COUNTY GOVERNMENT OF KIAMBU

ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR PROPOSED UPGRADING OF MUMBI STAGE, LANG'ATA HOSPITAL, MWIKI BRIDGE ROAD TO BITUMINOUS STANDARDS AND STREET LIGHTING

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

MAY 2020

DECLARATION

This Environmental Impact Assessment project report has been prepared by registered and licensed EIA /EA lead and Associate Experts in accordance with the Environmental Management and Coordination Act (EMCA), 1999 (amended 2015) and the Environmental (Impact Assessment) and Audit regulations 2003 which requires that every development project must have an EIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

EIA TEAM

Name	Designation	Reg.No
Esther N. Kaguima **Date……** **Signature……..**	**Lead Expert**	**2529**
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PROPONENT

On Behalf Of **COUNTY GOVERNMENT OF KIAMBU**:

CHIEF OFFICER **MUNICIPAL ADMINISTRATION AND URBAN DEVELOPMENT**

P.O. BOX 2344- 00900, Kiambu

Name: **John M Mutie**

Authorized Signature……..……

Date/ Official stamp: ……..

Summary of Particulars for the Proposed Upgrading of mumbi stage Langata hospital, mwiki bridge road to bituminous standards and street lighting in Kiambu County

- Fact Sheet

Name of Proponent	**Kiambu countygovernment**
Assignment - Name of project	Environmental Impact Assessment (ESIA) for Proposed project
Objectives of Project	Todesignenvironmental managementplanand upgradingofMumbistage,Langatahospital, Mwikibridgeroadtobituminousstandardsand streetlighting
ScopeofProject	Improvingtheroadtobituminousstandardsand streetlights.
Location of Project	Ruiru municipality Kiambu County.
Land Registration	n/a
Current Site Land Uses	road
Technical Design	Department of Lands, Housing, Physical Planning, Municipal Administration and Urban Development
Implementing Agency	County Government of Kiambu
Funding	Government of Kenya- World Bank
Project duration	12 months

EXECUTIVE SUMMARY

The County Government of Kiambu intend to upgrade and streetlight Mumbi stage, Langata hospital to Mwiki bridge road in Kiuu ward road to bituminous standards in Ruiru municipality, Kiambu County.
The project activities will involve upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards and street lighting since the road is currently gravel state. This EIA project was conducted through consultation with the various stakeholders including; Kenya urban support program coordinators, government representatives and local community leaders in Kiuu ward, Ruiru municipality. Several methods were employed to collect baseline data. This involved participatory approaches, a walk through the proposed project site and making observations on the natural environment. Desktop study was also conducted on available relevant documents regarding the proposed project development. A public consultation meeting was held on 16th October 2019 between the EIA team, community leaders, and government officials. The meeting was held to gather more information concerning stakeholders' views on the impacts of the proposed project. An environmental management plan (EMP) was developed in a participatory manner that ensured identified potential negative impacts were mitigated and responsible persons identified including the frequency of monitoring and the approximate costs to be incurred.

The main activity will be upgrading the road to bituminous standards, street lighting, storm water drains and a footpath for pedestrians. A detailed environmental management plan has also been developed to help the proponent take care of negative impacts that may arise from the project. The study findings show that there are potential negative environmental impacts that vary both in magnitude and scope.

The project will be undertaken within an existing public road.

Study Methodology

In conformity with the Environmental Management and Coordination Act (EMCA) of 1999 (revised 2018), such a project should be subjected to EIA before commencement. The purpose of this EIA was to investigate potential impacts of the proposed project on the bio-physical, social and natural environment in Project influence area. The EIA has proposed mitigation measures, including an Environmental Management Plan (EMP). The overall objectives of the project are to:

- Examine the impacts of the proposed project on the physical, biological, socio-economic and socio-cultural environment;
- Propose mitigation measures for the identified potential and likely impacts; and
- Develop an Environmental Management and Monitoring Plan *(EMP)* to guide the project team during the implementation of the mitigation measures.

The study approach involved undertaking data collection through field surveys and literature review. The data collected were evaluated using the three main EIA methodologies namely scoping, screening and detailed analysis.

Project screening was the first step undertaken during collection of basic data on the project and evaluating them against the requirements of the EMCA and the Environmental (Impact assessment and Audit) Regulations of 2009 on the category of study to be undertaken. After the screening exercise the EIA team concluded that the project is to undergo an EIA as per the requirement of the second schedule of EMCA, 2015 and produce report as per section 7 of the EIA Regulations.

The project scoping stage which followed the screening stage was applied to narrow down the project issues to those requiring detail analyses.

The main objectives of scoping process are to:

a) Define the scope of work or breadth of the project for EIA,

b) Identify issues of concern to the key stakeholders/interested and affected parties,

c) Provide guidance on the nature of impact likely to occur,

d) Determine the primary impact for the EIA to focus on,

e) Identify any major environmental problems at an early stage to allow for design changes,

f) Determine skills and experience required in the multi-disciplinary EIA team,

g) Identify and analyse any feasible alternative project locations and designs,

h) Design the public participation or consultation plan,

i) Provide some indication of mitigation measures required.

The EIA employed several methods and techniques in data collections including:

a) Discussions with project proponent staff;

b) Consultations and public Participation (CPP);

c) Observations and Photography

d) Literature review.

Data collection instruments used in the EIA included a checklist (for preliminary survey); Observations guide for site inspection; and Interview guides. Topics covered during the EIA of the proposed project focused on but not limited to the following:

i. Public safety
ii. Waste management
iii. Project characteristics
iv. Physical landscape
v. Soil-water run-off characteristics
vi. Land use activities in the location
vii. Biodiversity and environmental issues
viii. Social and cultural issues
ix. Conservation
x. Analysis of the discussions

Public consultation

Stakeholder participation is a mandatory requirement in the EIA process in Kenya therefore consultation and participation was incorporated into the project. The anticipated negative and positive impacts were discussed with the local community in the project area. The approach used comprised interviews, discussion and observations during the site visits that were during the month of October 2019. The outcome was that the stakeholders showed overwhelming support for the proposed project and that the project, when complete, will result in positive impacts in the area.

Summary of the Assessment of impacts

The positive impacts of the proposed Upgrading and street lighting of mumbi stage, Lang'ata hospital, to Mwiki bridge Road in Kiuu ward, to bituminous standards will be as follows:

a) Creation of direct and indirect employment opportunities especially during the implementation stage;
b) It will enhance safety and security in the project site
c) It will attract more entrepreneurs hence improved economy

Recommendations from the key stakeholders

- The project should go on;
- All relevant stakeholders should be involved all through and where the skills needed and are locally available, locals should be accorded first priority.
- Continuous consultative meetings during the project implementation

- Suggestion box to allow the public to comment on the projectSummary of the Assessment of impacts

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Table 2: **List of the potential environmental impacts during implementationoftheprojectandincludesabriefdescriptionof recommended mitigationmeasures.**

IdentifiedPotentialEnvironmentalandsocialImpactandMitigation Measures

Phase	Environmental andsocialImpact	Mitigation measures
constructio n phase	Gender Issues	Most beneficiaries could be men therefore awareness creation is neededtoimprovetheiraccessand controlofresourcesarisingfrom project;
	Public health	Putinplaceinformation,education and communication programmes about safeuse IncludeHIV/AIDSawarenessand controlcampaignsintheproject.
	Healthandsafety	Warning signs of existence of ongoing construction. UseofPPEstoallworkersshould be enhanced. Hoarding areas with deep excavation
	Drainage	Repair any damaged drainage systems Ensureproperbackfilling,levelling and compaction Clearlymarkeddrainageareas
	Conflict due to competition of employment	Prioritizesjobopportunitiesforthe local community first the

