services. Materials such as cement, sand, quarry chips, ballast, hard core, bitumen products etc will be procured and supplied to the project site. Other support services that would be required would be power connectivity, water supply insurance cover for the workers, transport, and catering services

5.2.1.4 Source of Government Revenue

The extraction, sale and transportation of construction materials will attract revenue for the national and county governments in form of taxes, licenses, business permits and fees. For instance, the procurement of construction materials and purchase of fuels for running vehicles and construction machinery will be charged value added tax (VAT) which will be payable to the national government. Besides the contractor will also pay tax from the earnings that he will get upon completion of the assigned task. The taxes paid will be a source of income for the National Government that will be used to finance its operations and activities.

Conversely the county Government of Kiambu will also generate revenue through the issuance of business permits to the contractor, materials sites (quarries and borrow pits) owners who will be selling the construction materials. The vehicles ferrying construction materials such as sand, hard core, stones etc will be charged cess or fees for transportation of materials.

5.2.1.5 Social - Economic Impacts

Since the project will create some form of employment though temporarily, this would imply that young energetic people who would otherwise be engaged in some form of social vices will be involved in some gainful employment upon which their livelihood will depend. Besides the multiplier effect of the employment and increased business opportunities arising from the ongoing activities would result in economic gains for the workers and business community. The money earned would improve the standards of living and livelihood of all the beneficiaries thus contribute towards a reduction in poverty levels.

5.2.1.6 Skills Transfer

Considering that some of the skilled workers who will be employed may not be from the locality, their interaction with the locals who will also be employed may result in transfer of skills that will be gained through apprenticeship and on job training

5.2.2 Positive Impacts during Operational Phase

5.2.2.1 Enhanced Accessibility and Connectivity

Upon completion, the connectivity between Kinoo and Uthiru Wards will be enhanced. Equally, the residents will have easy access to social amenities in the area such as religious centres , health facilities and learning institutions and government services.

5.2.2.2 Improved and Efficient Means of Transport

The upgrading of the road will ease the movement of the people in and out of the area especially during the rainy season as the roads will no longer be muddy. Besides the transportation and delivery of goods to markets, shopping centre and homesteads will be done promptly and efficiently

5.2.2.3 Improved Air Quality

The upgrading of the road to bituminous standards will greatly improve the quality of the air in the area as the amount of dust generated from the gravel roads during the dry season will be reduced.

5.2.2.4 Reduced Operation and Maintenance Costs

Upon completion of the project, the cost of maintaining the road will be reduced besides the cost of operating and maintaining vehicles using the road will also be cut down since the rate of wear and tear of the vehicles will be reduced. The savings made can be used for other income generating activities by the owners of the vehicles.

5.2.2.5 Reduction in Travel Time

With the upgrading of the roads, the time spent on travel will greatly be reduced as the vehicles will be able to move faster. The time saved on travel can be used for other activities that can improve the livelihoods of road users

5.2.2.6 Reduced Transport Costs

The efficient, fast and reliable transport system in and out of the project area will translate into reduced transport costs of goods and people

5.2.2.7 Increase in Land Value

With the upgrading of the roads to bituminous stands and installation of street lighting, the connectivity of the area and security will greatly be improved and as such the population of the area may rise leading to demand for development of more infrastructure such as residential houses and emergence of new businesses. In that regard the value of the land in the area may appreciate which will be a benefit for the landowners.

5.2.2.8 Improved Comfort and Road Safety

Since the upgrading of the road will reduce the amount of dust generated from un-tarmacked road surface during the dry season and muddy conditions experienced during the rainy season, the comfort of the road users will greatly be enhanced. The use of walkways, and road signages or markings is also likely to reduce incidents of roads accidents. Finally risks of flooding will also be reduced by the storm water drains.

5.2.2.9 Increased Pedestrian Mobility

The creation of walkways along the roads will hasten the movement of pedestrians in the area as well as reduce human traffic conflicts or accidents that occur due to lack of provision of non-motorized transport facilities (NMT)

5.2.2.10 Enhancement of Social and Economic Development

Since the upgraded road will increase connectivity between Kinoo and Uthiru wards, and contribute to speedy movement of goods and passengers in and out of the project area it is likely that the development will spur economic growth in the region. For instance, once completed, the project may attract more investors from different sectors such as transport operators such as PSVs, taxi and motor bike *(bodaboda)* operators who will be engaged in the transportation of passengers and goods in the area. This will also enhance and facilitate trade between the project area and its neighborhood. Equally the installation of street lighting will enhance security in the area, reduce accidents that may be caused by poor vision and improve hours of doing business that will subsequently generate more revenue for the residents and the county government.

5.2.2.11 Improved Storm Water Management and Associated Benefits

With the upgrading of the road, storm water drainage system will be constructed which will greatly enhance the management of storm water in the area. This will subsequently reduce incidences of flooding and destruction of infrastructure that may be due to incidences of

flooding and reduced incidences of water borne illnesses that may be caused by pools of stagnant water.

5.2.2.12 Creation of Employment Opportunities

Upon completion some employment opportunity will be created for those who will be engaged in the undertaking of routine operation and maintenance of roads and street lighting. Equally the economic activities that will be occasioned by the completion of the project such as transport services and business will indirectly create employment for people such as *boda boda* drivers.

5.2.2.13 Climate Change Mitigation and Adaptation

The use of solar energy to light up the street will contribute towards mitigating against and adapting to impacts of climate change. This will be attributed to the fact that solar energy is one of green energy that is clean and less polluting. The improved transport will also translate into faster movement of vehicles, less fuel consumption and less emissions of exhaust fumes which are contributors of greenhouse gases. Since the project will entail installation of solar powered lighting, it will reduce over-dependence on hydro-power which sometimes becomes unreliable in dry spell and helps address issues of power cuts that sometimes are experienced in rainy season. In that regard the use of green energy will be an adaptation measure to the impacts of climate change.

5.2.2.17 Reduced Electricity Bills

The installation of integrated solar street lighting will contribute significantly towards reduction of high costs of electricity bills which are currently incurred by the County Government.

5.2.3 Positive Impacts during the Decommissioning Phase

5.2.3.1 Employment Opportunities

Employment opportunities will be created for the workforce that will be engaged in undertaking of demolition works and rehabilitation activities

5.2.3.2 Site Restoration

Whereas the road operations are expected to be continuous, upon decommissioning, it is expected the project site will be rehabilitated through landscaping activities and re-vegetation of the land to restore it to nearly its original state. Equally the material sites (quarries and borrow pits) will also be rehabilitated through back-filling of the areas. The restoration of the

sites will greatly enhance the aesthetic value of the area and can be used for other development projects

5.2.3.3 Material Recovery

Some of the construction material may be recovered during demolition activities that can be reused or recycled hence reduce the pressure on environmental resources.

5.2.3.4 Income Generation

Some of the recovered materials can be sold for reuse or recycling hence generate income for the proponent

5.2.3.5 Reduced Negative Environmental Impacts

Upon decommissioning of the project, the negative impacts identified during the operation phase such as emission of exhaust fumes from vehicles, oil spills and risk of falling in open borrow pits will be reduced

5.2.3.5.1 Proposed Measures for Enhancing Positive Impacts

- It is recommended if possible, the construction materials apart from the solar lighting which are normally imported should be sourced and procured locally and not far from the project site. This is aimed at cutting down on costs of transportation and in order to promote local products and materials
- Priority should be given to the locals while recruiting the workers and suppliers of construction materials and other services such as transportation and catering
- The local community can be engaged in the maintenance of the road
- Consideration should be given in employing women
- Ensure that any unplanned and haphazard development of structures such as kiosks and business premises along the roads does not take place in order to minimize encroachment on to the roads' reserves and especially onto the walkways intended for use by pedestrians
- The use of environmentally friendly materials should be encouraged as well as the use of renewable energy sources in order to minimize environmental impacts
- Adoption of energy and water saving techniques in order to minimize wastage and cut down on expenses.

5.3 Anticipated Negative Impacts and their Mitigation Measures

5.3.1 Negative Impacts during Planning and Construction Phase

5.3.1.1 Unequal Employment Opportunities

It is anticipated that conflicts associated with the process of engaging the workers may arise especially if the locals, skilled and issues related to gender are not put into consideration. For instance, women may not be engaged in the construction activities due to the belief that the nature of the work nay be hard for them. To ensure the possibility of such conflicts arising is minimized, the contractor should ensure that the following mitigation measures are adopted.

5.3.1.1.1 Mitigation Measures

- Ensure that everyone has an equal opportunity of being hired regardless of their gender, skills and status. In that case the contractor has an obligation of ensuring that women, men, youths, locals and people living with disability are considered for employment opportunities
- Consideration should be given to the locals first when hiring the workers

5.3.1.2 Solid and Liquid Waste Generation

It is envisaged that a high rate of waste and spoils will be generated from construction site quarrying and borrow pits sites. The type and characteristic of waste will be dependent on the nature of activities being undertaken throughout the construction phase. For instance, twigs, grass, and other forms of vegetation cut down during site clearance activities will constitute part of waste that will be generated. Other types of waste will entail excavated materials, packaging materials, bitumen products, petroleum/ diesel-contaminated solids, solvent sludge sharp objects, and food waste. Equally, liquid emanating from sanitary facility in the area and construction activities such as sprinkling of water on road surface, hydraulic fluid and oil and lubricant spills will be generated. Improper management of this waste is likely to have adverse social-economic and environmental impacts as it may cause ill health to the public, interfere with the aesthetic conditions of the area and degrade the environment.

5.3.1.2.1 Mitigation Measures

- The contractor should ensure compliance with the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 which give guidelines on how waste should be managed at point of generation to the final disposal site

- The contractor should plan to engage a licensed garbage collector to collect, transport and dispose of the waste appropriately in designated sites within Kiambu County as per the provisions provided for in the environmental Management and Coordination (Waste Management)Regulations, 2006, legal Notice 121.
- Make provision for covered waste receptacles where the waste should be stored as it awaits collection by the licensed garbage collector
- Encourage segregation of waste with an aim of recovering materials and products that can be reused, recycled in order to minimize waste generation and associated costs of collection, transportation and disposal. For instance, some of the excavated material such as soil can be used for back-filling the open borrow pits and exhausted quarry sites or for landscaping purposes
- Ensuring careful budgeting and purchase of construction materials to avoid any wastage that may occur and to minimize expenses.
- Proper management of oils and fuels in order to avoid any wastage and spillage
- The contractor should make provision for sanitation facilities (toilets) for use by the workers and for disposing of waste water generated at the construction site

5.3.1.3 Noise and Excessive Vibration

It is envisaged that an increase in noise levels beyond the ambient levels will arise from activities typical of any road construction site. For instance, there will be some noise that will be produced by vehicles moving in and out of the construction site while delivering construction materials and from the operation of machines such as mixers, grinders and crushers. The use of heavy machinery such as compactors, bulldozers, extraction of materials from quarries and borrow pits, use of a standby generator in case of any power shortages, grinding and mixing of materials will also likely cause noise that may be beyond the acceptable levels in the area. If not abated, the exposure to continuous noise may cause nuisance and have adverse short-and long-term impacts on the health (increases the risk of ear damage) and comfort of the workers, residents, passers-by, and any animals within the project site. The discomfort and ill health may consequently create un-conducive work environment and affect work productivity

To minimize these impacts the contractor shall ensure that the following abatement measures are integrated in the project plan and specification as stated in Article 15 (c) of the Environmental Management and Co-ordination (Noise and Excessive Vibrations) Regulations, 2009

5.3.1.3.1 Mitigation Measures

- Restrict construction activities to daytime starting from 0700 to 1700 hours
- Provision of appropriate protective equipment such as earmuffs to construction workers and any person visiting the construction site
- Compliance with the Environmental Management Co-ordination (Noise and Excessive), Regulation, 2009
- The contractor should adopt the use of machines and equipment with tolerable noise levels and those that can be fitted with noise reduction devices or silencers
- Regular maintenance and servicing of vehicles, machinery and equipment that will be used in construction activities
- Sensitize the drivers to avoid unnecessary hooting or braking especially near residential areas, learning institutions and health facilities which are major receptors of noise
- Ensure that any trees that are not within the road corridor are not cut so that they can act as sound absorbers
- The siting of quarrying sites which are likely to emit high levels of noise should be far away from residential areas
- Plan and minimize the frequency of transportation of construction materials
- Formulation of rules to regulate noise levels during the construction activities

5.3.1.4 Air Pollution

Upon commencement of construction activities, it is anticipated that some amount of dust will be generated from excavation works, materials handling, construction materials sites such as quarries and borrow pits and moving vehicles transporting uncovered construction materials. Moreover, there will be emissions of exhaust fumes such as carbon dioxide and nitrogen dioxide from vehicles and machinery using fossil fuels. Once the dust and fumes get into the air, they comprise the air quality in the area hence end up having negative environmental and social impacts. For instance, when such fumes and dust are inhaled by human beings, they are exposed to the risk of getting respiratory and chest infections and illnesses such as bronchitis.

Plant life may equally be interfered with should these fumes and dust end up falling on vegetation as they may end up blocking the stomata thus affecting the photosynthesis process and plant growth rate. Conversely the gases when they get to the atmosphere, they may

contribute to greenhouse gases that cause global warming and cause acid rain which may equally impact on the plant growth and the roofing of buildings made of iron sheets.

5.3.1.4.1 Mitigation Measures

- Regular sprinkling of excavated roads, dusty construction areas and materials handling sites with water especially during the dry season to suppress the dust
- The contractor should ensure that any materials being transported to the construction site is covered.
- The location of materials grinding, and mixing areas should be far away from sensitive receptors such as residential areas, learning institutions, and health facilities.
- Adopt the use of wet crushing technology while undertaking quarrying activities
- Use of mechanical equipment, machinery and vehicles that are efficient in their fuel consumption
- Ensuring that no machines or vehicles are left running if not in use
- Regular servicing and maintenance of vehicles, and all mechanical equipment and machinery that will be in use throughout the construction phase
- Compliance with air quality and fossils fuels regulations
- The contractor should ensure that all the workers and visitors on site are provided with PPEs (dust coats, helmets and dust masks) and are worn all the time
- If possible, the undertaking of excavation works should preferably be done during the wet season, However, limited excavation works should be undertaken during extreme weather conditions
- Controlling the speed of the vehicles on site to reduce the amount of dust being produced by moving vehicles through e.g. erection of speed bumps
- Restricting clearance of grass only to the areas where construction activities will be undertaken in order to minimize the amount of surface area left bare hence being more susceptible to dust generations
- Any activities generating dust should be undertaken within the shortest time possible
- Have separate ESIA conducted for borrow pits and quarrying sites

5.3.1.5 Soil Erosion and Land Degradation

Construction activities such as clearance of vegetation along the roads sides, excavation, compaction, quarrying activities and digging of borrow pits are likely to impact negatively on the soils and result in land degradation on project sites. For instance, the clearance of vegetation and excavation of land loosen the soils and leave them bare thus making them

more vulnerable to agents of erosion. The removal of the topsoil, subsequent erosion and loss of organic matter due to the clearance of vegetation may also end up affecting the fertility of the soil along the project corridor. Likewise, the compaction of the soils caused by movement of heavy machinery that will be used during construction may end up compacting soil's particles and thus reduce its water holding and percolation capacity.