Phase	Environmental andsocialImpact	Mitigationmeasures
	opportunitieswith localpopulation.	compensate the deficit with the influx population • Encourage inclusion ofall gendersintheprojectconstruction
	Security and Crime, Child protection, Gender equity and Sexual harassment	• Properdesignincorporating lighting to enhance security at the site • Liaisewiththeadministrationunits (County and sub county governments, Police, DO, chiefs, etc.) to provide regular surveillance and patrols to protect workers • Thecontractortohaveandenforce 'Child Protection Code of Conduct' • Ensurenochildrenareemployed onsiteinaccordancewithnational labourlaws • Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police.
	Excavationofthe soil fromthe gravel road	• Allexcavatedsoilwillbetakenoff sitetoaholingareauntilwhenit willbeneededbackifitssuitable • Allaffectedpeoplealongtheroad corridorwillbeinvolvedin continuousparticipationand

Phase	Environmental andsocialImpact	Mitigation measures
		communicationwithtecontractor so that they are not affected
	Cleared vegetation	All flowers and vegetation that will be uprooted during implementation will be replanted orreplacedwithanalternative plant after project completion to maintaintheplantandanimal ecosystem as it were before the project commenced
	Noise and excessive vibration	Allmachineryusedonsitewillbe used during the allowed operational hours between 8:00am – 6:00pm within the allowed decibels levels of noise Heavymachinerywillbeinstalled withsilencerstominimizethe noise

Conclusion

Having considered the data collected, analyzed and collated information available, it is the experts considered opinion that:

- The project **DOES NOT** pose any serious environmental concern, other than those of minor scale that accompany most development activities.
- The positive impacts of the project far **OUTWEIGH** the negative ones, which will be adequately contained by following the prescribed ESMP

Recommendation

The project is important for the improvement of transport and security in the area and to ensure sustainability, the proponent is advised to balance environmental, social considerations and project benefits through implementation of the proposed mitigation measures. It is recommended that preventive measures be given first consideration in order to reduce costs of undertaking the mitigation measures and at the same time reduce the overall project impacts.

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LIST OFACRONYMS

CBD	Convention on Biological Diversity
EIA	Environmental ImpactAssessment
ESIA	EnvironmentalandSocialImpactAssessment
EMP	Environmental Management Plan
ER	Environmental Report
EMS	Environmental Management System
FS	Feasibility Study
GoK	Government ofKenya
KISIP	KenyaInformalSettlementsImprovementProject
NEAP	National Environmental Action Plan
NEMA	NationalEnvironmentManagementAuthority
NGO	Non-Governmental Organization
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
TOR	Terms of Reference
WHO	World HealthOrganization
WB	World Bank
WRA	Water Resources Authority
KCG	Kiambu CountyGovernment
MAUD	Municipal Administration and Urban Development

CHAPTER ONE;

1.0 BACKGROUND OF THE PROJECT

Ruiru municipality has proposed to carry out Upgrading and street lighting of mumbi stage, Lang'ata hospital, to Mwiki bridge Road in Kiuu ward, to bituminous standards at Ruiru in Kiambu County. The project activity mainly involves upgrading the road to bituminous standards and street lighting of mumbi stage to mwiki bridge

Reasons for upgrading the road and street lighting of mumbi stage, Langata hospital, mwiki bridge road to bituminous standards;

a) To enhance safety and security in the project site

b) To improve road transport in the area since the road is gravel

c) To improve faster access to Langata hospital for cars and pedestrians

d) To provide storm water drain to allow proper flow of water away from the road.

e) To create a pathway for pedestrians to comfortably use the road with other road users I.e bikes and cars.

1.1 Project Scope

The environmental impact assessment covered the proposed project site it focused on the following;

- Describing nature of the project, location and rationale
- Describing the pertinent policies, legislation regulation
- Identification of both positive and negative environmental impacts of the project
- Propose environmental mitigation plan to minimize the negative impacts
- Conduct a public participation exercise during the process
- Develop Environmental Management Plan (EMP)

1.2 Terms of Reference for EIA

The EIA was undertaken in accordance with the requirements of the Government of Kenya and World Bank in conformity with the National Environment Management Authority (NEMA) guidelines following the requirements of the Environmental Management and Coordination Act (EMCA), 1999 *(revised 2018)* which makes it mandatory for such projects to undergo EIA process.

- Formulation of environmental monitoring program for implementation phase.
- Estimation of cost for implementation of Environmental Management Plan.

- Assessment of the existing status of physio-chemical, ecological and socio-economic aspects of environment.
- Identification of potential impacts on various environmental components due to activities envisaged during implementation of the proposed project.
- Prediction of significant impacts on various aspects of environment.
- Delineation of Environmental Management Plan (EMP) outlining measures to minimize adverse impacts during implementation of the proposed project.

1.3 Consultation and Public Participation (CPP)

Consultation and Public Participation was done within the Project Influence Area (PIA). This promotes open governance whereby everybody is granted equal opportunity to voice their opinion/views about the proposed project: the opinions/views given assist in planning of the proposed project. This promotes awareness and provides an opportunity for better planning of the proposed project whereby opinions from various stakeholders are considered.

Kenya has developed EIA Regulations, which must be adhered to by proponents of all development projects. These regulations have been clearly spelt out in the Environmental Management and Coordination Act EMCA, 1999 *(revised 2018)* and the EIA and Environmental Audit (EA) Regulations of 2009. These documents provide guidance on environmental and social issues/factors that must be considered during an EIA and preparation of the project report. The study found out the proposed project lies close to highly populated area i.e. Ruiru area Estate and therefore consultation was done with various stakeholders within the namely: the project contractor, community leaders, World Bank representatives and the consulting engineers.

CHAPTERTWO;EIABACKGROUND,OBJECTIVES,TERMS OFREFERENCEANDCONSULTANCY PURPOSE

2.0 EIA Background

EnvironmentalImpactAssessment(EIA)isadecisionmakingsupport instrumentwhichaimsatidentifying, predicting,evaluatingandmitigating thebiophysical,socialandotherrelevantenvironmentaleffectsof developmentproposalspriortocommencementofaproject.Itaimsto:

- Ensure that environmental considerations are explicitly addressed and incorporated into the development decision-making process.
- Anticipate and minimize or offset the adverse significant biophysical, social and other relevant effects of development proposals;
- Protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and promote development that is sustainable, optimizing resource use and management opportunities.

Environmental Management and Coordination Act 1999(revised 2018) provides for legal and institutional framework for environmental management in Kenya. Under this Act the National Environmental Management Authority (NEMA) and mandated to oversee and coordinate environmental management in Kenya. Among its duties NEMA reviews all environmental impact assessment reports of projects listed under the second scheduleoftheActandissuesanEIAlicenseapprovingtheprojects.

Section 58 (1) of EMCA 1999 states "*Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall before for financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by 0.1% of total project cost as a fee for the EIA license".*

In compliance the project proponent, the has engaged a team of experts to carry out an Environmental Impact Assessment Project report out in accordance with NEMA's Environmental Impact / Audit Regulations of 2009 and submit project report to NEMA for approval and licensing. The report should also be in consonance with Environmental Impact Assessment Guidelines of the World Bank, European Commission and United Nations Environment Program. Also reference will be made to the Kenya's EnvironmentalManagementandCoordinationAct(EMCA)of2015.

This Environmental Impact Assessment (EIA) was primarily aimed at establishing the impacts of backfilling the borrow pit and Project's environmental management plan on the environment and bio-

diversity, sustainability of resource utilization, resource use conflicts arising from human interactions; and the socio-economic, socio-cultural and socio- political well-being of the beneficiaries, to meet requirements.

2.1 Objectives of EIA project report

The specific objectives of the EIA project were to:

a) To review existing policy, legal and institutional framework on environmental management on proposed projects

b) To collect and collate baseline information on construction of the project

c) To conduct interviews through the community participatory process.

d) To identify and assess positive and negative impacts of the project

e) To identify and analyse project alternatives.

f) To develop mitigation measures and cost estimates from all the negative impacts of project.To design an Environmental Management Plan (including cost estimates) and a monitoring framework for the environmental impacts of the project.

2.2 Terms of Reference of EIA Study

The EIA was undertaken in accordance with the requirements of the Government of Kenya in conformity with the National Environment Management Authority (NEMA) guidelines following the requirements of the Environmental Management and Coordination Act (EMCA), 1999 (revised 2015) which makes it mandatory for such projects to undergo EIA process.

- The terms of reference to be observed were in conformity with the environmental (impact and audit) regulations Legal Notice 101 (2009)
- To collect baseline socio economic data of the project area and potential impact expected from construction phase of the project.
- To review existing policy, legal and institutional framework and environmental management as relates to the project
- To identify and contact stakeholders, plan and undertake participatory stakeholders and public consultation as may be appropriate.
- To identify and analyze project alternatives in terms of location of site, technology and materials to be used among other variables.To develop mitigation measures and possibly cost estimates for all the identified negative impacts of the project.

2.3 Purpose of Environmental Impact Assessment

In the National Environment Action Plan (GoK, 1994), the government proposed to "integrate environmental conservation in economic strategies to provide sustainable development for posterity. This includes, integration of environmental considerations in development planning at all levels; promotion of environmentally sound use of both renewable and non- renewable resources in the process of national development; establishment of an institutional framework for coordinating, monitoring, and enforcing environmental regulations and standards; and finally providing human and financial resources to support the environment and develop a co- coordinating agency and an EIA institution".

Environmental Impact Assessment therefore is a process whereby all activities of a proposed project are critically examined to ascertain negative and positive impacts of that project resulting from all its activities and to develop mitigation measures or alternatives that minimize adverse impacts and maximize on the benefits.

The goal of this EIA project was to guide the proponent in ensuring that the development options adhere to the requirements of NEMA and related laws and regulations in Kenya. More importantly, the aim of the study was to ensure that any adverse environmental consequences of the project are established and their scope and effect to the environment identified and analyzed. Mitigation measures to minimize the negative impacts were also identified and documented during the study

CHAPTER THREE; BASELINE CONDITIONS

3.0 BASE LINEINFORMATION

3.1 Administrative Location

Kiambu County is a county in the former Central Province of Kenya. Its capital is Kiambu and its largest town is Thika. The county is adjacent to the northern border of Nairobi County and has a population of 2,400,000 million people The county is predominantly rural, but its urban population is increasing as Nairobi is growing rapidly. Kikuyu are the dominant tribe in the county.

Kiambu County is located in central Kenya. It covers an area of 2,543 sq km with average temperatures of 18.7°C and 989mm of rainfall per annum. The county has 6 (Municipalities; Kiambu, Limuru, Thika, Ruiru,KikuyuandKaruri).Kiambutownistheadministrativecapital.

Economy KiambuCounty

With rich highland soils coupled with very favorable climatic conditions, agriculture plays a very important role in the county's economy. However, with is proximity to Nairobi and limited land resources, the services sector is slowly replacing agriculture as a major economic activity. The county is undergoing rapid urbanization as a result.

With its high population, the county has is a good source of labor for industrial production and agricultural value addition or the services sector. The county also has good tourist attractions and forest resources conduciveforeco-tourism,campingandexpeditionsites.

Figure 1: Map of Kiambu County

Ruiru is one of twelve constituencies in Kiambu County. It lies within the Nairobi metropolis and Juja town is approximately 33 km from Nairobi city Centre. There are 8 wards within ruiru municipality, namely; biashara ward, gitothua ward, gatong'ora, kiuu, mwiki, mwihoko, kahawa sukari and kahawa wendani It has a large network of roads with the main Thika super highway road cutting right across the municipality. Ruiru municipality through the world bank funding under Kenya urban support prgramme intend to upgrade mumbi stage, Langata hospital tomwiki bridge which is located in kiuu ward.

3.2 Climatic conditions

Ruiru's climate is mild, and generally warm and temperate. The summers here have a good deal of rainfall, while the winters have very little. The climate here is classified as Cwb by the Köppen-Geiger system. The temperature here averages 19.7 °C. The average annual rainfall is 769 mm.

3.3 Soils and Geology of the Area

The principal rocks distinguished in this area are basalts, basaltic agglomerates (autobreccias), trachytes, phonolites, pyroclastic rocks and lacustrine deposits. Soils resulting from tertiary volcanic rocks are dark reddish brown, well drained. Soils on volcanic footbridges are of moderate to high fertility and are found in most parts of the sub-county. They are well drained, red to dark brown friable clays.

The soils in kiuu ward specifically mumbi stage road all the way to mwiki bridge where the project is going to take place is dark brown friable clays, they are poor absorbers of water. When clay particles come into contact with water they swell and close all the pores in the soil stopping any further percolation of water into under ground aquifers. That explains why areas with predominantly clay soil are prone of flooding.

3.4 Flora and Fauna

The project area has both exotic and indigenous vegetation. Some forests however have been cleared for firewood, agriculture and settlement posing a threat to water catchments in the area. Trees are used mainly for shade, boundary demarcation, fencing, and production of fruits, timber, and fuel wood and for ornamental purposes. Common trees in the area include: Eucalyptus spp, Markhamialutea, Cupressuslusitanica, Bischoviajavonica, Croton megalocarpus and Pinup sp. Common fruit trees are Perseaamericana, Syzygiumguminii and Eryobotria japonica.Shrubs include lantana camara, Tethoniadiversifolia and Solanumincanum. Animals in the sub-county are mainly domestic animals such as cattle, goats, pigs and poultry. There are no animals or resources of wildlife and tourism importance. Kiuu ward is mainly covered by small shrubs and flowers because the project area is heavily built by residential apartments.

3.5 Land use

Current land use is a mostly residential housing/commercial units with minor arable farming. The proposed project will be implemented on a public road reserve.

3.6 Structures in the site area

Currently the site is a rough road. The neighborhood comprises mainly of residential/commercial and small farming plots.

Plate showing commercial commercial and residential along mumbi stage road

Plate 3 showing mumbi stage in kiuu war

CHAPTER FOUR; POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.0 General Overview

Kenya has a policy, legal and administrative framework for guiding it in environmental management. Under the framework, the National Environment Management Authority (NEMA) is responsible for ensuring that EIAs are carried out for new projects and EAs on existing facilities as per the provisions of EMCA, 1999 *(revised 2015).* EAs are carried out in order to identify positive and negative impacts associated with ongoing projects with a view to taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EAs are contained in Sections 58 to 67 of EMCA of 2015.

EIA is a tool for environmental conservation and has been identified as a key requirement for new projects to ensure sustainable operations with respect to environmental resources and socio-economic activities about the facilities. The government has established regulations to facilitate the process on EIAs and EAs. The regulations are contained in the Kenya Gazette Supplement No. 56, legislative supplement No. 31, Legal Notice No. 101 of 13th June 2009.