The excavation of borrow pits and quarrying activities for the extraction of construction materials such as sand, hardcore etc may result in land degradation due to clearance of vegetation and removal of materials that may make the land derelict. If left open, the excavated pits and quarry sites may end up flooding during the rainy season hence become breeding sites for mosquitoes.

5.3.1.5.1 Mitigation Measures

- Ensure that re-vegetation of completed sections of the roads is undertaken
- Minimization of the removal of vegetation that is likely to accelerate soil erosion
- Construction activities such as excavation, rock blasting and compaction should be restricted to the project area only
- Ensuring that open pits are rehabilitated as soon as the construction activities are completed
- Excavation works should be restricted to the dry spell to reduce soil erosion which is likely to be high during the rainy season
- Levelling and compaction of excavated materials such as soil to ensure that that the loose soils which are vulnerable to erosion are stabilized
- Any surface runoff should be channeled towards areas that are less susceptible to erosion
- Adoption of soil conservation measures such as construction of gabions, embankment of slope and planting of ground cover vegetation.

5.3.1.6 Accidental Spillage and Leakages of Potential Contaminants

During the handling and transportation of construction materials accidental spillage or leakage of products such as fuels. oils, lubricants and solvents that will be used on either running or servicing of vehicles and mechanical equipment may be experienced. If not properly managed, these leakages may find their way into the ground and end up polluting the soils and surface and groundwater sources such as shallow boreholes and rivers.

5.3.1.6.1 Mitigation Measures

- Use of grease and oil traps
- Undertake regular maintenance and servicing of vehicles and equipment
- Ensure that servicing of vehicles is carried out on impervious concrete surfaces
- Provision of containers where used oil and fuels should be stored awaiting collection for disposal
- Adherence to the Environmental and Social Management and Monitoring Plan (ESMMP) regarding the management of potential spills and leakages
- Formulation of a spill/ leakage management plan by the contractor and adherence to it
- Ensuring that any oils /fuels leakages spills and leakages are remediated as soon as they occur to avoid any contamination with the soils.
- The contractor should ensure that all areas where oils and fuels are store are provided with spills /leakages containment facilities
- Undertake regular inspection of vessels containing oils and fuels and machines and equipment for any leaks
- Notify the supervisor or the relevant personnel of any leakage that may have been detected

5.6.1.7 Occupational Health and Safety (OHS) Risks and Fire Hazards

It is anticipated that the workers are likely to be exposed to different forms of occupational health and safety risks associated with construction activities such as rock blasting, mixing of concrete, excavation, earthworks, machine and equipment operations and movement of vehicles. For instance, there might be injuries caused by accidental slipping or falling, and cuttings from sharp objects. The frequent movement of vehicles in and out of the construction site as they transport construction materials may also expose motorists and pedestrians especially children who may not be aware of risks associated with the use of roads to the risk of road accidents

Excessive noise, dust, particulate matter and fumes may also compromise the health and comfort of the workers and residents in the area as they can be a nuisance if their impacts are adverse. Consumption of food that may not be prepared under strict hygiene and sanitary conditions as per the guidelines from the public health may have some detrimental impacts on the health of those who consume it. Exposure to extreme weather conditions such as rainfall and sun may cause discomfort to workers and incidents like floods may cause destruction to

the ongoing works. Finally, fire outbreaks emanating from electrical related activities may also be experienced.

As a demonstration of adherence to the rules and regulations governing the safety, health and welfare of the works as stipulated in the Occupational Safety and Health Act, 2007 and Public Health Act, CAP 242, the contractor will commit himself to undertaking the following mitigation measures in order to minimize the risks of injuries and accidents that will be associated with construction activities.

5.6.1.7.1 Mitigation Measures

- Provision of a fully equipped first aid kit
- Deployment of officers with knowledge and understanding of first aid procedures on site
- Provision of fire extinguishers on project site and all vehicles being used during construction
- Formation of health and safety committees and some individuals with some knowledge of first aid procedures being on site
- Provision of personal protective equipment such as helmets, heavy duty gloves, overalls, earmuffs, dust masks and industrial boots to all workers and visitors on site and ensure that they are used appropriately
- Ensuring that the operation of machines and use of construction activities is undertaken by people with knowledge of their operation as per the manual guidelines and understand their safety
- Erection of road signages for e.g. parking space, speed bumps and warning signs for any risk of accidents in the ground to enhance and safeguard health and safety of all individuals within the vicinity of the construction site.
- Preparation of any food to be supplied to the workers should be done under hygienic conditions as per the guidelines of the Public Health Department
- Avoid overworking of the workforce
- Provision of improved sanitation services and safe water supply for use whilst at work
- Ensure all the workers are given some training on health and safety issues at place of work and that routine safety checks on all equipment for use are undertaken
- Development of emergency preparedness and evacuation procedures
- Formulation of health and safety policy documents and display them for construction workers

- Provision of materials for documenting incidences, accidents and occurrences that may occur as per the prescribed format from the local Occupational Health and Safety Office (OHSO)

5.6.1.8 Insecurity and Social Crimes

An influx in population is expected to occur due to additional number of people that will be attracted at the construction site such as the workers and those supplying food and construction materials. This influx may lead to some social evils such as theft and insecurity as not all the people on site may have good intentions.

5.6.1.8.1 Mitigation Measures

- Provision of a safe and secure place where personal belongings and all tools and equipment for use are locked to ensure their safety
- Securing the construction site with a fence and gate
- Employ a guard to watch over the site
- Thorough screening and vetting of all people getting onto the project site
- Vetting of the workers during the hiring of the workers to minimize the risk of engaging criminals
- Lighting up of the construction site to enhance the security
- Encouraging all the workers to take care of their personal belonging to minimize the risk of losing them or being stolen
- The contractor should liaise with the local authority and the police service in order to address any security issues that may arise within the project site.

5.6.1.9 Increased Traffic Flow

It is envisaged that there will be a high influx of vehicles in and out of the project site while transporting construction materials and personal vehicles. If not properly managed the high influx of the vehicles would lead to traffic jams and related road accidents. The increase in traffic flow would imply an increase in the mount of fumes emitted by the vehicles which consequently end up causing air pollution and contribute to greenhouse gases.

5.6.1.9.1 Mitigation Measures

- Restrict the transportation of materials to off-peak hours in order to ease the traffic jams
- Notify the road users of ongoing road construction activities and heavy traffic flow through use of signage

- Have alternative routes or diversion to ease the congestion on the road
- Deploying traffic marshals on construction site to control the flow of vehicles in and out of the construction site
- Remind the drivers to adopt best practices regarding driving and road safety

5.6.1.10 Increased Water and Energy Use

The execution of the proposed project will result in an increase in water and energy use as their requirement will be intensive. Large amounts of water will be used for sprinkling of dusty surfaces, mixing and casting of construction materials, drinking, and sanitary services. The implementation of the project will also entail the use of mechanical equipment, machines and vehicles that will be powered by electricity and other forms of fuel such as diesel or petrol.

5.6.1.10.1 Mitigation Measures

- Sensitisation of the workforce on adoption of energy and water saving techniques in order to avoid any wastage by for example switching of all electrical appliances and equipment when not in use and turning of the taps.
- The contractor should consider the use of alternative water sources
- Encourage recycling of water in order to minimize water consumption
- Consider harvesting rainwater for use in the dry season

5.6.1.11 Loss of Habitat and Biodiversity

Construction activities such as clearance of vegetation on site, earthworks, excavation, compaction and material sourcing and handling may result in destruction of habitat for both plants and animals thus destruction of the ecosystem in the area. The compaction of the area may harden the soils making it difficult for any vegetation to re-generate.

5.5.1.11.1 Mitigation Measures

- Mapping of the areas and identifying any special plant species that may be within the area, once identified it can be harvested and transplanted onto another site
- Levelling and stabilization of the soils so that they can be used for growing of plants
- Restrict clearance of vegetation to project sites
- Re-vegetate the land after construction work is done.

5.6.1.12 Interference with Existing Public Utilities

Once the construction activities commence, it is likely that they may interfere with installed public utilities such as water, sewerage and electricity supply. For instance, excavation works may result in destruction of water pipes hence interruption of the water supply. To minimize the inconvenience that may be caused by such interference it is recommended that the following mitigation measures be adopted

5.6.1.12.1 Mitigation Measures

- Mapping out of all infrastructure such as water pipes and electrical cables that may be within the project area and coming up with a plan of minimizing disruption of basic services such as provision of water supply in the area
- Engage with all stakeholders and people who are likely to be affected and inform them of possible interruption in advance
- The contractor should notify the service provider of the possible interference with the service delivery so that a clearance to carry on with the construction activities can be given
- Undertake excavation works within the shortest time possible in order to minimize the time that the interruption will be experienced.

5.6.1.13 Increase and Spread of Sexually Transmitted Diseases

The execution of the project will attract several migrants into the area who will be working on the project. This influx of people in the area may trigger social vices such as prostitution or irresponsible sexual behaviour that could increase the risk of contracting sexually transmitted illnesses and spread of HIV and AIDs. This may be attributed to the fact that some of the workers may be away from their homes thus may seek sexual satisfaction from the residents in the area and the fact that the workers will have some income that they can use to indulge in some sexual activities.

5.6.1.13.1 Mitigation Measures

- Undertake a HIV/AIDS awareness campaign to sensitize the workers and residents within the project site of the risks of contracting sexually transmitted illnesses and how to protect themselves against the infections
- Provision of condoms dispensers for the workers and residents to access condoms

- The contractor should liaise with the local health facility in the area so that they can offer VCT services to the workers and the residents in the area.

5.7.2 Negative Impacts during Operational Phase

5.7.2.1 Risk of Road Accidents

With the upgrading of the road it is anticipated that the number of the vehicles using the roads and their speed will increase which may end up increasing the risks of road accidents for both the pedestrians and motorists

5.7.2.1.1 Mitigation Measures

- Observance of traffic rules by all road users
- Provision of road signages such as speed limit signs and use of bumps
- Regular maintenance and rehabilitation of worn out sections of the roads

5.7.2.2 Increased Surface Runoff

The upgrading of the road will reduce the rate at which the storm water infiltrates into the ground due to the paved road surface hence increasing the surface runoff. Whereas this surface runoff is meant to flow into the storm water drains, its flow may be blocked by sediments and waste which if not properly managed may result in floods.

5.7.2.2.1 Mitigation Measures

- Regular di-siltation of the storm water drains
- Clearing of waste from the storm water drains to ensure free flow of storm water
- Sensitize the community on the need to avoid dumping waste and channelling of sediments into the storm water drains

5.7.2.3 Waste Generation

It is envisaged that a significant amount of waste will be generated especially as a result of demolition of the project site office as well as waste from road users and routine maintenance of the roads.

5.7.2.3.1 Mitigation Measures

- The contractor should ensure that all waste generated during the demotion of project site office is collected and disposed of appropriately in designated disposal sites as per the provisions provided for in the environmental Management and Coordination(Waste Management)Regulations,2006, legal Notice 121.

- ❖ Make provision for waste receptacles where the waste should be stored as it awaits transportation and disposal by the licensed garbage collector
- ❖ Collection of streets sweeping by the County Government of Kiambu

5.7.2.4 Loss of Employment and Source of Income

It is envisaged that there will be loss of employment for all the staff that were engaged in the undertaking of various duties and activities during the construction phase such as the security guards, labourers, foremen and supervisors. Equally, all the suppliers of construction materials, food and transporters of construction materials will lose their source of income since their business engagement with the contractor will cease upon completion of the proposed construction activities.

5.7.2.4.1 Mitigation Measures

- ❖ If possible, the contractor should consider engaging the staff in other projects that they may be involved in.

5.8.3 Negative Impacts During Decommissioning Phase

5.8.3.1 Waste Generation

A large amount of waste will be generated following the demolition of project site office, roads infrastructure and dismantling of street lighting and poles. The generated waste will comprise of e-waste emanating from the street lighting, fixtures and building materials such as nails, metals, iron sheets and wood planks from site office. Another major waste stream will be from the roads' infrastructure such as bitumen materials, cement, concrete, metals, oil sealants and fasteners. Poor management of this waste may impact negatively on public health and is likely to cause environmental pollution and degradation.

5.8.3.1.1 Mitigation Measures

- ❖ The contractor should provide waste receptacles where waste should be stored while awaiting collection for disposal in designated sites within the County
- ❖ Engaging the services of licensed garbage collector by the County Government of Kiambu to collect, transport and dispose the waste as per the provision of environmental Management and Coordination (Waste Management) Regulations, 2006, legal Notice 121
- ❖ Segregate waste in order to facilitate the recovery of any materials or products that can be reused or recycled

5.8.3.2 Air Pollution

The demolition activities such excavation of the tarmacked surfaces, removal and hauling of the demolition materials and waste from the demolition sites will generate amount of dust and exhaust fumes. The fumes and dust may end up compromising the quality of the air in the area and cause ill health to workers and the residents living close to the project site.