In order to ensure that the activities undertaken during construction of the project conform to existing policies and laws, several key statutes and principles geared towards ensuring proper environmental and natural resources management were examined. This enabled the identification of specific provisions of various relevant laws that need to be adhered to. These included the following Environmental Management Principles and Guidelines

Sustainability

Principle of Intergenerational Equity

Principle of Prevention

Precautionary Principle

Polluter Pays Principle

Principle of Public Participation

The Cultural and Social Principle

Principle of International Co-Operation

The Kenya National Environmental Action Plan (NEAP, 1994) Policy Framework

Environmental Policy Framework

National Water Policy, 2000

Water Catchment Management Policies

The National Poverty Eradication Plan (NPEP),1999

Legal Framework

Environmental Management and Coordination Act No. 8 of1999.

Physical Planning Act, 1999.

Environmental Impact Assessment and Audit Regulations of 2009.

Local Authority Act (Cap 265), 1998.

EMCA (Waste Management) Regulations, 2006 Legal NoticeNo.12.

The Public Health Act, Cap242.

Occupational Safety and Health Act (OSHA) 2007.

Noise and Excessive Vibrations Pollution Control Regulations 2009.

Water Act of 2002

The Constitution of Kenya

Kenya road policies

Mining act (Cap306)

4.1 Review of Relevant Policy Provisions

4.1.1 Requirement to carry out an EIA

This EIA is the basis for the environmental assessment of all programs, activities and projects to be carried out that is widely out of context with surrounding. It is available in World Bank Info Shop. The EIA project report deals with specific construction activities to be implemented within Ruiru area area. Note that the screening and scoping exercise classifies the proposed project in category B and an Environmental and Social Management Plan has been prepared in compliance with OP 4.01. This means that projects which are likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented, and which have been classified as Category A, may not be eligible for financing.

4.1.2 WB Operational Policies

OP/BP 4.01 (Environmental Assessment)

The World Bank has well-established environmental assessment procedures, which apply to its lending activities and to the projects undertaken by borrowing countries, in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment report which:

- Identifies and assesses potential risks and benefits based on proposed activities, relevant site features, consideration of natural/human environment, social and trans-boundary issues
- Compares environmental pros and cons of feasible alternatives
- Recommends measures to eliminate, offset, or reduce adverse environmental impacts to acceptable levels (sitting, design, technology offsets)
- Proposes monitoring indicators to implement mitigation measures
- Describes institutional framework for environmental management and proposes relevant capacity building needs.

The environmental assessment evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The assessment considers: the natural environment (air, water, and land); human health and safety) social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans-boundary and global environmental aspects. Preventive measures are favored over mitigation or compensatory measures, whenever feasible. This approach is universally applied in many institutional projects.

The World Bank considers Environmental Impact Assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank include regional or sectoral environmental assessment, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF).

The World Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment. Proposed projects are classified into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the Proponent is responsible for preparing an EIA report.

Category B: The proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A

projects. Like Category A, the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

Category C: The proposed project is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C project. Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental associated with Bank lending operations. The purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted. The magnitude of the proposed project falls under category B.OP/BP 4.04 (Natural Habitats)

The policy is designed to promote environmentally sustainable development by supporting the protection, conservation, maintenance and rehabilitation of natural habitats and their functions. The policy seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products, which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present). This project has no notable interaction with any known natural habitat apart from limited localized riverine aquatic animals.

OP/BP 4.11 (Physical Cultural Resources)

This policy is meant to assist in preserving physical cultural resources including the movable or immovable (above or below ground, or under water) objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance including sites and unique natural values. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices.

The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources from development projects.

- Identify Category A (any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes) and/or B (any project located in, or in the vicinity of, a physical cultural resources site) projects that fall under this OP policy

- Identify the likely physical cultural resources issues, if any, to be taken into account by the EIA and develop the ToRs for the EIA.

- If the project is likely to have adverse impacts on physical cultural resources, identify appropriate measures for avoiding or mitigating these impacts as part of the EIA process. These measures may range from full site protection to selective mitigation, including salvage and documentation, in cases where a portion or all of the physical cultural resources may be lost.

For purposes of this project there will be no development of a physical cultural resources management plan that includes measures for avoiding or mitigating any adverse impacts on physical cultural resources and provisions for managing chance find.

International Conventions

Relevant international agreements, treaties and conventions that have a social and/or environmental aspect to which Kenya is a signatory/acceded or ratified to are detailed in Table 4.1 below.

Table 4.1: International Conventions

Convention	**Date Ratified/Accededto**
African Convention for the Conservation of Nature and Natural Resources(2003)	Ratified (12 May 1969)
Convention on Biological Diversity (1992)	Ratified (26 July 1994)
UNESCO Convention for the Protection of the World Cultural and Natural Heritage (1972)	**Acceded to (1 May 1964)**

4.1.3 International Standards

Like in any project financed by, or with financial participation of, the World Bank, the environmental and social safeguards as defined in the Bank's Operational Procedures (OPs) have to be respected. The following Tableliststhese OPsandidentifiestheirapplicabilityinthiscase.

Table 4.1: Applicability of WB OPs

OP No.	Title	Dated	Comments
4.01	Environmental Assessment	Jan. 1999	**Applicable.** The project was identified as a Type B project.
4.11	Physical Cultural Resources	Jan. 2006	**Not applicable**. Site visits and inventories have not indicated the presence of any cultural (historical, archaeological) sites in the proposed project area.
4.12	Involuntary Resettlement	Dec. 2001	**Not applicable**.
4.36	Forests	Nov. 2002	**Not applicable**. The proposed project is not located in forested areas, and no forests are directly or indirectly affected by the project.

4.1.4 Kenya Vision 2030

One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives is necessary.

Sustainable land use: The current land use practices in the country are incongruent with the ecological zones.

4.1.5 The Land Policy

To restore the environmental integrity the government shall introduce incentives and encourage use of technology and scientific methods for soil conservation and maintain beaches at high and low water mars and put in place measures to control beach erosion. Fragile ecosystems shall be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. Zoning of catchment areas to protect them from further degradation and establishing participatory mechanisms for sustainable management of fragile ecosystems will also be done. It will also develop procedures for co- management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly all the

national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems.

Conservation and sustainable management of land based natural resources. The sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land based natural resources, all policies ,regulations and laws dealing with these resources shall be harmonized with the framework established by the Environmental Management and Coordination Act(EMCA),2015Constitution Provisions

According to the Constitution of Kenya (2010), with regard to the environment, Section 42 of the Constitution states as follows:

Every person has the right to a clean and healthy environment, which includes the right:

(a) To 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.

In Sections 69 and 70, the Constitution has inter alia identified National Obligations in respect of the environment and Enforcement of Environmental Rights respectively as follows: Section 69

1) **The State shall—**

(a) ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

(b) protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;

(c) encourage public participation in the management, protection and conservation of the environment;

(d) protect genetic resources and biological diversity;

(e) establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

(f) eliminate processes and activities that are likely to endanger the environment; and

2) Utilize the environment and natural resources for the benefit of the people of Kenya. Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

4.2 National Legal Framework

Kenya has approximately 77 statutes that relate to environmental concerns. Most of these statutes are sector specific, covering issues such as public health; Soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws, and also through permits and licenses. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998, it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance.

The key national laws that govern the management of environmental resources in the country have been briefly discussed below.

4.3 The Environmental Management and Co-ordination Act, 1999 (revised 2015)

The Environmental Management and Co-ordination Act (EMCA) of 1999 provides for the establishment of a National Environment Management Authority (NEMA), as the supreme regulatory and advisory body on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programme, plans and project Under Part II (General Principles), sub section (1), the Act entitles every person in Kenya to a clean and healthy environment, but also confers responsibility on them to safeguard and enhance the environment. Some other key principles that should guide environmental management and decision-making include public participation; the polluter pays principle and the precautionary principle.

Section 58 of EMCA makes it mandatory for any proponent undertaking any development activity in the second schedule of the Act to carry out and Environmental Impact Assessment study and gets it approved by NEMA before being licensed to commence implementation. The Act also states that EIA shall be conducted in accordance with the environmental impact regulations, guidelines and procedures issued under the Act.

4.3.1 Environment (Impact Assessment and Audit) Regulations, 2009

The regulations provide for the detailed procedure of carrying the EIA and audit process in Kenya. They also provide explicitly for public consultation and mechanisms for doing it. The regulations also indicate "Issues to be Considered in Environmental Impact Assessment' in the second schedule of the regulations and "General Guidelines for Carrying out an Environmental Impact Assessment Study" in the third schedule to the regulations.

4.3.2 The Waste Management Regulations, 2006 (Legal Notice 121)

The Waste Management Regulations (2006) are contained in the Kenya Gazette Supplement No 69, Legal Notice No 121. Of immediate relevance to proposed development for the purposes of this project report is Part II, Sections 4(1-2), 5 and 6. Section 4 (1) states that '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'. Sections 4 (2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority. Section 5 provides methods of cleaner production (to minimize waste generation) which includes the improvement of production processes through: conserving raw materials and energy.

4.3.3 Noise and Excessive Vibration Pollution Control Regulations, 2009

Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered;

(i) Time of the day;

(ii) Proximity to residential area;

(iii) Whether the noise is recurrent, intermittent or constant;

(iv) The level and intensity of the noise;

(v) Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,

(vi) Whether the noise can be controlled without much effort or expense to the person making the noise.

Part II Section 4 states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

Part III, Section 11(1) states that any person wishing to (a) operate or repair any machinery, motor vehicle, construction equipment or othe equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or (b) engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Section 13(1) states that except for the purposes specified in sub- Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of a domestic nature and /or public utility.

Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying sites, and states that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding (a) machinery that may be used, and (b) the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

It further states that the relevant lead agency shall ensure that mines and quarries where explosives and machinery used are located in designated areas and not less than two kilometers away from human settlements and any person carrying out construction, demolition, mining or quarrying work shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30m from any moving source.

4.4 The Water Act,2016

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resource, and discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999 (revised 2018).

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water which he is authorized to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Board.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including the payment rates for the discharge as may be provided under section 77 of the same Act.

4.5 The County Government Act 2012

AN ACT of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments powers, functions and responsibilities to deliver services and for connected purposes. This Act provides for the election, functioning, control of, tasks and powers, etc. of county governments as provided for under Article 176 of the Constitution. It also provides for a wide variety of matters relating to public administration at local level such as civic participation, access to information, public communication and the protection of minorities.

A county government shall be responsible for any function assigned to it under the Constitution or by an Act of Parliament. A county government shall be responsible for planning and development of its county in accordance with the principles and objectives set out in Part XI of this Act. Objectives include: facilitation of the development of a well- balanced system of settlements and ensuring productive use of scarce land, water and other resources for economic, social, ecological and other functions across a county; and the achievement and maintenance of a tree cover of at least ten per cent of the land.

4.6 The Public Health Act (Cap, 242)

Part IX section 115 of the Act states that no person/institution shall cause a nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation

of materials or refuse which in the opinion of the medical officer of health is likely to harbor rats or other vermin.

By providing for guidelines of water quality, this Act provides a useful tool for regulating activities for companies or individuals with potential to pollute the water resource base. Whereas the contractor must comply with the Act during construction, the proposed road construction work will be required to comply with the provisions of this Act during the construction phase.

4.7 The Physical Planning Act (Cap 286)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of a county, municipal or town council and for specific control of the use and development of land.Section 29 of physical Planning Act gives county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999(revised 2018).

Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions. The Land Planning Act, Cap 303

Section 9 of the subsidiary legislation (The development and use of land regulations 1961) requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce conflict with other interests such as settlement and other social and economic activities. In this case there are no people affected by the project.

4.8 The Penal Code (Cap 63)

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

4.9 The Occupational Health and Safety Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces and provides for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. The Act has the following functions among others:

(i) Secures safety and health for people legally in all workplaces,

(ii) Prevents employment of children in workplaces where their safety and health is at risk.

(iii) Encourages entrepreneurs to set achievable safety targets for their enterprises.

(iv) Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing similar occurrences in future

(v) Promotes creation of a safety culture at workplaces through education and training in occupational safety and health

During implementation phase the contractor must adhere to all requirements of this Act.

CHAPTER FIVE; PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

5.0 PROJECT DESCRIPTION

5.1 General overview

The proposed project is designed to be in character of current development trend of the project area and to upgrade the road to bituminous standard.

5.2 Project Location

The proposed project site is situated within Ruiru location in Kiambu County. The project activities involves upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards and streetlighting

Proposed project site google map (source google map)

5.3 Project Description and Design

The Ministry of lands, housing and urban development intends to upgrade and street light upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards.

5.3.1 Electricity

There will be the existing main line of the KPLC, which will be used in implementation of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

5.3.2 Water Reticulation System

The water to be used at the site and its environs will be obtained from local vendors to reduce dust emission that arises from movement of trucks and vehicles within the project site.

5.4 Description of the Project's Activities

The main activity will involve proposed upgrading of mumbi stage, lang'ata hospital, mwiki bridge road to bituminous standards and street lighting There are no structures or unwanted materials to be removed since there is an existing road. Priority will be given to reuse of this equipment to other projects.

5.4.1 Site clearance

All the waste resulting from construction works is removed from the site should be used to fill up the pits or re-used in other projects. Proposed uses of the excess soil might be used to benefit social enterprises like back filling in school playing fields that do not have a flat gradient.

5.5 Environmental Monitoring and Audit

Environmental monitoring and audit are essential in a project's lifespan as they are conducted to establish if project implementation has complied with set of environmental management standards as provided for in EMCA 2018 and the EIA/EA regulations of 2009. For this project, environmental monitoring and audit will be conducted to as the contractor proceeds with construction work to ensure compliance with environmental regulations.

CHAPTERSIX;ANALYSISOFPROJECTALTERNATIVES AND PUBLIC PARTICIPATION

6.1 Introductions to project alternatives

This section analyzes the possible project alternatives from various facets applicable to the proposed project. The major aspects that will be considered for alternatives are; project site, technology scale and waste management strategies. Alternatives should be economically feasible with minimal adverse environmental impacts and time delays. Diverse alternatives to the proposed action must be included in the EIA. Alternatives may include both design and location options (Steinneman, 2000). In most cases, the EIA process often occurs too late in decision- making to consider a full range of alternatives. This can undermine EIA goals to encourage more environmentally sound and publicly acceptable solutions. Allowing new alternatives and objectives to evolve in relation to environmental conditions, public preferences and project sustainability may be a solution to most of the environmental and socio- economic problems associated with the implementation of new projects (Anderson et al. 2003).

6.1.1 Relocation OptionAlternatives

Relocating the proposed project to another site by the contractor was not a viable option. The proposed site was arrived at as a result of the need to upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards and street lighting

6.1.2 Zero or No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however lead to challenges in soil erosion, air pollution, noise emission from machines and possible accidents and crime from handling of machines and workers. The **No Project Option** is the least preferred from the socio-economic and partly environmental perspective.

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the proponent.

6.1.4 Alternatives of the Project Designs

The project design alternatives will be based on the bio-physical environmental factors and expected cropping aspects within the site. These include topography, minimum and maximum run off flows, socio-economic demands of Ruiru location, and geophysical conditions.

6.1.5 Alternatives in the Project implementation

Construction work will be realized through analysis and selection of the best option. These options include;

- Implementing the project while mitigating emerging impacts
- Implementation of the whole project within the design period The first option means designing the project and implementing in construction phase while mitigating any emerging impacts. This depends on the flow of funds as per the contractor plans.