5.8.3.2.1 Mitigation Measures

- Sprinkling of all dusty surfaces with water in order to suppress dust
- The demolition activities should be undertaken within the shortest time possible
- Ensure that the demolition activities are carried out when it is not very windy
- Provision of personal protective equipment (dust coats, masks and dust screens)
- Enclose the site to prevent dust from being blown to other areas away from the site.
- Inform the public in advance of the potential dust generation during the demolition phase

5.8.3.3 Noise Pollution

It is anticipated that the use of heavy machinery that will be used in the undertaking of demolition activities and vehicles removing the demolition materials will cause a significant amount of noise and vibration

5.8.3.3.1 Mitigation Measures

- Provision of earmuffs and ear plugs to all workers and visitors on site to minimize the noise levels
- Restricting the demolition activities to daytime (between 0700 to 1700 hours)
- Enclose the site with e.g. iron sheets to reduce the noise levels
- Use of well-conditioned and well-maintained demolition machines and equipment
- Use of silencers on machine

5.8.3.4 Interference with Road Users

The decommissioning of the proposed project would imply that the road users will have to seek for an alternative means of transport hence a disruption of the normal services along the roads

5.8.3.4.1 Mitigation Measures

- Notify the road users of the proposed demolition plans
- Creation of alternative routes for use

- Use of appropriate road signages to guide the road users

5.8.3.5 Loss of Employment and Economic Decline

Upon decommissioning of the project, the workers who will be carrying out the maintenance work of the roads and street lighting will be laid off. This will result in loss of source of income for the workers and loss of revenue that would have been generated from taxes for the Government. This would therefore raise the unemployment levels, cause social crimes in the area and lead to economic decline.

5.8.3.5.1 Mitigation Measures

- Notify the workers of the intention to decommission the project and of the plan to lay off the workers
- If possible, the contractor should look for alternative employment for his or her staff
- The proponent should rehabilitate and redevelop the site again in order to create other opportunities for employment

5.8.3.6 Loss of Positive Impacts Associated with the Project

Once the project is decommissioned all the positive impacts associated with the operational project as pointed out in section 5.3.2 of this report will be lost. For instance, improved means of transport, improved security, reduced transport cost and reduced travel time

5.8.3.6.1 Mitigation Measures

- Creation of an alternative improved means of transport

5.8.3.7 Occupational Health and Safety Hazards

With the demolition of structures, it is likely that risk of accidents and incidents will be high. This may be caused by falling objects such as demolition rubbles, sharp objects, open pits and health risks may be caused by dust.

5.8.3.7.1 Mitigation Measures

- Provision of personal protective equipment to all workers and anyone visiting the site
- Investigation of all accidents and appropriate measure be taken to avoid them
- Erection of clear signs and warning signs of the ongoing activities
- Have clear routes for use by the traffic

CHAPTER SIX: PUBLIC PARTICIPATION AND CONSULTATION

6.1 Introduction

In order to promote the integration of environmental and social aspects of project in the planning, management and decision-making process, the provisions of EMCA, 1999, Environmental Impact (Assessment and Audit) Regulations, 2003 and Constitution of Kenya, 2010, require that that public consultation and stakeholder engagement be undertaken. This is aimed at informing the key stakeholders of the proposed project and present them with an opportunity to give their comments or raise any concerns regarding the project. The process ensures that environmental and social soundness and sustainability of projects is realized as well enhancement of project acceptance. The process also provides a platform upon which useful information that would be used in the analysis of the potential impacts associated with the project is gathered.

6.2 Approach to the Public Participation and Stakeholders' Engagement Process

The views of public regarding the proposed project were sought through administration of questionnaires in order to get the views of the public regarding the proposed project as demonstrated in figure eight. A sample of the data collection tool and filled questionnaires are attached to this report as annexes three and four. The information gathered was analyzed and subsequently incorporated into the ESIA report.

Equally, stakeholders were also consulted through a citizen fora held on 15th April 2019 at the ACK church in Kikuyu. During the meeting the members of public gave their submissions on project priorities that would be funded by KUSP as per the Programme Operations Manual (POM). The meeting brought together municipal management board members, members of the county assembly (MCAs), members of the public and County Government officers. Prior to this, the stakeholders had been invited to make their submissions and petitions regarding the proposed project through a Daily Nation newspaper advertisement dated 12th April, 2019 attached as appendix five. A copy of minutes for the citizen fora meeting and attendance list for the participants from all the ten wards within the municipality are attached as appendices six and seven respectively.

Figure 8 Administration of Questionnaire to a Member of Public

6.3 Feedback from the Public

From the analysis of the findings it was evident that no negative impacts regarding proposed project were raised however, those interviewed pointed out that the implementation of the project would result in the following benefits:

- Thriving of businesses
- Improved business activities /economic development
- Increased economic development
- The area will be more accessible
- Reduced dust generation
- reduced air pollution from dust
- More development that will benefit the residents of Uthiru and its environs
- Ease of transport of people goods and services

- Improve the standards of the area
- Improved security
- Reduced accidents due to skidding in rainy season
- Enhanced transport and movement
- Increase in land value

CHAPTER SEVEN: ANALYSIS OF THE PROJECT'S ALTERNATIVES

7.1 Introduction

It is the requirement of the ESIA process to consider the feasible alternative options to a proposed development project in order to assess the best approach of executing the project while minimizing the adverse environmental impacts. The analysis of the available options is dependent on the overall objective of the proposed project, cost benefit analysis and social and environmental impacts of implementing the project. The various options that were considered in this study are summarized in the subsequent sections.

7.2 No Project Alternative

This is the option whereby a decision would be made not to implement the proposed project, instead the routine maintenance of the existing road will continue being undertaken by the County Government of Kiambu. This would be considered the most suitable option from an extreme environmental perspective because it would not interfere with the existing physical, biological and social conditions in the area. The implication of this option is that the benefits that would have accrued from the upgrading of the road such as enhanced security and visibility at night, creation of employment, increase in land value and improved transport system will not be realised or will be foregone. The community will still have issues with dust that will be emanating from the roads and exposure to muddy conditions during the rainy season. From a social-economic perspective this may not be the best option since the objectives of the proposed project will not be achieved.

7.3 Alternative Project Site

This is an option whereby the proposed development project would have to be relocated to another site. Considering that the objective of the project is to improve the connectivity and accessibility between 87 and Ndumbuini area, a site visit in the project area revealed that there are no other roads that offer better access and connectivity to project area than the proposed road.

7.4 Preferred Option

This is the alternative that is recommended for development after social, economic, and technological considerations were put in place. Once completed, the project would bring many benefits as discussed in chapter five such as improved safety, creation of business opportunities and improved mode of transport. The choice of this option was deemed to be the most viable option since the proposed road is the most strategic road that links Ndumbuini and 87 areas. This option also happens to be one of the projects that was prioritized for development following a citizen fora that was held on 15th April 2019 at the ACK church in Kikuyu.

Whilst the option is the most viable option, several negative impacts, as pointed out in chapter five, will be associated with the implementation of the project. To ensure that the project is implemented in an environmentally sustainable and socially acceptable way, all the proposed mitigation measures to minimize and ameliorate the negative impacts should be implemented.

7.5 Analysis of Alternative Construction Materials and Technology

The implementation of the project will entail the use of materials that will be sourced locally provided they meet the required standards and are environmentally friendly. The adoption of use of locally available materials is aimed at promoting the local industry and minimizing the cost of transport. The project will also adopt the use of modern technologies that comply with the environmental and safety issues and are cost effective.

To ensure that the rate of emissions of fumes is reduced, the use of equipment, vehicles and machinery that use less energy and cleaner sources of fuel will be encouraged. This will also contribute towards reducing the cost of fuel. Moreover, the use of machines and equipment with enhanced safety features such as pollution control devices and noise abatement devices should also be promoted.

The proposed technology that can be used will either be labour intensive or heavily mechanized. Whereas the use of labour force would be considered to be more environmentally friendly and one that would create more job opportunities, the use of heavy machinery and other mechanical equipment would be more appropriate for use in the execution of the construction works as it would speed up the implementation of the project which need to be implemented within a year. Besides, the use of machinery would be more

effective and efficient as the machines would be able to excavate and compact the soils better than the use of labour force. In view of the above, the use of machines and mechanical equipment would be the most preferred technology to be used in the construction activities.

7.6 Solid Waste Management Alternatives

Since a large amount of waste will be generated it is recommended that an integrated solid waste management system (which is a sustainable option)be adopted. In that regard, segregation of waste at source will be encouraged in order to minimize the amount of waste that will end up in the dump site and to promote recovery of materials that can be recycled or reused. Excavated material can be used to refill excavated materials sites such as borrow pits and quarry sites. It is also recommended that sensitization programme on waste management for the workers be organised and for the contractor to engage the services of a licensed garbage collector by the County Government of Kiambu to collect and dispose waste in designated sites within the County.

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Significance of Environment and Social Management and Monitoring Plan (ESMMP)

The Environmental Management and Monitoring Plan is the final output of the ESIA report which provides a road map on how to address the anticipated negative environmental and social impacts associated with the implementation of the proposed development project throughout its project life cycle. The outline of the plan considers the anticipated impacts, the mitigation measures, the parties responsible for the action, time frame for the implementation and cost as it will be stipulated on the table. The monitoring process aims at generating useful information that would be useful in facilitation of the implementation of the mitigation measures.

The implementation of the ESMMP solely shall be the responsibility of the contractor while the proponent will play a supervisory role of ensuring that the proposed measures are implemented as outlined on the plan. The frequency of implementation of the proposed measures and monitoring will be dependent on the nature of the anticipated impact as well as the proposed measures. The cost of implementation of the ESMP especially during the construction phase will be factored in the bills of quantities for the proposed project while the cost of maintaining the project after completion will be met by the proponent.

ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

S/N	Anticipated Impacts	Proposed Measures	Monitoring Indicator	Frequency of Monitoring	Responsibility	Cost
		Planning and Construction Phase				
1	***Unequal Employment Opportunities***	❖ Adoption of equal employment opportunity policy where everyone is considered for employment ❖ Give the locals priority when hiring the workers	❖ No. of locals employed ❖ No. of Job created per Gender ❖ Proportion of male workers to that of female	One off and whenever a need arises	Contractor	As per the contractual agreement with the workers
	Solid and	❖ Compliance with guidelines on waste management ❖ Engage a licensed garbage collector ❖ Provision of waste receptacles ❖ Encourage waste segregation ❖ Careful budgeting and purchase of	Waste generation rates Presences & number of waste receptacles on site Contract for waste	Continuous	Contractor County Government - Environment Officer (Environment	As per the BOQ

2	***Liquid Waste Generation***	construction materials in order to minimize wastage and expenses ❖ Proper management of oils and fuels to avoid any wastage and spillage ❖ Provision of sanitation facilities	collection		Officer/ Resident Engineer NEMA Officers	
3	***Noise and Excessive Vibration***	❖ Restrict construction activities to daytime ❖ Provision and use of appropriate protective equipment ❖ Compliance with noise regulations ❖ Use of machines & equipment with tolerable noise levels ❖ Regular maintenance and servicing of vehicles, machinery and equipment ❖ Sensitize the drivers to avoid unnecessary hooting or braking ❖ Avoid cutting trees within the road corridor so that they can act as sound absorbers ❖ Siting of quarrying sites away from residential areas	No. of workers provided with & using PPEs No. of notices for sensitizing the drivers, workers and visitors No. of serviced equipment's and machinery Distance between material sites (quarries) and residential areas	Continuous	Proponent Contractor Workers NEMA Environment Officer	Factored in the BOQ

		❖ Minimize the frequency of transportation of construction materials ❖ Formulation of rules to regulate noise levels				
4	***Air Pollution***	❖ Sprinkle dusty surfaces with water ❖ Covering of materials while on transit ❖ Site materials grinding, and mixing areas away from sensitive receptors ❖ Use of wet crushing technology while undertaking quarrying activities ❖ Use of mechanical equipment, machinery and vehicles that are efficient fuel consumption ❖ Ensuring that no machines or vehicles are left running if not in use ❖ Regular servicing and maintenance of vehicles and all mechanical equipment and machinery ❖ Compliance with air quality and fossils fuels regulations ❖ Provision and use of PPEs	Surface area sprinkled with water Evidence of dust/particulate matter in the air or on surfaces Number of workers with provided with and using PPPEs Record of respiratory complications among the workers and neighbours No. of vehicles covering construction	Continuous Daily	Contractor Resident Engineer Site Agent Environment Officer All workers Social safeguards officer	As per the BOQ

		❖ Undertake excavation works preferably during the wet season, ❖ Control speed of the vehicles on site to reduce dust generation ❖ Clearance of grass only on areas where construction activities will be undertaken ❖ Undertake activities likely to generate dust within the shortest time possible ❖ Have separate ESIA conducted for borrow pits and quarrying sites	materials while on transit ESIA report for materials sites Vehicle servicing schedule No. of complaints recorded			
5	***Soil Erosion and Land Degradation***	❖ Re-vegetate sections of roads upon completion ❖ Minimize removal of vegetation ❖ Restrict construction activities such as excavation, rock blasting and compaction to the project area only ❖ Rehabilitation of open pits once the construction activities are completed ❖ Excavation works should be restricted to the dry spell when less erosion is likely to occur	Number of trees planted Surface area landscaped and re-vegetated No. of borrow pits and quarries rehabilitated	One off / Continuous	Contractor	As per the BOQ

		❖ Stabilisation of loose soils through levelling and compaction of excavated materials ❖ Surface runoff channelling to areas that are less susceptible to erosion ❖ Adoption of soil conservation measures e.g. gabions and planting of ground cover vegetation	Types of soil conservation measures adopted Absence of erosion			
6	***Accidental Spillage and Leakages of Potential Contaminants***	❖ Use of grease and oil traps ❖ Regular maintenance and servicing of vehicles and equipment ❖ Servicing of vehicles to be carried out on impervious concrete surfaces ❖ Provision of containers to store used oils and fuels ❖ Adherence to the ESMMP regarding the management of potential spills and leakages ❖ Formulation of and adherence to spill/ leakage management plan ❖ Remediation of spills and leakages as	No. of grease and oil traps in use No. of vehicles and machines serviced Frequency of servicing of the vehicles No, of storage containers provided Spill and Leakage management plans in place	Continuous	Contractor Resident engineer Supervisor Clerk of works Workers Environment Officer	Factored in the BOQ

		soon as they occur ❖ Provision of spills and leakages containment facilities in areas where oils and fuels are stored ❖ Regular inspection of vessels containing oils and fuels and machines and equipment for any leaks ❖ Notify the supervisor or the relevant personnel of any leakage that may have been detected.	Spills remediation schedule Inspection schedule No of leakages incidences reported			
7	***Occupational Health and Safety (OHS) Risks and Fire***	❖ Provision of an equipped first aid kit ❖ Deployment of first aiders on site ❖ Provision of fire extinguishers on project site and in all vehicles ❖ Formation of health and safety committees ❖ Provision and use of PPEs ❖ Operation of machines, equipment and vehicles be done by people with knowledge of their operation	Presence of first aid kits on site Evidence of qualification of first aiders Health and safety committee reports No. of PPEs supplied and those using them No. of signages	One off/ Continuous	Contractor All workers Public Health department	As per the BOQ