The second option means implementation of the project within the period provided in the design. This will require continuous flow of the

contractor's funds until the all the construction work is achieved. This minimizes socio-political oppositions or issues throughout the construction period. However issues like alteration of field designs and general project overhead costs may be a problem.

6.1.6 The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option is most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, the planning and initial preparation including stockpiling of material has already been done. This option will however, involve several losses to the project proponent. The property will remain under-utilized. The No Project Option is the least preferred from the socio-economic and partly environmental since if the project is not done:

i) The economic benefits during construction i.e. provision of jobs for skilled and non-skilled workers will not be realized.
ii) There will be no generation of income to workers.
iii) The local skills would remain under-utilized.
iv) No employment opportunities will be created for Kenyans who will work in the project area.
v) Discouragement for investors within the project site.

From the analysis above, it becomes apparent that the No Project Alternative is not the appropriate alternative to the local people, Kenyans, and the Government of Kenya.

6.2 Public Participation

A socio economic survey for the proposed upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards and streetlighting was carried out to find the views from the neighboring communities and other stakeholders. The stakeholders and neighbors who filled the questionnaires were not objected to the proposed project, it attracted positive views from the stakeholders for example the project will create employment both for local people and consultants/contractors, and increased aesthetic value of land.

Public participation involved consulting and undertaking socio economic survey for the proposed construction work to find out the views from the immediate neighboring residents to the project site within Ruiru location and other stakeholders through administration of questionnaires and interviews. The questionnaires have been annexed in this report.

6.2.1 Administration of questionnaires and interviews

Structured questionnaires were administered to randomly selected individuals who were the immediate neighboring residents and business men. The respondents who filled the questionnaires were not objected to the proposed project and it attracted positive views.

6.2.2 Issues of Concern during the Public Participation

I. Project's acceptability

Most of the residence who were interviewed individually accepted the establishment of the project at the area. Some reasons that informed acceptance include provision of employment, space to expand their business, better transport among other benefits.

II. Benefits /positive impacts

- Will attract serious investors
- Improved Security in the area.
- Employment opportunities to both skilled and unskilled residents Recommendations
- Ensure workers are in full PPEs during construction work
- Ensure sprinkling water of the road due to dust emission as vehicles move to the project site
- Continuous consultations with the various stakeholders during the project cycle
- Have signages both in English and Kiswahili on ongoing construction work

CHAPTER SEVEN; POTENTIAL IMPACTS AND MITIGATION MEASURES

7.0 Identification of impacts

7.1 Existing impacts.

There are no existing environmental concerns on the site and the surrounding area. The site soil compact may be affected and air quality.

7.2 Anticipated impacts.

Impacts can either be positive or negative, direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long-term or

short-term, specific/localized or widespread and reversible or irreversible. In order to accurately identify the environmental impacts, the following environmental issues were considered pertinent and important for the coverage based on considerations of physical and natural environments, social welfare, economic and cultural environments.

a) Physical Environment

- Water quality aspects for both surface water sources like piped water, storm water, and other related aspects
- Soil conditions, soil contamination and landscape alterations/degradation associated with the proposed project.
- Drainage patterns especially in relation to storm water channeled into the drainagesystem.
- Air quality aspects especially atmospheric emissions and related discharges from operatingmachinery.
- Noise and vibration (sonic factors) where applicable

b) Social welfare, economic and cultural environment

- Notablechangesinlandusesystemsandthegeneralland utilization types where applicable.
- Implications on the employees, visitors and public health, safety and related hazards/risks such as HIV/AIDS, consumption of contaminated intravenous infusions products due to disease outbreaks, sanitary facilities, etc.
- Aesthetic, landscape alterations and changes to infrastructural facilities, among others.
- Effects associated with the construction activities and related handling and disposal of wastes generated during the operations.

7.3 Positive impacts of the proposed project (economic and social benefits)

7.3.1 Land Values

The upgrading of Mumbi stage, Langata hospital, Mwiki bridge road to bituminous standards and streetlighting the area will increase the rush for the plot by commercial developers and will consequently increase the land values in the surrounding area and in the neighbourhood due to the potential high returns after construction activity and also the increase in new comers to the area. This will lead to attraction of middle income groups with improved economic status.

7.3.2 Employment

The project provides direct and indirect job opportunities to a significant number of the skilled and unskilled population thus reducing the unemployment and in the process provide livelihood.

7.3.3 Promotion of development

Theprojecthasthepotentialtoinfluencethecommercialtrendsinthe areainvariouswaysandinthe longrunthemultiplierеffectwilllead to development and reduction of poverty. The proposed project contributes in providing enough space for expansion of business and increased land value.Increase governmentrevenue

Theproposedprojectgeneratestaxrevenueforthegovernment directlyandindirectly. The County government for example collects taxes and other user charges

7.4.4 Promotion of social cohesion

The development brings together people with diverse traditions and culture. It will lead to promotion of cultural integration.

7.5 Predictednegativeimpactsandpotentialmitigatingmeasures

There are a few negative impacts anticipated from the proposed project, these negative impacts however are not major enough to cause any major impact to the environment. They are few compared to the anticipated positive impacts. The anticipated negative impacts include:-

7.5.1 Soil erosion

Thisislossofthetop-mostsoftmaterialontheearthsurface(soil)down

- slope or transportation by the use of machinery or other equipment including animals. Soil movement is common in road work activities. The top loose material that is heaped around the project site will be used to fill pits within the project site. Uncontrolled soil erosion can have adverse effects on the local water bodies such as sedimentation, introduction of nutrients into the water bodies, de-coloration of water affecting the penetration of sunlight into the water.

In this case, soil erosion will be a major environmental impact especially when the project work starts. This may not cause any significant impact but some mitigation measures are proposed.

Potential mitigation measures

- Unnecessary movement of soil materials from the site should be avoided.
- Open areas should be paved after the completion of the project.
- Suitable and well-managed vegetation need to be introduced to generate surface covers on the open areas; to control soil movement by erosion agents i.e. water, animals and wind.
- Storm water drainage channel to discharge water to safe areas need to be provided. Such channels need to be regularly maintained and repaired to avoid point discharges in case of breakages or blockages. Point water discharges usually have pronounced effect to soil erosion.

7.5.2 Noise andvibration

Noise is unwanted sound that can affect job performance, safety, and health. Psychological effects of

noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.

Construction activity will generate noise and hence affecting the immediate environment; i.e. other operations in the nearby areas. Such noise will emanate from the machinery and equipment i.e. trucks and other vehicles accessing the site. It will also affect small animals and bird life. Hearing protection is thus essential when noise exposures cannot be controlled at their source.

Potential mitigation measures

- The activities will be limited to working hours between, 8.00 am and 5.00 pm.
- Contractor has to ensure all machinery are properly greased and oiled to reduce friction and possible noise pollution.
- During construction, the provisions of Section 101 of Environmental Management and Co-ordination (Amendment) Act, 2018 will be brought to the awareness of the residents.
- There should be no unnecessary horning of the involved machinery and vehicles.
- Workers should be provided with relevant personal protective equipment/ materials such as earmuffs and earplugs when operating noisy machinery and when in noisy environment. These provide a physical barrier that reduces inner ear noise levels and prevent hearing loss from occurring.

7.5.3 Ecological impacts: Flora and Fauna

Vegetation has a great effect on the general and localized environment and normally can modify microclimate. Usually, the flora creates a good environment for habitats thus the two may go together more often than not. In consequence, de-vegetation may result to negative effects on the fauna.

Singly, the proposed project may appear of no significant impact but the cumulative effect in concern with other current and future projects are capable of significant and serious effects including but not limited to soil erosion, decrease in air purifiers (carbon sinks) and thus contribution to global warming etc.

Potential mitigation measures

- Avoid destruction of vegetation in the project site during project Implementation.

7.5.4 Fire incidences

Fire outbreaks are common in Kenya and they usually subject detrimental effects to the environment. Fire causes both economic and social drawbacks. There are operations that are prone to such outbreaks at site e.g. electrical faults, smoking, gas leaks, carelessness, gas cylinder explosions, etc. It is therefore always important to consider the issue of fire.

Potential mitigation measures

- Recommended Fire fighting equipment such as fire extinguishers in the form of hydrants and carbon dioxide gas extinguishers to be included at strategic points within the project site. Fire breaks need also to be provided for Insecurity and theft

Security is a prerequisite for any development. During construction, security is very important in any site. This ensures that materials are in order. It also controls movement within the site especially for the intruders who might be injured by the materials and other hazardous features available within the site. The area is well covered with communication facilities, which facilitate security to large extents.

Potential mitigation measures

- Security guards must always guard the project site to the facility to keep away the intruders and to control movement within the site.

7.5.5 Risk of sickness, accidents and injuries during construction

During construction, there will be increased dust, air and noise pollution. These are considered as negative impacts. The residents and workforce involved will be more subjected to these environmental hazards. Food for the workers is usually provided by mobile vendors most of which operates without health licenses. This can compromise the health of the workers especially if such foodstuffs are prepared in unhygienic conditions.

Because of the intensive engineering and construction activities workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls of materials, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of sections among others.

Potential mitigation measures

- All workers should be provided with full protective gear. These include working boots, safety harness, overalls, helmets, goggles, masks and gloves.
- People preparing food for the workers on site should be monitored to ensure that food is hygienically prepared.
- A first aid kit should be provided within the site. This should be fully equipped at all times, site workers should also be trained on basic First Aid Skills.
- The site workers should be warned of drugs and alcohol since they might affect their concentration at work causing accidents.
- Sanitary facilities should be provided on site during construction and should be kept clean at all times.
- Injured workers must be rushed to nearby dispensaries and if need arises, referred to appropriate locations for further treatment

7.5.6 Dust and gasemissions

The construction activities on the site will result to increased dust and gas emissions. Some construction machinery and trucks generate hazardous exhaust fumes such as Carbon Oxides (CO_2), Sulphur Oxides (SO_2) and Nitrogen Oxides (NO_2). Dust, as caused by vibrations of machines and vehicle movement suspends in the air mostly during dry spells. Such dust and gases have direct negative impact to the quality of air. This is expected to be minimal and short term

Potential mitigation measures

- Provideprotectiveequipmentandmaterialsandclothingsuchas nose masks and goggles
- Regular and prompt maintenance of machinery and equipment. This will minimize production of hazardous gases.
- Areas generating dust particles should be sprinkled with water to reduce dust blowing out over the area and should be enclosed where possible to mitigate effects of wind on them.
- Workers should go for regular health check-ups to ascertain their health standards and should be encouraged to take milk regularly asthiswillcontrolthe levelofcongestionofdustintheirchests.
- The generator exhaust should be directed away from the facility t avoid smoke clouding. Oil leaksand spills Oilspillsareprevalentinconstructionsite.Thoughthismaynotbe common, it is wise to control and observe the little leaks and spills that willoccurespeciallyduringmaintenanceofthe involvedmachinery and vehicles.

Potential mitigation measures

- Allmachineryshouldbekeenlyobservednottoleakoilsonthe ground. This can be ensured through regular maintenance of the construction machines and equipment.
- Maintenance should be carried out in a well-designed and protected area and where oils/grease is completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away oils into the soil/water systems.
- All oils/grease and materials should be stored in a store which is usually located in the contractor's yard/site office.

7.6 Summary recommendations on mitigation measures

Recommendation for the preventive and mitigation of adverse impacts is presented here below:

i) Theproponentwillensurethatthedevelopmenthasbeen approvedbyrelevant regulatory departments. The proponent should therefore follow guidelines as set by the government to safeguard EMP principles during construction phase of the proposed

project.

ii) Itisimportantthatwarninginformationsignageiserected strategically at the site. This will indicate the operation hours and works are likely to start and completed. The signage will be positioned in a way that both pedestrians and motorist will see.

iii) All solid waste and debris resulting from the construction activities must be disposed off at approved dumpsites. Ensure that construction activities must be undertaken only during the day i.e. 0800 hours to 1700 hours. This will minimize anticipated disturbance and nuisance to the residents of adjacent properties and the general public.

iv) The service road to the site be well maintained even after use by the heavy machinery e.g. Lorries.

v) Traffic along nearby roads should be controlled and informed during working hours especially of heavy turning Lorries and plant in and out. This will minimize potential accidents from unsuspecting motorists.

vi) The contractor will ensure that loose soils must be covered to prevent erosion. Other soil erosion preventive measures including sprinkling water during dry season to prevent wind erosion will be implemented.

vii) Used and new oils from the motor vehicles and plant will be handled and stored properly. Due care on leakages and accidental spills will be taken.

viii) Workers should be provided with complete personal protective equipment (PPE) and safety gear. They should be provided with safety boots, overalls, gloves, helmets, ear plugs and muffs, goggles etc. A fully equipped first aid kit must be within reach.

ix) The contractor must have workman compensation cover. He or she must comply with Workman compensation Act as well as other ordinances that apply to the workers.

x) Due diligence should be exercised by the contractor or the project agent during the construction phase to safeguard and ensure that all the mitigation measures are adhered to the later

CHAPTER 8

ENVIROMENTAL MANAGEMENT PLAN (EMP)

8.0 Significance of the EMP

The environmental management plan is a logical framework which guides the proponent of a project in mitigating the negative impacts that may arise as a result of undertaking or implementing a project. It outlines the potential negative impacts, the mitigation measures to address the impacts, those that are responsible for undertaking the measures, the monitorable indicators of mitigation measure and where possible the added costs of undertaking such measures.

The EMP is a crucial tool as it gives the bench marks for the compliance of a project with the set environmental standards as spelt out by EMCA. It is also the most important part of the EIA as it guides the National Environmental Management Authority (NEMA) in decision-making as to whether a project should be permitted to proceed with or without additional modification, or if it should not be permitted at all.

It should be noted that a well formulated EMP will in the long run strengthen the project implementation as it will reduce conflict and avoid crisis. It also enhances community ownership of the project as it takes into account their views ensuring its sustainability.

The following measures will be taken up as a part of EMP.

- Control of air pollution
- Control of noise pollution
- Less disturbance on flora and fauna

8.1 Environmental Monitoring and Audit

Environmental monitoring during the implementation of the project is essential for its sustainability. The proponent should take the leading role during the construction phase of the project. The community should be fully involved and their capacity enhanced to manage environmental issues. They should be made to appreciate environmental conservation and sustainable exploitation or the natural resources for the project to survive the implementation phase and beyond. To ensure that the project has complied with environmental management standards for Kenya as set out by EMCA (1999) *(revised 2018)* and the Environmental impact assessment/audit regulation of 2009. This will ensure that the identified potential negative impacts are mitigated during the project cycle.

8.2 Institutions responsibilities

Institutional responsibility for in cooperating mitigation measures and for monitoring various environmental/socio-economic aspects during construction phase have been indicated in the Table below. During construction, the contractor will be responsible for implementing all the proposed mitigation measures. The proponent may decide to appoint a project manager amongst his technical staff, who will supervise all construction activities, in which case this person/entity will be responsible for overseeing that environmental and social management is incorporated into the project development process. However, the overall task of ensuring that

mitigation and monitoring is in fact implemented lies with the proponent.