	Hazards- done	❖ Use of road signposts /signages ❖ Preparation of food for workers to be done under hygienic conditions ❖ Avoid overworking of the workforce ❖ Provision of sanitary facilities and safe water supply for use at work ❖ Train workers on health and safety issues at place of work ❖ Routine safety checks of all equipment ❖ Development of emergency preparedness and evacuation procedures ❖ Formulation of health and safety policy documents and display them for construction workers ❖ Provision of incidences and accidents registers	erected and in use No. of workers trained on health and safety issues and attendance register Sanitation facility in place Type of water supply on site Clearance from public health for the food vendor (s) Checks reports No. of incidences and accidents recorded Display of health and safety policy document			
		❖ Provision of storage facility for workers' belongings, equipment and tools	Storage facility in place			As per the BOQ

8	***Insecurity and Social Crime***s	❖ Fencing of construction site ❖ Employ a guard to watch over the site ❖ Thorough screening and vetting of all people getting onto the project site ❖ Vetting of the workers before they are hired ❖ Lighting up the construction site ❖ Encouraging all the workers to take care of their personal belonging	A secured site Presence of a security guard A lit construction site	One off/ continuous	Security officer Administration	
9	***Increased Traffic Flow***	❖ Transportation of materials to be done during off-peak hours ❖ Notify road users of ongoing road construction activities and heavy traffic flow ❖ Have alternative routes to ease the congestion on the road ❖ Deploying traffic marshals ❖ Remind the drivers to adopt best practices regarding road safety	No. of vehicles transporting construction materials during off-peak hours No. of signages erected No. of diversions or alternate routes Traffic flow along the project area No. of accidents	Continuous	Contractor Resident Engineer/Site Agent Supervisor Drivers	As per the BOQ

			recorded			
10	***Increased Water and Energy Use***	❖ Sensitise the workforce on adoption of energy and water saving techniques ❖ Consider the use of alternative water and energy sources ❖ Encourage recycling of water ❖ Consider harvesting rainwater for use in the dry season	Behaviour change regarding water and energy use Alternate sources of water and energy sources	One off /daily	Contractor Workers	Factored in the BOQ
11	***Loss of Habitat and Biodiversity***	❖ Map areas and identifying any special plant species that may be harvested and transported to another site ❖ Levelling and stabilization of the soils so that they can be used for growing of plants ❖ Restrict clearance of vegetation to project sites ❖ Re-vegetate the land after construction work is done.	No. of species identified Area cleared of vegetation No. of trees planted Re-vegetated surface area	One off	Contractor	As per the BOQ
12	***Destruction of Existing Public***	❖ Map all infrastructure such as water pipes and electrical cables that may be	Report on mapping	One off	Proponent Service	As per the BOQ

	Utilities	interfered with ❖ Prepare a plan to minimize disruption of services ❖ Engage all stakeholders and people who are likely to be affected ❖ Notify the service provider of the possible interference with the service delivery	No, of infrastructure identified No. of stakeholders consulted and notified Notification		providers Contractor	
13	***STDS and HIV and AIDS***	❖ Undertake a HIV/AIDS awareness campaign to sensitize the workers and residents of the risks of contracting sexually transmitted illnesses and their management ❖ Provision of condoms dispensers for the workers and residents ❖ The contractor should liaise with the local health facility in the area so that they can offer VCT services to the workers and the residents in the area	No. of sensitization campaigns undertaken No. of condom dispensers in place No. of condoms given out VCT services offered	Quarterly/ Daily	Contractor Department of Health Services	
			Operational Phase			

1	***Risk of Road Accidents***	❖ Observance of traffic rules ❖ Provision of road signages/signs ❖ Regular maintenance and rehabilitation of worn out sections of the roads	No. of accidents recorded No. of visible signages Frequency of road maintenance No. of sections repaired and rehabilitated	On need basis	Road users Traffic police County Government of Kiambu	As provided for in the county budget
2	***Increased Surface Runoff***	❖ Regular di-siltation of the storm water drains ❖ Clearing of waste from the storm water drains ❖ Sensitize the community on the need to avoid dumping waste and channelling of sediments into the storm water drains	Frequency of di-siltation of drainage systems Absence of waste in the drainage systems No. of sensitization campaigns undertaken	Continuous	Road engineer Environment officer	As per the departmental budgets
		❖ Collect and dispose waste appropriately in designated disposal sites in the county ❖ Provisionof receptacles to store waste as it awaits transportation and disposal by	Contractual documents with licensed garbage collectors	Daily	Contractor County	As per the departmental

3	***Waste Generation***	the licensed garbage collector ❖ Collection of streets sweeping by the county government of Kiambu			Government of Kiambu /Environment Officer	budgetary allocation
4	***Loss of Employment and Source of Income***	❖ If possible, the contractor should consider engaging the staff in other projects that they may be involved in.	No. of staff engaged in other projects	One off	Contractor	No direct cost associated with the proposed project
Decommissioning Phase						
1	***Waste Generation***	❖ Provision of waste receptacles to store waste while awaiting collection ❖ Engage services of licensed garbage collector to collect and dispose waste as per the waste regulations ❖ Segregate waste to recover materials for reuse or recycling	No. of waste receptacles provided Contractual agreement between waste collectors and the contractor Recovered materials	Weekly	Environment Officer Contractor	As per the BOQ

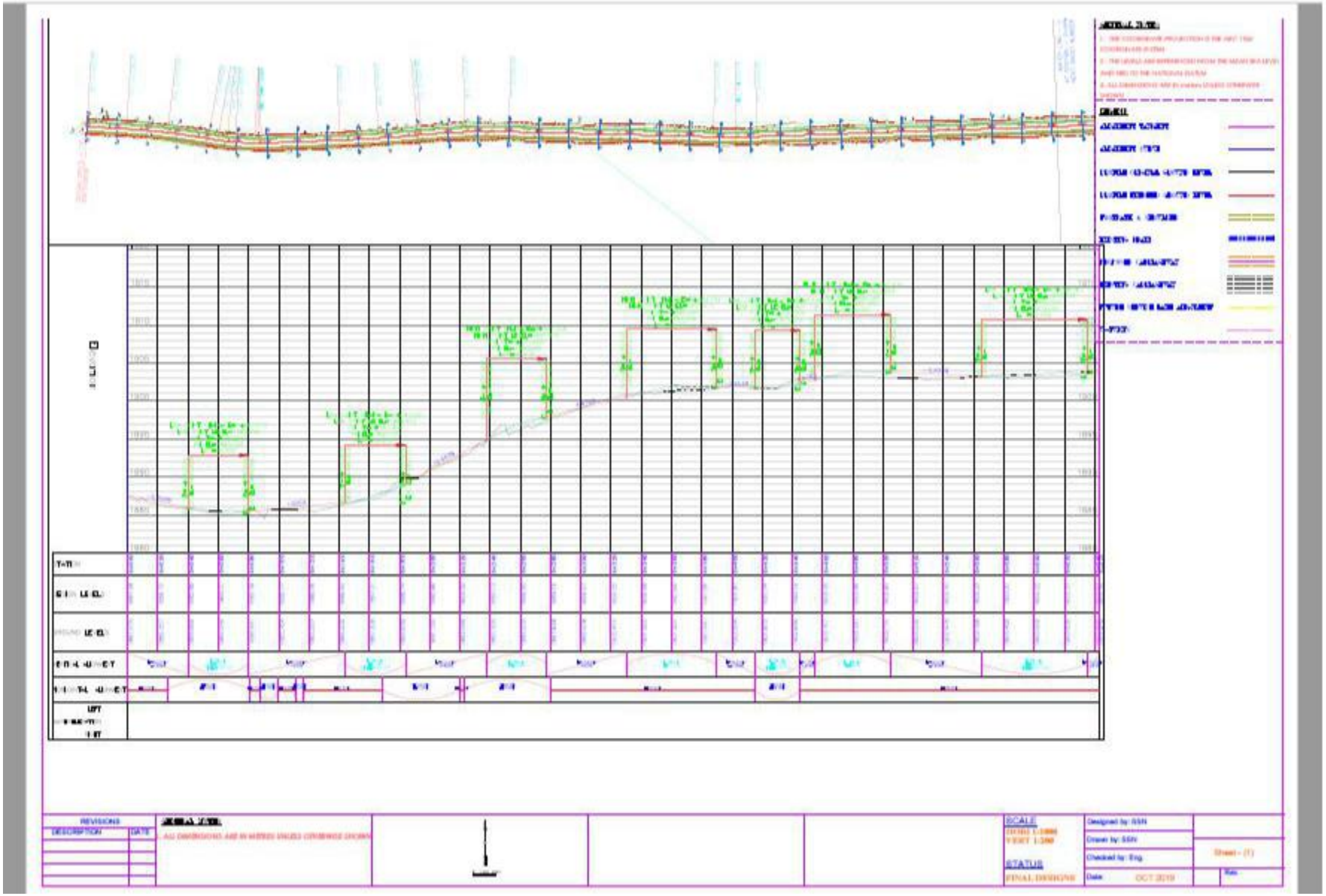
2	***Air Pollution***	❖ Sprinkling of dusty surfaces with water ❖ Undertake demolition activities within shortest time possible and when not very windy ❖ Provision and use of PPEs ❖ Enclose the construction site ❖ Notify public of the potential dust generation during the demolition phase	Frequency of watering Timing of demolition activity No. of workers with PPEs Presence of a fence No. of notices	Daily / One off	Contractor Workers	As per the BOQ
3	***Noise Pollution***	❖ Provision and use of PPEs ❖ Restrict demolition activities to daytime ❖ Enclose the site with e.g. iron sheets to reduce the noise levels ❖ Use of well-conditioned and well-maintained demolition machines and equipment ❖ Use of silencers on machine	No. of workers with PPEs Absence of noise related complaints Presence of a fence No. of serviced machines No. of machines with silencers	Daily On need basis	Workers Contractor	As per the BOQ

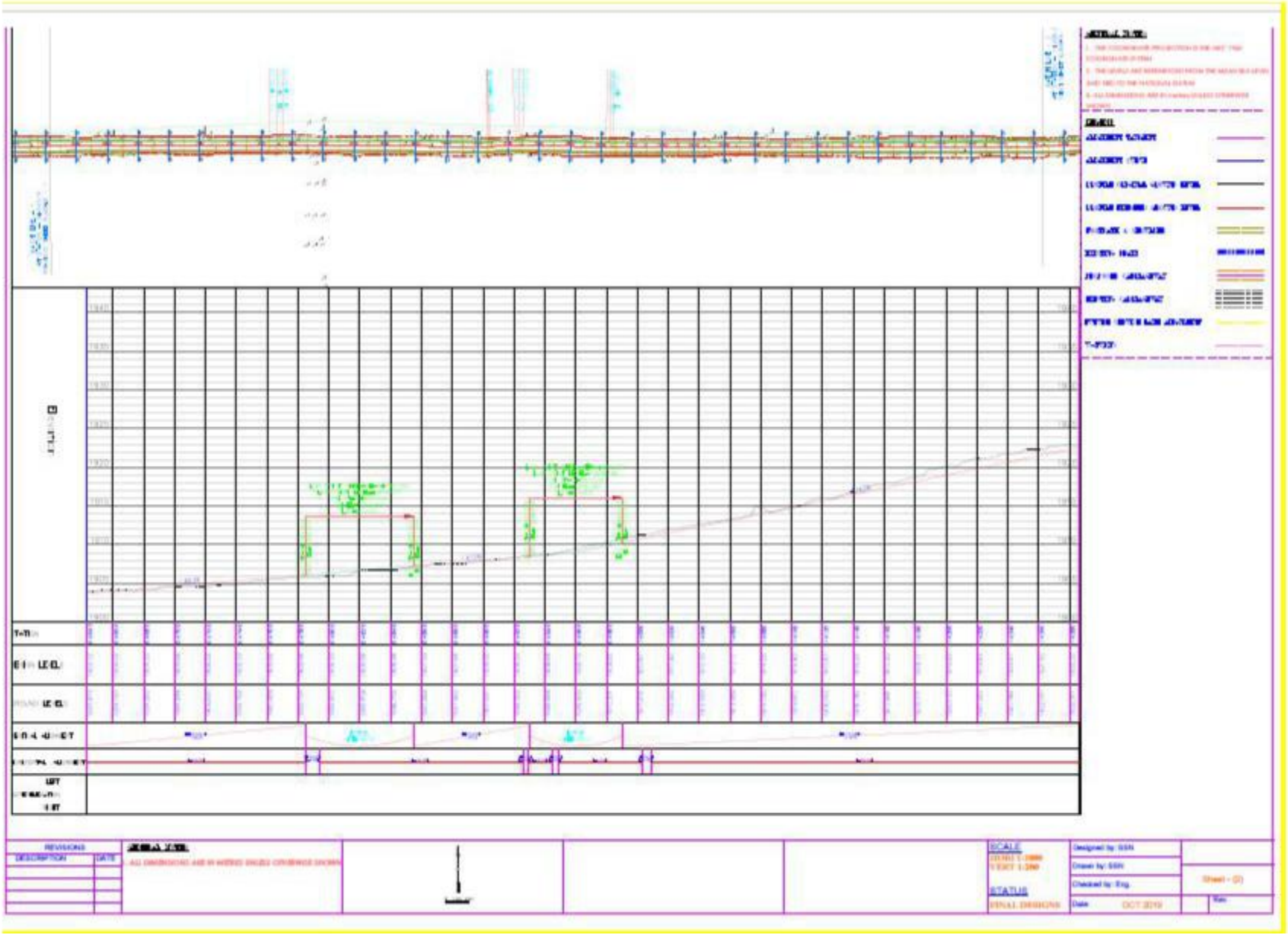
4	***Interference with Road Users***	❖Notify the road users of the proposed demolition plans ❖ Creation of alternative routes for use ❖ Use of appropriate road signages to guide the road users	No. of notices No. of alternative routes created No. of signages	One off	Contractor	As per the BOQ
5	***Loss of Employment and Economic Decline***	❖ Notify the workers of the plan to lay off the workers ❖ If possible, the contractor should look for alternative employment for his or her staff ❖ The proponent should rehabilitate and redevelop the site again in order to create other opportunities for employment	Notification No. of staff engaged by the contractor in other jobs No. of rehabilitated sites	One off	Contractor	As per the BOQ (for rehabilitation works)
6	***Loss of Positive Impacts Associated with the Operational Project***	❖ Creation of an alternative improved means of transport	Proposed development projects	One off	County Government of Kiambu	To be provided for
7	***Occupational***	❖ Provision of PPEs ❖ Investigation of all accidents and	No. of workers with PPE	Daily One off	Contractor Workers	As per BOQ