Construction ESMP

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (KShs)
1.Minimize vegetation disturbance at and/or around construction site				
Vegetation disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor, & Project Manager	1 month	55,000
2.Reduce storm-water, runoff and soil erosion				
Increased sorm water, runoff and soil erosion	A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed	Contractor	Throughout construction period	200,100
	Open drains all interconnected will be provided on site			

3.Minimize solid waste generation and ensure efficient solid waste management during construction

Expected Negative Impacts	**Recommended Mitigation Measures**	**Responsible Party**	**Time Frame**	**Cost (KShs)**
Increased solid Generation	Use of an integrated solid waste management system i.e. through a • hierarchy of options: . Source reduction • Recycling Composting and reuse • Combustion • Sanitary land filling	Project Manager & contractor	Throughout construction period	20,000
	Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed rather than cutting them to size, or having large quantities of residual materials	Project Manager & contractor	One-off	0
	Ensure that construction materials left over at the end of construction will be Used in other projects rather than being disposed of.	Project Manager & contractor	One-off	0

	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Project Manager & contractor	Throughout construction period	0
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & contractor	One-off	15,000
Expected Negative	**Recommended Mitigation**		**Time Frame**	**Cost**
	Re-use packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site	Project Manager & contractor	Throughout construction period	0
	Dispose waste more responsibly by dumping at designated sites or landfills only	Project Manager & contractor	Throughout construction period	10,000 a month
	Waste collection bins to be provided at designated points on site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	35000
	Private waste disposal company to be contracted to transport and dispose the solid waste from site	Project Manager, & Contractor	Throughout construction period	
4.Minimize dust emissions				
	Ensure strict enforcement of on-site speed limit regulations	Project Manager, & Contractor	Throughout construction period	18000

	Avoid excavation works in extremely dry weathers or sprinkle water periodically to minimize dust	Project Manager, & Contractor	Throughout construction period	

Expected Negative Impacts	**Recommended Mitigation Measures**	**Responsible Party**	**Time Frame**	**Cost (KShs)**
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	& Project Manager Contractor	Throughout construction period	
	Personal Protective equipment to be worn	Project Manager/Contractor	Throughout construction period	
5.Minimization of exhaust emissions				

Exhaust emission	Vehicle idling time shall be minimized	Project Manager/Contractor	Throughout construction period	29000
			construction period	
	Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	& Project Manager Contractor	Throughout construction period	47,000
	Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points	& Project Manager Contractor	Throughout construction period	70,000
6.Minimization of noise and vibration				
Noise and vibration	Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	& Project Manager Contractor	Throughout construction period	5,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (KShs)
	Sensitize construction drivers to avoid gunning of vehicle engines or hooting unnecessarily	Project Manager & Contractor	Throughout construction period	5,000
	Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor	Throughout construction period	16,000
	Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels	Project Manager & Contractor	Throughout construction period	10,000

	The noisy construction works will entirely be planned to be during daytime when most of the neighbors will be at work	Project Manager & all site foremen	Throughout construction period	10,000
	Comply with the provisions of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 regarding noise limits at the workplace	Project Manager & all site foremen	Throughout construction period	0

Expected Negative Impacts	**Recommended Mitigation Measures**	**Responsible Party**	**Time Frame**	**Cost (KShs)**

7.Minimization of energy consumption				
	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts Monitor energy use during construction and set targets for reduction of energy use.	Project Manager & Contractor	Throughout construction period	12,000
		Project Manager & Contractor	Throughout construction period	5,000
8. Minimize water consumption and ensure more efficient and safe water use				
High water demand	Promote recycling and reuse of water as much as possible	Project Manager & Contractor	Throughout construction period	15,000

	Sensitize staff to conserve water by avoiding unnecessary water use	Project Manager & Contractor	Throughout construction period	2,500
9. Liquid waste management				
10. Minimize occupational health and safety risks				

	Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Contractor, Project Manager& Site Safety Officer	Continuous	14,400
Insurance	Ensure that the employees are insured as per statutory requirements (third party and workman's compensation)	Contractor	Annually	_
Safety, health and environment (SHE) policy	Develop, document and display prominently an appropriate SHE policy for construction works	Project Manager, Developer & Contractor	One-off	2,500

Machinery/equipment safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, & Contractor	One-off	_
Expected Negative Impacts	**Recommended Mitigation Measures**	**Responsible Party**	**Time Frame**	**Cost (KShs)**
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager	One-off	_

	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager/Contractor	Continuous	5,000 per training
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager/Contractor	Continuous	8,000
First Aid	Well stocked first aid box which is easily available and accessible should be provided within the workplace	Project Manager & Contractor	One-off	3,800
	Provision must be made for persons to be trained in first with a certificate issued by a recognized body	Project Manager & Contractor	One-off	10,000

9.0 CONCLUSIONS AND RECOMMENDATIONS

In conclusion the proposed project will have several positive economic impacts during its construction phase that include: creation of employment; stimulating development through revenue, taxes and income, improved aesthetic value of land. In general several environmental impacts during the construction phase will be encountered. Notable these impacts include noise pollution, exhaust and dust emission, increased water demand, energy consumption, solid waste generation and occupational health and safety impacts, among others. However these impacts are synonymous with development of the project and can adequately be mitigated through implementation of the EMP prepared. In addition the contractor and proponent are committed on implementing the measures as outlined in the EMP as well as adhering to all relevant County, National and international environmental, health and safety standards, policies and regulations that govern such developments. Several environmental concerns were also been raised by area residents, specifically those residing within the area. These impacts can be adequately mitigated through implementation of the EMP. Our conclusion is that the project is important for social and economic development and its benefits outweigh its shortcomings. We therefore recommend that the project be licensed after it has met the standards and compliance with the EMCA Act of 1999 *(revised 2018)* and EIA/EA Regulations 2003 *(Amended 2009)*.

9.1 summary recommendations

Recommendation for the preventive and mitigation of adverse impacts is presented herebelow:
The proponent will ensure that the development has been approved by relevant regulatory departments. The proponent should therefore follow guidelines as set by the government to safeguard EMP principles during the construction phase of the proposed project.

i) It is important that warning information signage is erected strategically at the site. This will indicate the operation hours and works are likely to start and completed. The signage will be positioned in a way that both pedestrians and motorist will see.

ii) All solid waste and debris resulting from the construction activities must be disposed off at approved dumpsites.

iii) Ensure that construction activities must be undertaken only during the day i.e. 0800 hours to 1700 hours. This will minimize anticipated disturbance and nuisance to the residents of adjacent properties and the general public.

iv) The service road to the site be well maintained even after use by the heavy machinery e.g. Lorries.

v) The contractor will ensure that loose soils must be covered to prevent erosion. Other soil erosion preventive measures including sprinkling water during dry season to prevent wind erosion will be implemented.

vi) Used and new oils from the motor vehicles and plant will be handled and stored properly. Due care on leakages and accidental spills will be taken.

vii) Workers should be provided with complete personal protective equipment (PPE) and safety gear. They should be provided with safety boots, overalls, gloves, helmets, earplugs and muffs, goggles etc. A fully equipped first aid kit must be within the project site.

The contractor must have workman compensation cover. He or she must comply with Workman compensation Act as well as other ordinances that apply to the workers. Where the workers have a union, the Collective Bargaining Agreement (CBA) shall be observed.

References

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i. WHO (2006): Guidelines for the Safe Use of Wastewater, World Health Organization, WHO Press. Geneva, Switzerland

Appendices

ii. Project consultation forms

iii. Project Designs

iv. Experts License

v. Bill of Quantities