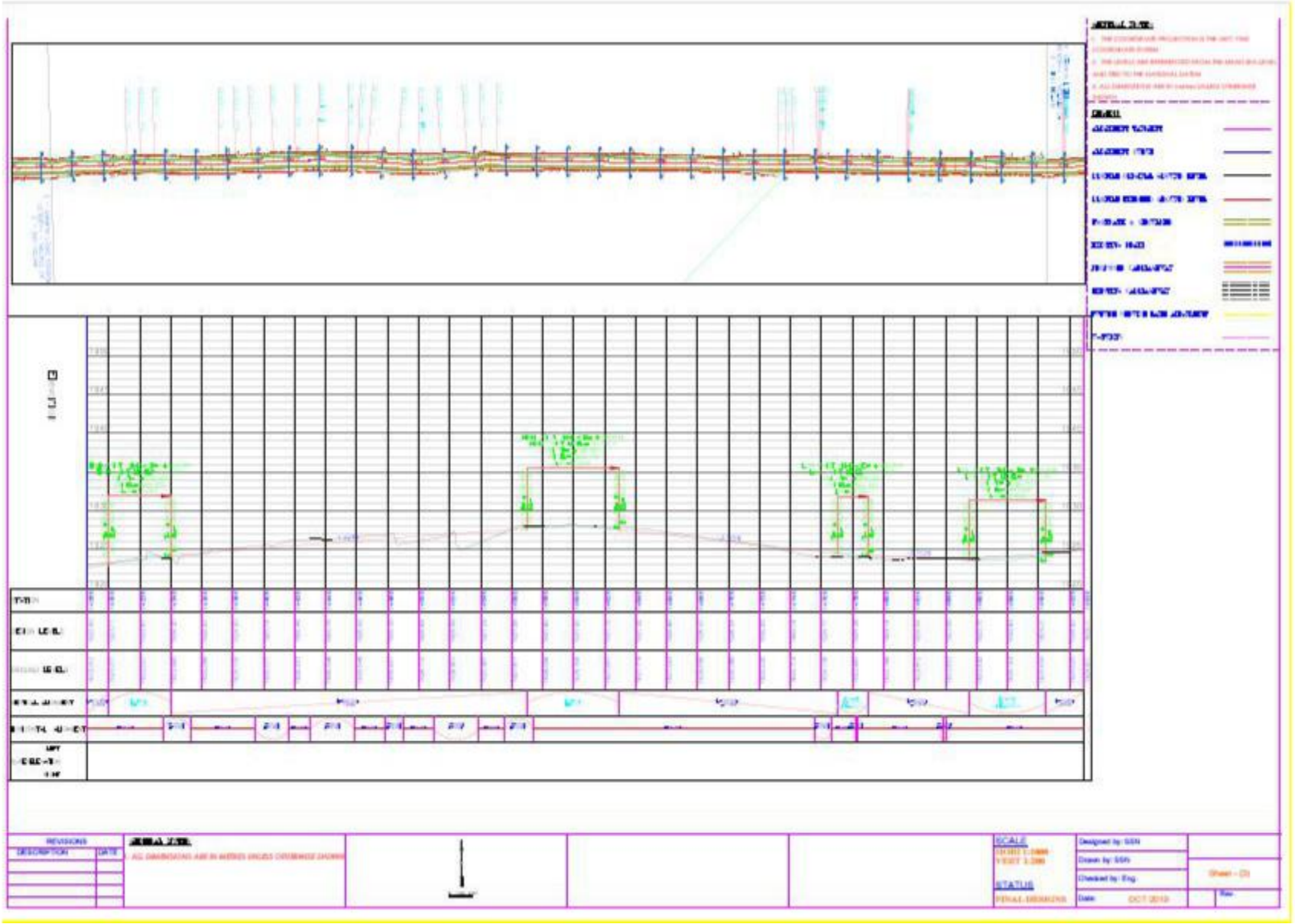
	Health and Safety Hazards	appropriate measure be taken to avoid them ❖ Erection of clear signs and warning signs of the ongoing activities ❖ Have clear routes for use by the traffic	No. of incidents and accidents reported No. of signages No. of alternative routes			

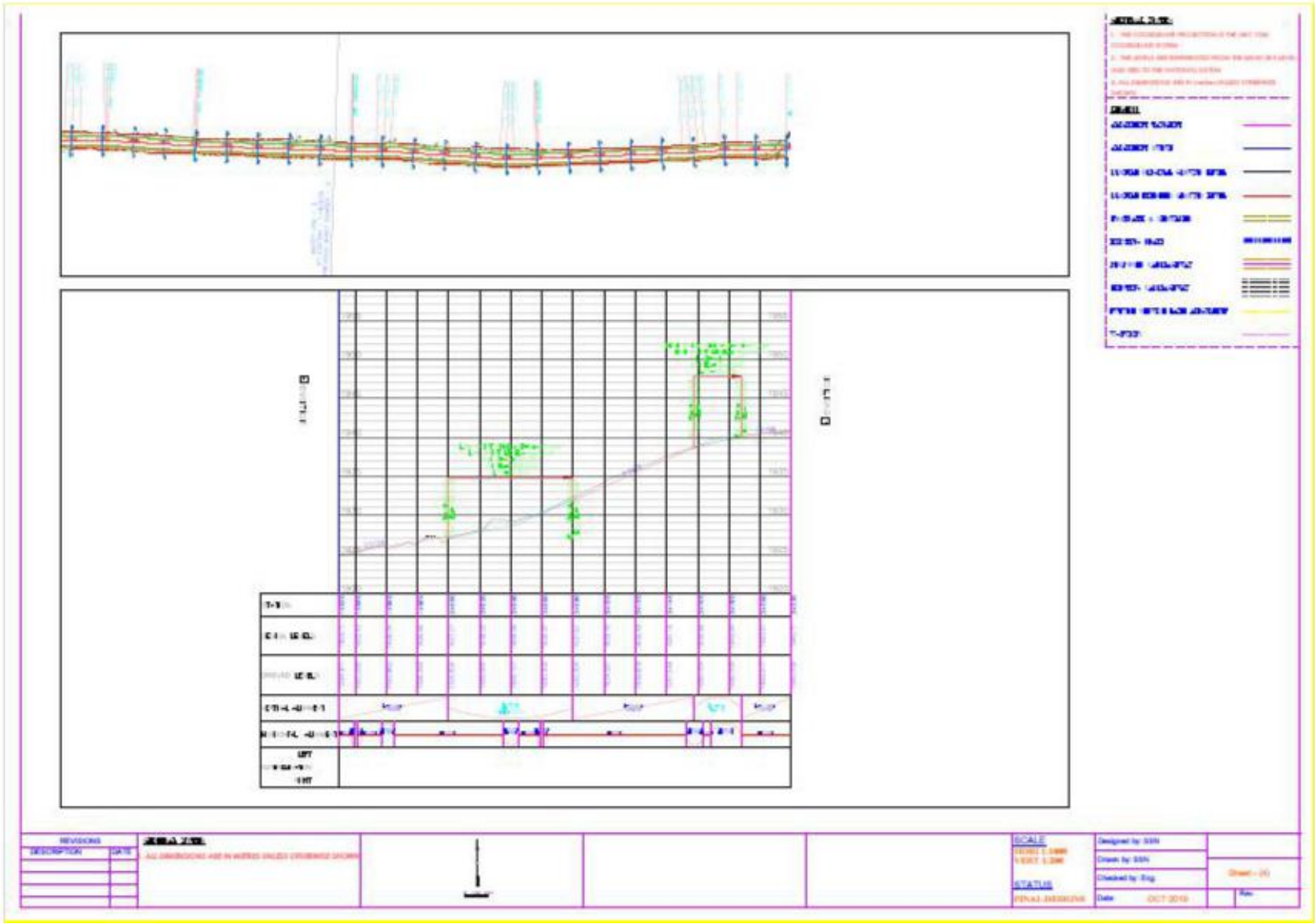
APPENDICES

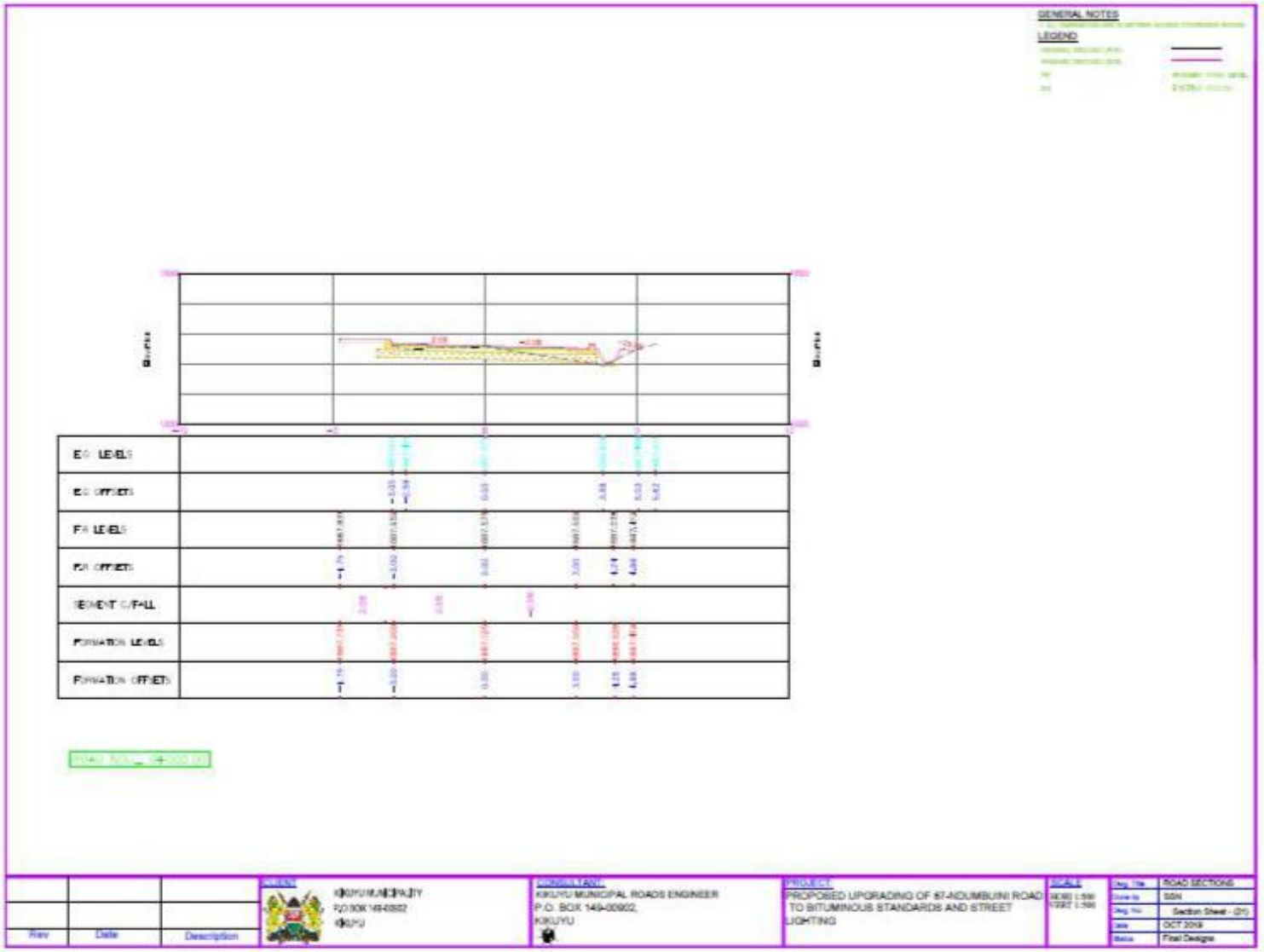
Appendix One: Sections of the Project Design







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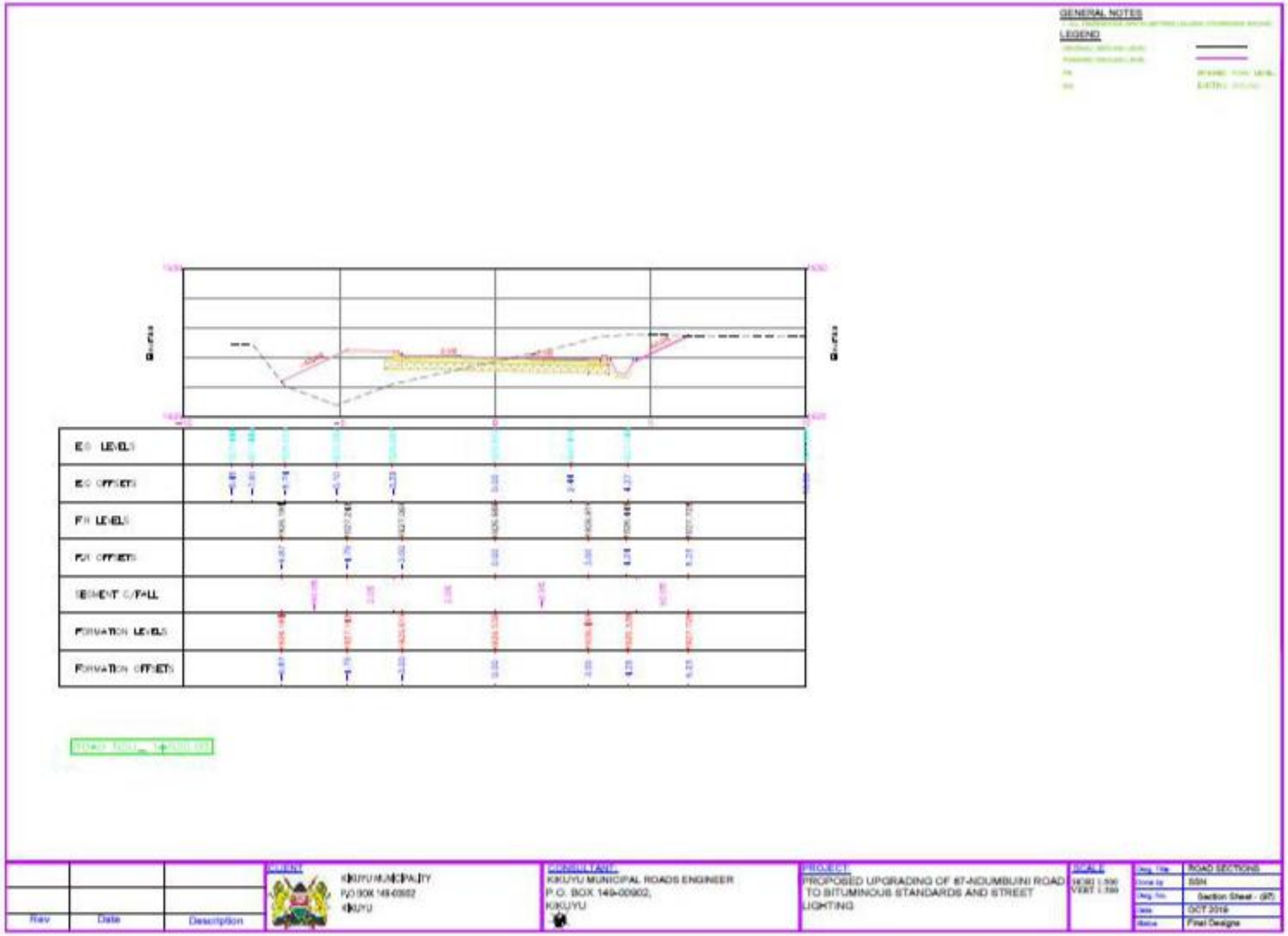
Rev
Date
Description
CLIENT:
KIKUYU MUNICIPALITY
P.O BOX 149-00902
KIKUYU
CONSULTANT:
KIKUYU MUNICIPAL ROADS ENGINEER
P.O. BOX 149-00902,
KIKUYU
PROJECT:
PROPOSED UPGRADING OF 87-NDUMBUINI ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING
SCALE
Dwg. Title
ROAD SECTIONS
Drawn by
SSN
Dwg. No.
Section Sheet - (21)
Date
OCT 2018
Status
Final Design


GENERAL NOTES
LEGEND
KIKUYU MUNICIPAL ROADS ENGINEER
P.O. BOX 149-00902,
KIKUYU
PROPOSED UPGRADING OF 87-NDUMBUINI ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING
ROAD SECTIONS
OCT 2018
Final Designs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Date
Description
CLIENT:
KIKUYU MUNICIPALITY
P.O BOX 149-00902
KIKUYU
CONSULTANT:
KIKUYU MUNICIPAL ROADS ENGINEER
P.O. BOX 149-00902,
KIKUYU
PROJECT:
PROPOSED UPGRADING OF 87-NDUMBUINI ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING
SCALE:
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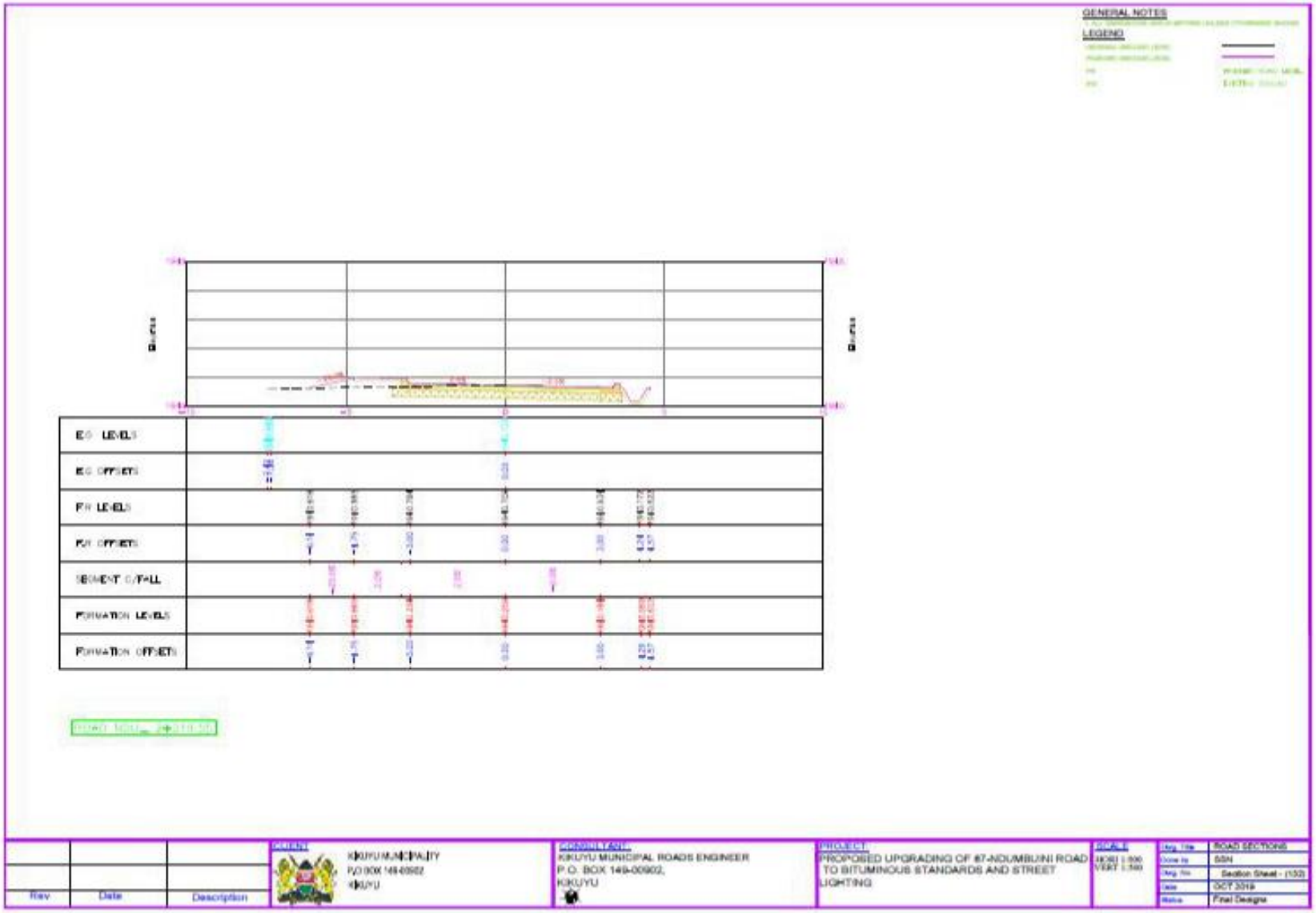
OCT 2019
Final Designs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Description
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P.O BOX 149-00902
KIKUYU
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P. O. BOX 149-00902,
KIKUYU
PROPOSED UPGRADING OF 87-NDUMBUINI ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING
ROAD SECTIONS
OCT 2019
Final Designs

CHAPTER EIGHT: CONCLUSION AND RECOMMENDATION

8.1 Conclusion

The ESIA study has established that the proposed project is a worthy investment due to the social-economic and environmental benefits that will accrue from the implementation of the proposed project such as creation of employment, opening up of business opportunity, enhanced accessibility and connectivity of the area, enhanced security and visibility, improved comfort, increased land value, improved storm water management and enhanced road safety and improved pedestrian mobility. Conversely, there will be negative impacts that will arise from the implementation of the project such as increased waste generation, dust emissions, noise pollution, risk of accidents while at work, exposure of workers to communicable diseases, increased traffic flow, increased water and energy use, soil erosion, land degradation, loss of biodiversity and habitat destruction.That notwithstanding, appropriate measures to mitigate against or ameliorate the negative impacts have been proposed to ensure that the project is implemented with minimal impacts to the project's beneficiaries and environment. Based on the analysis undertaken, it is recommended that the project be accepted for review and consideration for approval as it is viable socially, environmentally and economically.

8.2 Recommendation

Whereas the study has established that the implementation of the project is a worth investment, to ensure that the project is implemented with minimal social and environmental risks it is recommended that:

- All the proposed measures to minimize all the anticipated negative impacts and reduce all health and safety risks associated with the project should be implemented as per the Environmental and Social Management and Monitoring Plan (ESMMP) outlined in chapter seven of this ESIA report.
- The positive impacts associated with the project should be maximized fully in order to benefit the members of public
- The proponent should take the lead role of ensuring that the project is implemented as per the relevant legal, policy and institutional framework and as per the guidelines and

social and environmental standards of the World Bank who is the financier of the project as discussed in chapter four of this report

- All other implementing agencies and individuals identified in the ESMMP should also be committed to ensuring that they have complied with all the regulations guiding the implementation of the project.
- All the workers should be provided with the right tools and equipment to protect them from any accidents that may occur while at work
- The technology to be used and materials should be those that are environmentally friendly
- The contractor should undertake an ESIA of all material sites such as borrow pits and quarrying sites before commencement of any construction work and acquire all relevant permits and licenses.
- The proponent should ensure that anyone who may have encroached on to the road reserve is notified well in advance of the proposed project so that they can vacate or remove any structures that may have been constructed on the road reserve in order to avoid conflicts.

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World Bank, (2002), *The World Bank's Environmental and Social Safeguards*

Policies World Bank, (2017), *Environmental and Social Framework*

APPENDICES

Appendix Two: Project Identification Check List

Appendix Three: Summary of Bills of Quantities (BoQ)

BILL OF QUANTITIES FOR UPGRADING OF 87-NDUMBUINI ROAD (2.25 KM) TO BITUMINOUS STANDARDS AND STREET LIGHTING IN KIKUYU MUNICIPALITY

SUMMARY

Bill No.	Description	Tender Amount (Kshs)
1	General	11,353,000.00
4	Site clearance & Top soil stripping	1,197,000.00
5	Earthworks	1,391,520.00
8	Culvert and Drainage works	18,686,900.00
9	Passage of Traffic	350,000.00
11	Shoulder to Pavement	472,500.00
12	Natural Material Sub Base & Base	15,593,600.00
13	Graded Crushed Stones	10,337,500.00
14	Cement Treated Materials	5,982,500.00
15	Bituminous Surface Treatments and Surface Dressings	2,678,400.00
16	Bituminous Mix Bases, Binder Courses and Wearing Course	37,568,400.00
20	Road Furniture	12,963,900.00
25	HIV & AIDS	350,000.00
26	Street lighting	5,000,000.00
A	**Sub Total 1**	**123,925,220.00**
B	Add 3% Contingencies	3,717,756.60
C	Add 5% Variations	6,196,261.00
D	**Sub Total 2**	**133,839,237.60**
E	Add 16% V.A.T	21,414,278.02
F	**TOTAL**	**155,253,515.62**

Appendix Four: Sample Questionnaire for Public Participation

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE PROPOSED UPGRADING OF 87- NDUMBUINI ROAD - UTHIRU (2.25 KMS) TO BITUMINOUS STANDARDS AND STREET LIGHTING IN KIKUYU MUNICIPALITY

PUBLIC PARTICIPATION QUESTIONNAIRE

The County Government of Kiambu through the World Bank Kenya Urban Support Programme intends to upgrade 87 - Ndumbuini (2.25 kms) to bituminous standards and street lighting. To ensure public participation in the project planning process, you are hereby invited to answer the following questions aimed at gathering the public's comments that would be useful in making informed decision regarding the proposed development project.

Please note that all information gathered will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your response will highly be appreciated.

A. Background Information

1. Name…….
2. Gender (tick where appropriate) (**)** Male **( )** Female
3. Place of residence…….....
4. Distance between your place of residence and project site……

B. Environmental Concerns

1. In your opinion do you think the proposed development will have any **positive impacts** in your area? **( )** Yes **( )** No If yes please state how ……
   ……
   ……
   ……
2. (a) In your opinion do you think the proposed development project will have any **negative impacts** on the people and environment in your area? **( )**Yes **( )** No

If yes, state how

……

……

……

……

(b) What measures would you propose to minimise the negative impacts identified above?

C. <u>Social-Cultural Concerns</u>

3. Is the project located near any important historical, archaeological or cultural heritage site? Yes ( ) No ( )

   If yes, state the site ----------

4. (a) Will the project cause any disadvantage to persons with disability, elderly, vulnerable, minority or low status groups within the community? Yes ( ) No ( )

   If yes, state the type of the group that will be affected and how

   ---

   (b) State what can be done to address the above issue

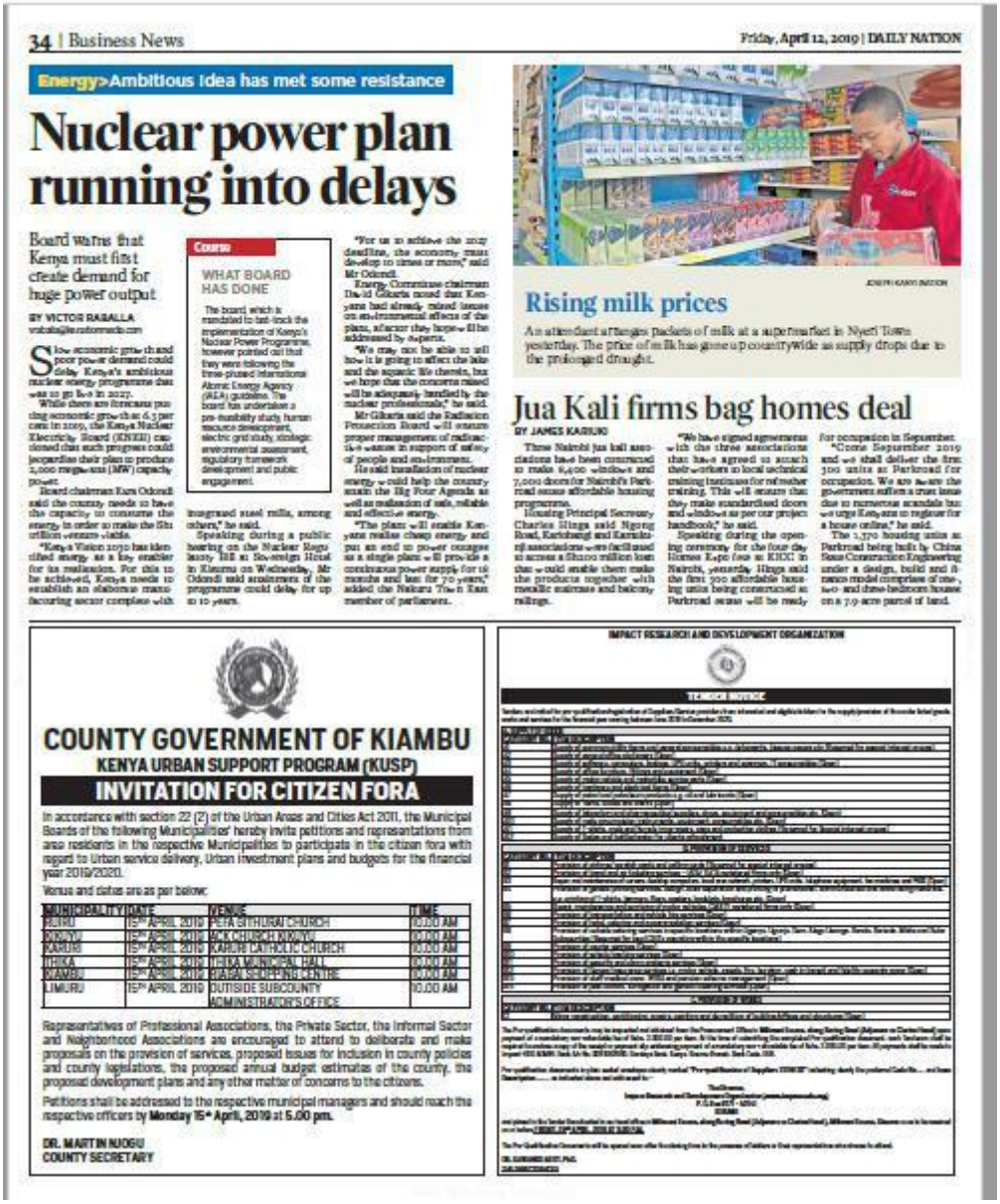
   Signature of the respondent

   _____

Thank you for your response

Appendix Five: Administered Questionnaires

Appendix Six: Advertisement for Citizen Fora



34 | Business News — Friday, April 12, 2019 | DAILY NATION

Energy>Ambitious idea has met some resistance

Nuclear power plan running into delays

Board warns that Kenya must first create demand for huge power output

BY VICTOR RABALLA
vrabalia@nationmedia.com

Slow economic growth and poor power demand could delay Kenya's ambitious nuclear energy programme that was to go live in 2027.

While there are forecasts pushing economic growth at 6.3 per cent in 2019, the Kenya Nuclear Electricity Board (KNEB) cautioned that such progress could jeopardise their plan to produce 1,000 megawatts (MW) capacity power.

Board chairman Ken Odondi said the country needs to have the capacity to consume the energy in order to make the Sh1 trillion venture viable.

"Kenya's Vision 2030 has identified energy as a key enabler for its realisation. For this to be achieved, Kenya needs to establish an elaborate manufacturing sector complete with

Course

WHAT BOARD HAS DONE

The board, which is mandated to fast-track the implementation of Kenya's Nuclear Power Programme, however pointed out that they were following the three-phased International Atomic Energy Agency (IAEA) guideline. The board has undertaken a pre-feasibility study, human resource development, electric grid study, strategic environmental assessment, regulatory framework development and public engagement.

inaugurated steel mills, among others," he said.

Speaking during a public hearing on the Nuclear Regulatory Bill at Serengia House in Kisumu on Wednesday, Mr Odondi said assessments of the programme could delay for up to 10 years.

"For us to achieve the 2027 deadline, the economy must develop 10 times or more," said Mr Odondi.

Energy Committee chairman David Gikaria noted that Kenyans had already raised issues on environmental effects of the plans, a factor they hope will be addressed by experts.

"We may not be able to tell how it is going to affect the lake and the aquatic life therein, but we hope that the concerns raised will be adequately handled by the nuclear professionals," he said.

Mr Gikaria said the Radiation Protection Board will ensure proper management of radioactive wastes in support of safety of people and environment.

He said installation of nuclear energy would help the country attain the Big Four Agenda as well as realisation of safe, reliable and efficient energy.

"The plant will enable Kenyans realise cheap energy, and put an end to power outages as a single plant will provide a continuous power supply for 18 months and last for 70 years," added the Nakuru Town East member of parliament.

Rising milk prices

An attendant arranges packets of milk at a supermarket in Nyeri Town yesterday. The price of milk has gone up countrywide as supply drops due to the prolonged drought.

Jua Kali firms bag homes deal

BY JAMES KARIUKI

Three Nairobi jua kali associations have been contracted to make 6,400 windows and 7,000 doors for Nairobi's Parkroad estate affordable housing programme.

Housing Principal Secretary Charles Hinga said Ngong Road, Karishangi and Kamukunji associations were facilitated to access a Sh200 million loan that would enable them make the products together with metallic staircase and balcony railings.

"We have signed agreements with the three associations that have agreed to attach their workers in local technical training institutes for refresher training. This will ensure that they make standardised doors and windows as per our project handbook," he said.

Speaking during the opening ceremony for the four-day Homes Expo fair at KICC in Nairobi, yesterday, Hinga said the first 300 affordable housing units being constructed at Parkroad estate will be ready for occupation in September.

"Come September 2019 and we shall deliver the first 300 units at Parkroad for occupation. We are aware the governments suffers a trust issue due to numerous scandals but we urge Kenyans to register for a house online," he said.

The 1,370 housing units at Parkroad being built by China State Construction Engineering under a design, build and finance model comprises of one-, two- and three-bedroom houses on a 7.9 acre parcel of land.

COUNTY GOVERNMENT OF KIAMBU

KENYA URBAN SUPPORT PROGRAM (KUSP)

INVITATION FOR CITIZEN FORA

In accordance with section 22 (2) of the Urban Areas and Cities Act 2011, the Municipal Boards of the following Municipalities' hereby invite petitions and representations from area residents in the respective Municipalities to participate in the citizen fora with regard to Urban service delivery, Urban investment plans and budgets for the financial year 2019/2020.

Venue and dates are as per below:

MUNICIPALITY	DATE	VENUE	TIME
KIRU	15th APRIL 2019	PETA STHURAI CHURCH	10.00 AM
KIKUYU	15th APRIL 2019	ACK CHURCH KIKUYU	10.00 AM
KARUR	15th APRIL 2019	KARURI CATHOLIC CHURCH	10.00 AM
THIKA	15th APRIL 2019	THIKA MUNICIPAL HALL	10.00 AM
KIAMBU	15th APRIL 2019	KIAMBU SHOPPING CENTRE	10.00 AM
LIMURU	15th APRIL 2019	OUTSIDE SUBCOUNTY ADMINISTRATOR'S OFFICE	10.00 AM

Representatives of Professional Associations, the Private Sector, the Informal Sector and Neighborhood Associations are encouraged to attend to deliberate and make proposals on the provision of services, proposed issues for inclusion in county policies and county legislations, the proposed annual budget estimates of the county, the proposal development plans and any other matter of concerns to the citizens.

Petitions shall be addressed to the respective municipal managers and should reach the respective officers by **Monday 15th April, 2019 at 5.00 pm.**

DR. MARTIN KUGU
COUNTY SECRETARY

IMPACT RESEARCH AND DEVELOPMENT ORGANIZATION

Appendix Seven: Copy of Minutes for the Citizen Fora Meeting

Appendix Eight : Attendance Sheet for the Citizen Fora Meeting

MUNICIPALITY BOARD MEMBERS ①

KIKUYU MUNICIPALITY

DATE:15/04/2019

PUBLIC PARTICIPATION FORUM

VENUE: ACK KIKUYU

No.	NAME	NAME OF THE ORGANISATION	WARD	ID NO.	TELEPHONE	SIGNATURE
1	Rawson W. Kamnje	Kikuyu Municipal Board	Kinoo	[illegible]	0722 [illegible]	[illegible]
2	Grace W Ndungu	"	Uthiru	20722228	0722457528	[illegible]
3	Steve M Kanja	"	Karai	22030708	0715256577	[illegible]
4	Danson M Ngoo	"	KABETE	9237332	0722477479	[illegible]
5	Amos N. Mugiuki	"	Kabete	3102091	0722902725	[illegible]
6	BISHOP THEURI MAINA	"	KIKUYU	10967023	0722895012	[illegible]
7	[illegible]	[illegible]	[illegible]	7816752	[illegible]	[illegible]
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MCAs ②

KIKUYU MUNICIPALITY

DATE:15/04/2019

PUBLIC PARTICIPATION FORUM

VENUE: ACK KIKUYU

No.	NAME	NAME OF THE ORGANISATION	WARD	ID NO.	TELEPHONE	SIGNATURE
1	ERICK W NDUNGU	MCA	UTHIRU	22397539	0722-782215	[illegible]
2	[illegible]	UTHIRU DEV Committee	UTHIRU	[illegible]	0723984262	[illegible]
3	BISHOP THEURI MAINA	VIONGOZI ASSEMBLY	KIKUYU	10967023	0722895012	[illegible]
4	NAPHTALY NGUGI	MCA	SIGONA	22571822	0725 224914	[illegible]
5	HENRY KAGIRI	MCA	KIKIKUYU	25182593	0722 681 765	[illegible]
6	Edward Kigonyo	M.C.A	Nyathuna	10290704	0722-25[illegible]	[illegible]
7	Gerishon Wangari	MCA	Kabete	1900579	0721 406957	[illegible]
8	Peter Muhindi	M.C.A	Ndeiya	0961625	07[illegible]	[illegible]
9	GRACE N WAWERU	SCA KABETE	-	28431793	0708 176776	[illegible]
10	Samuel Mugwanja	MCA Karai	Karai	13535135	0723454172	[illegible]
11	[illegible]	MCA Muguga	Muguga		[illegible]	
12	Grace Nyambura	Rep MCA	Muguga	9861691	0724223091	[illegible]
13	Philip N Mwihaki	MCA	Gitaru	10998552	0710 170931	[illegible]
14	Samuel Kimani	MCA - Kinoo	Kinoo	24922263	0727237748	[illegible]
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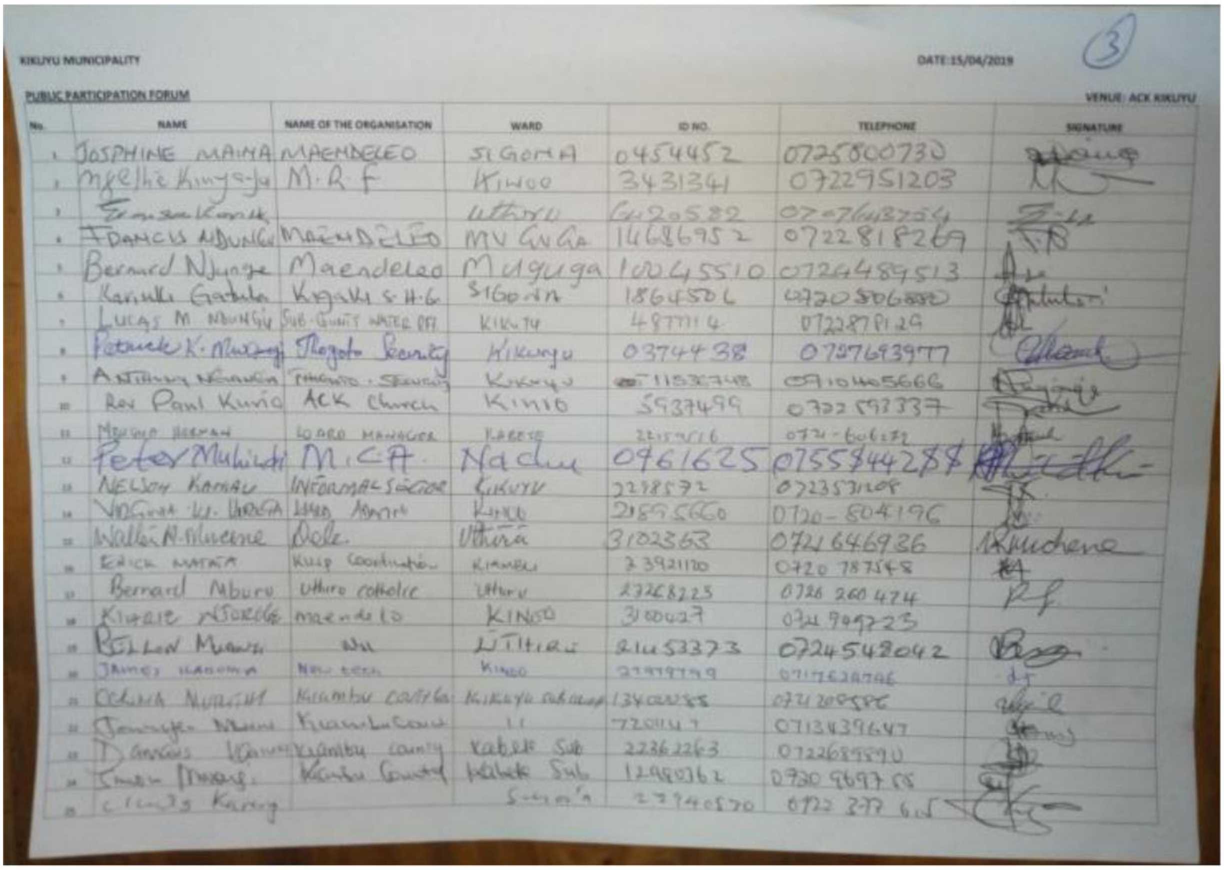
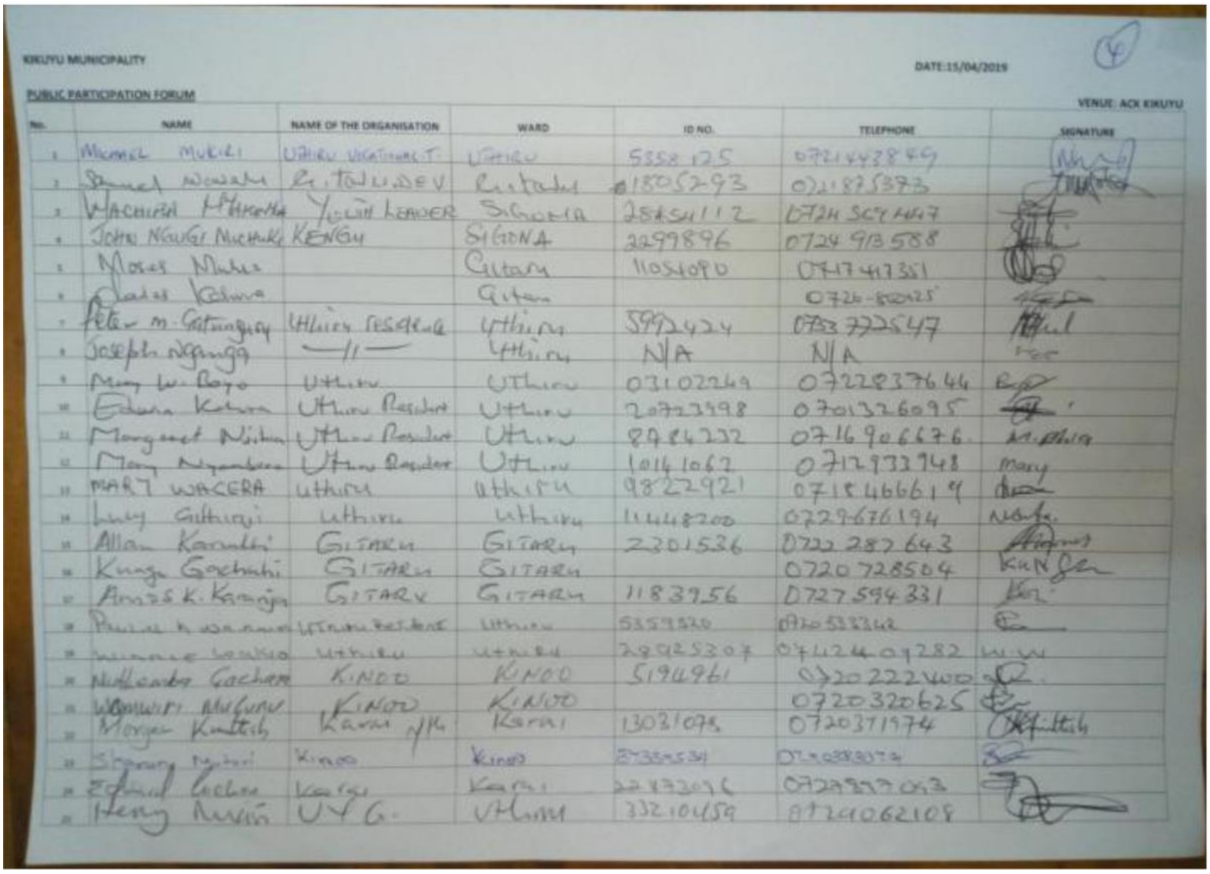


KIKUYU MUNICIPALITY DATE:15/04/2019 (3)

PUBLIC PARTICIPATION FORUM VENUE: ACK KIKUYU

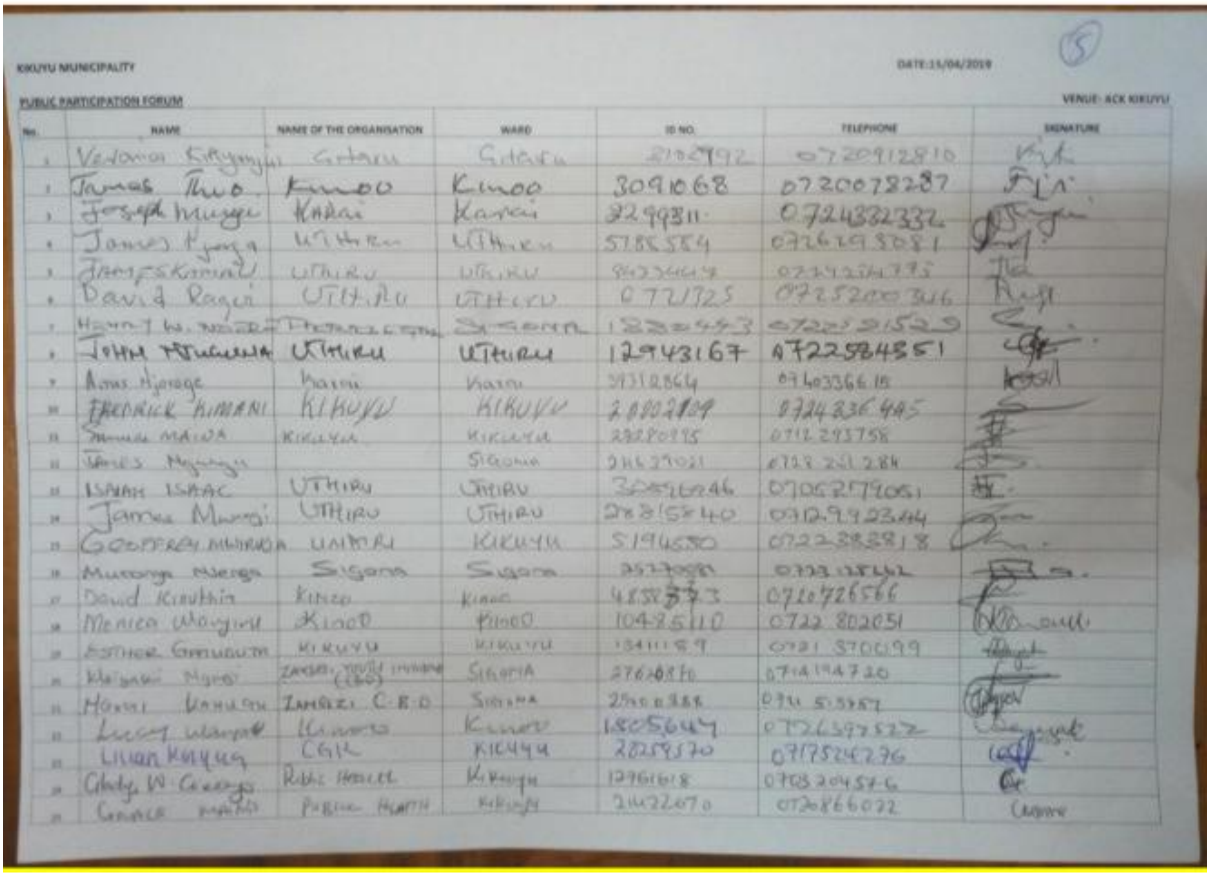
No.	NAME	NAME OF THE ORGANISATION	WARD	ID NO.	TELEPHONE	SIGNATURE
1	JOSPHINE MAINA	MAENDELEO	SIGONA	0454452	0725800730	[illegible]
2	Mgethe Kinyanjui	M.R.F	KINOO	3431341	0722951203	[illegible]
3	[illegible] Kamau		Uthiru	6420582	0727643754	[illegible]
4	FRANCIS NDUNGU	MAENDELEO	MUGUGA	1468695 2	0722818269	[illegible]
5	Bernard Njunge	Maendeleo	Muguga	10045510	0724489513	[illegible]
6	Karuki Gathuka	Kigaki S.H.G	SIGONA	1864506	0720806[illegible]	[illegible]
7	LUCAS M. NDUNGU	SUB-COUNTY WATER OFF	KIKUYU	487714	0722871129	[illegible]
8	Patrick K. Mwangi	Thogoto Security	Kikuyu	0374438	0727693977	[illegible]
9	ANTHONY NGANGA	THOGOTO · SECURITY	Kikuyu	11536748	0710405666	[illegible]
10	Rev Paul Kuria	ACK Church	KINOO	5937499	0722 593337	[illegible]
11	MUIGAI HERMAN	WARD MANAGER	KABETE	22159716	0721-606172	[illegible]
12	Peter Muhindi	M.C.A.	Nachu	0961625	0755844288	[illegible]
13	NELSON KAMAU	INFORMAL SECTOR	KIKUYU	2238572	0723531208	[illegible]
14	VIRGINIA W. WAIGA	[illegible]	Kinoo	21895660	0720-804196	[illegible]
15	Walter N. Muchene	Dole.	Uthiru	3102363	0721646936	KMuchene
16	ERICK MATATA	Kuup Coordination	KIAMBU	23921120	0720 787548	[illegible]
17	Bernard Mburu	Uthiru Catholic	Uthiru	23268223	0726 260 474	[illegible]
18	Kibiriti NJOROGE	maendeleo	KINOO	3100427	0721 909723	[illegible]
19	BILLOW MWANGI	Nil	UTHIRU	21453373	0724548042	[illegible]
20	JAMES KABOMBA	NEW [illegible]	KINOO	27979799	0717628796	[illegible]
21	Ochieng Nyagah	Kiambu County	Kikuyu Sub Co	13402285	0721 209586	[illegible]
22	Jennifer Nduta	Kiambu County	11	720447	0713439647	[illegible]
23	Dancan Kamau	Kiambu County	Kabete Sub	22362263	0722689890	[illegible]
24	Simon Mbugua	Kiambu County	Kabete Sub	12990362	0730 969755	[illegible]
25	Clinis Karing		Sigona	27940570	0722 377 615	[illegible]



KIKUYU MUNICIPALITY DATE:15/04/2019 (4)

PUBLIC PARTICIPATION FORUM VENUE: ACK KIKUYU

No.	NAME	NAME OF THE ORGANISATION	WARD	ID NO.	TELEPHONE	SIGNATURE
1	MICHAEL MUKIRI	UTHIRU VOCATIONAL T.	UTHIRU	5358125	0721443849	[illegible]
2	Samuel Ngunjiri	R. TOWN DEV	Ruthimitu	01805293	0721873373	[illegible]
3	WACHIRA MWANGI	YOUTH LEADER	SIGONA	28854112	0724 564447	[illegible]
4	JOHN NGUGI MUCHIRI	KENGU	SIGONA	2299896	0724 913588	[illegible]
5	Moses Muhia		Gitaru	11054090	0717417351	[illegible]
6	Gladys Wairimu		Gitaru		0726-802425	[illegible]
7	Peter M. Gatungu	Uthiru Residents	Uthiru	5992424	0733 772547	[illegible]
8	Joseph Nganga	—//—	Uthiru	N/A	N/A	[illegible]
9	Mary W. Boyo	Uthiru	Uthiru	03102249	0722837644	[illegible]
10	Edwin Kuria	Uthiru Resident	Uthiru	20723398	0701326095	[illegible]
11	Margaret Njoki	Uthiru Resident	Uthiru	8984232	0716906676.	M.[illegible]
12	Mary Nyambura	Uthiru Resident	Uthiru	10141062	0712933948	Mary
13	MARY WACERA	Uthiru	Uthiru	9822921	0718466619	[illegible]
14	Lucy Githinji	Uthiru	Uthiru	11448200	0729676194	[illegible]
15	Allan Kariuki	GITARU	GITARU	2301536	0722 287 643	[illegible]
16	Kungu Gachuhi	GITARU	GITARU		0720 728504	KuN[illegible]
17	Amos K. Kamanja	GITARU	GITARU	1183956	0727 594331	[illegible]
18	Paul K. [illegible]	Uthiru Resident	Uthiru	5359520	0720533342	[illegible]
19	[illegible]	Uthiru	Uthiru	28925307	0712404282	W.W
20	Nyambura Gachau	KINOO	KINOO	5194961	0720222400	[illegible]
21	Wamuiri Mugure	KINOO	KINOO		0720320625	[illegible]
22	Morgan Kuttah	Karai NYC	Karai	13031078	0720371974	[illegible]
23	Sharon Nduta	Kinoo	Kinoo	27356534	0720393073	[illegible]
24	Edward Gachau	Karai	Karai	22873076	0729997063	[illegible]
25	Henry Muriuki	UYG.	Uthiru	33210459	0724062108	[illegible]



KIKUYU MUNICIPALITY

DATE:15/04/2019

PUBLIC PARTICIPATION FORUM

VENUE: ACK KIKUYU

No.	NAME	NAME OF THE ORGANISATION	WARD	ID NO.	TELEPHONE	SIGNATURE
1	Veronica Kinyanjui	Gitaru	Gitaru	2102992	0720912810	
2	James Thuo	Kinoo	Kinoo	3091068	0720078287	
3	Joseph Muigai	Karai	Karai	2299311	0724332332	
4	James Kyanga	Uthiru	Uthiru	5785584	0726293081	
5	James Kamau	UTHIRU	UTHIRU	[illegible]	[illegible]	
6	David Ragoi	UTHIRU	UTHIRU	0772725	0725200346	
7	Harry W. [illegible]	[illegible]	Sigona	[illegible]	[illegible]	
8	JOHN NJUGUNA	UTHIRU	UTHIRU	12943167	0722584351	
9	Amos Njoroge	Karai	Karai	31312864	0740336615	
10	FREDRICK KIMANI	KIKUYU	KIKUYU	20002109	0724236445	
11	[illegible] MAINA	KIKUYU	KIKUYU	23280995	0712293758	
12	James Mugungu		SIGONA	24629021	0723 221 284	
13	ISAIAH ISAAC	UTHIRU	UTHIRU	30596246	0706279051	
14	James Mungai	UTHIRU	UTHIRU	28815840	0712992344	
15	GODFREY MWIRIGI	UNIMRI	KIKUYU	5194630	0722383818	
16	Murango Nyenga	Sigona	Sigona	[illegible]	0723 125442	
17	David Kiruthia	Kinoo	Kinoo	4858373	0720726566	
18	Monica Wanjiru	Kinoo	Kinoo	10485110	0722 802051	
19	Esther Gathumbi	KIKUYU	KIKUYU	13411159	0721 370099	
20	Wanjiru Ngugi	Zamzaki Youth [illegible] (CBO)	SIGONA	27620876	0714194720	
21	Mwangi Kahugu	ZAMRIZI C.B.O	SIGONA	25008288	0711 515957	
22	Lucy Wanjiku	Kinoo	Kinoo	1805647	0726397522	
23	Lilian Kinyua	CGK	KIKUYU	28259570	0717524276	
24	Gladys W. Gitonga	Public Health	Kikuyu	12961618	0703204576	
25	Grace Maina	Public Health	Kikuyu	21422070	0726866022	

Appendix Nine: Environment Institute of Kenya (EIK) Membership Certificate

EIK Environment
INSTITUTE OF KENYA

Certificate of Membership

This is to certify that

Esther Njeri Kaguima

Member No: EIK/1/1943

Is a Practising Lead Member of Environment Institute of Kenya An Institute Founded in the year 2014 to extend and disseminate Environmental knowledge and promote the practical application for public good.

Herbert Tawa Mwashiro
Chairman

29/01/2020
Date

This Certificate remains the property of Environment Institute of Kenya. Membership is subject to annual renewal

Appendix Ten : NEMA Lead Expert Practising License

FORM 7 (r.15(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/11069

Application Reference No: NEMA/EIA/EL/14847

M/S **Esther Njeri Kaguima**
(individual or firm) of address

P.O Box 21-20104, Nakuru

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **2529**

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

Issued Date: 7/12/2019 Expiry Date: 12/31/2019

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified