REPUBLIC OF KENYA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
PROJECT REPORT FOR THE REHABILITATION AND IMPROVEMENT OF QUARRY ROADS IN MULOLONGO AREA OF THE NAIROBI METROPOLITAN REGION

March 27, 2017
Certificate of Declaration and Document Authentication

This document has been prepared in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003 of the Kenya Gazette Supplement No.56 of 13th June 2003, Legal Notice No. 101.

This report is prepared for and on behalf of:

The Proponent
The Senior Principal Superintending Engineer (Transport), Ministry of Transport, Infrastructure, Housing and Urban Development, State Department of Housing and Urban Development,
P.O. Box 30130-00100,

Nairobi - Kenya.

Title ...................................................
Name ..................................................
Signature .............................................
Date ..................................................

Lead Expert
Eng. Stephen Mwaura is a registered Lead Expert on Environmental Impact Assessment/Audit (EIA/A) by the National Environment Management Authority –NEMA (Reg. No. 7284), confirms that the contents of this report are a true representation of the Environmental & Social Impact Assessment of the proposed Rehabilitation and Improvement of Quarry Roads in Mulolongo Area of the Nairobi Metropolitan Region.
This report is issued without prejudice.

Signature: ________________________
Date ________________________
### ACRONYMS

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>CPP</td>
<td>Consultations and Public Participation</td>
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<td>DEC</td>
<td>District Environment Committee</td>
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<td>EA</td>
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<td>Environmental Impact Assessment</td>
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<td>EMCA</td>
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<td>Environmental and Social Impact Assessment</td>
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<td>ESMMP</td>
<td>Environmental &amp; Social Management and Monitoring Plan</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GIS</td>
<td>Geographic Information System</td>
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<td>GoK</td>
<td>Government of Kenya</td>
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<td>HIV/AIDS</td>
<td>Human Immuno-Virus/ Acquired Immuno-Deficiency Syndrome</td>
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<td>MoTIH&amp;UD</td>
<td>Ministry of Transport, Infrastructure, Housing &amp; Urban Development</td>
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<td>Ministry of Transport</td>
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<td>NaMSIP</td>
<td>Nairobi Metropolitan Services Improvement Project</td>
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<td>National environment and Management Authority</td>
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<td>NMT</td>
<td>Non-Motorized Transport</td>
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<td>OSHA</td>
<td>Occupational Safety &amp; Health Act</td>
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<td>SDGs</td>
<td>Sustainable development Goals</td>
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<td>SME</td>
<td>Small and Medium Enterprise</td>
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<td>SPC</td>
<td>Spatial Planning Concept Development Plan</td>
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<td>TOR</td>
<td>Terms Of Reference</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

Executive Summary

CHAPTER ONE: INTRODUCTION ................................................................. 17

1.4 Project Justification ........................................................................ 21
1.5 Scope of Works .............................................................................. 21
1.6 GPS Coordinates and Altitude ...................................................... Error! Bookmark not defined.
1.7 Location Plan ................................................................................ Error! Bookmark not defined.
1.8 Description of the Project’s Construction Activities ................... 22

1.8.1 Pre-construction investigations ................................................... 22
1.8.2 Demolition works ....................................................................... 22
1.8.3 Sourcing and transportation of construction materials ............ 22
1.8.4 Storage of materials ................................................................... 22
1.8.5 Excavation and foundation works ........................................... 22
1.8.6 Construction ............................................................................... 23

1.9 Description of the Project’s Operational Activities ..................... 23
1.9.1 General repairs and maintenance ............................................. 23

1.10 Description of the Project’s decommissioning activities ........... 23
1.10.1 Demolition works ................................................................. 23
1.10.2 Site restoration ....................................................................... 23

1.11 Presentation of the Report ............................................................. 23

CHAPTER TWO: LEGAL AND INSTITUTIONAL FRAMEWORKS ........... 25

2.1 National, Legal and Institutional Framework ................................ 25
2.2 Environmental Management and Coordination Act of 2015 (Amended) ................................................................. 25
2.3 Occupational Health and Safety, 2007 ........................................ 26
2.4 Public Health Act Cap 242 ............................................................ 26
2.5 Physical Planning Act, 1999 .......................................................... 26
2.6 Land Planning Act Cap 303 ............................................................ 26
2.7 Building Code 2000

2.8 Other Relevant Laws

2.8.1 EMCA (Waste Management) Regulations, 2006

2.8.2 EMCA (Noise and Vibrations Control) Regulations, 2009

2.8.3 EMCA (Air Regulations), 2014

2.8.4 Way Leave Act Cap 292

2.8.5 Public Roads and Roads of Access Act (Cap 399)

2.8.6 Traffic Act Chapter 403

2.9 National Policy Framework

2.9.1 The National Poverty Eradication Plan (NPEP)

2.9.2 The Poverty Reduction Strategy Paper (PRSP)

2.9.3 National Environmental Action Plan (NEAP)

2.9.4 Environmental and Development Policy (Session Paper No.6 1999)

2.9.5 International Policy Framework

2.9.6 The National Environment Management Authority

2.10 World Bank Environmental and Social Safeguard Policies

3.1 Introduction

3.2 Project Location

3.2 Environmental Baseline Profile

3.2.1 Relief and physiography

3.2.2 Temperature

3.2.3 Rainfall

3.2.4 Topography

3.2.5 Hydrogeology

3.3 The Socio-Economic Profile
3.3.1 The County Perspective

3.3.2 Population

3.3.3 Education Status of the People

3.3.4 Housing

3.3.5 Energy access to Murang’a County

3.3.6 Community Organizations/Non-State Actors

3.3.7 Gender

3.3.8 Poverty

3.3.9 HIV and Aids

CHAPTER FOUR: PUBLIC PARTICIPATION AND CONSULTATION

4.1 Introduction

4.2 Approach to Public Participation and Consultations

4.3 Modalities for stakeholder consultation

4.4 CPP Methodology

4.5 Stakeholder Analysis

CHAPTER FIVE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

5.1 Introduction

5.2 Negative environmental and social impacts of construction activities

5.2.1 Extraction and use of construction materials

5.2.2 Dust emissions

5.2.3 Exhaust emissions

5.2.4 Noise and vibration

5.2.5 Risks of accidents and injuries to workers

5.2.6 Increased soil erosion

5.2.7 Solid waste generation

5.2.8 Energy consumption
5.2.9 Water use .................................................................................................................. 39

5.3 Positive environmental impacts of construction activities .................. 40

5.3.1 Creation of temporary employment opportunities ........................................ 40

5.3.2 Provision of market for supply of construction materials ....................... 40

5.3.3 Increased business opportunities ................................................................. 40

5.4 Negative environmental impacts of operational activities ...................... 41

5.4.1 Increased traffic .............................................................................................. 41

5.5 Positive environmental impacts of operational activities ....................... 41

5.5.1 Revenue to national and local governments ................................................. 41

5.5.5 Other positive impacts of operational activities ........................................... 41

5.6 Negative environmental impacts of decommissioning activities .......... 42

5.6.1 Solid waste ...................................................................................................... 42

5.6.2 Dust Emissions ............................................................................................... 42

5.6.3 Noise and vibrations ..................................................................................... 42

5.7 Positive environmental impacts of decommissioning activities ............. 42

5.7.1 Rehabilitation ............................................................................................... 42

5.7.2 Employment Opportunities ......................................................................... 42

CHAPTER SIX: ANALYSIS OF PROJECT ALTERNATIVES ......................... 43

6.1 Relocation Option ............................................................................................... 43

6.2 Zero or No Project Alternative ......................................................................... 43

6.3 Analysis of Alternative Construction Materials and Technology .......... 43

6.4 Solid waste management alternatives ............................................................ 44

CHAPTER SEVEN: IMPACTS MITIGATION AND MONITORING ............ 45

7.1 Introduction ........................................................................................................ 45

7.2 Mitigation of construction phase impacts ..................................................... 45

7.2.1 Efficient sourcing and use of raw materials ................................................. 45
7.2.2 Excavations .................................................................................................. 45
7.2.3 Minimization of run-off and soil erosion ..................................................... 45
7.2.4 Minimization of construction waste ............................................................. 46
7.2.5 Reduction of dust generation and emission .................................................. 46
7.2.6 Minimization of exhaust emissions ............................................................... 46
7.2.7 Minimization of noise and vibration ............................................................ 47
7.2.8 Reduction of risks of accidents and injuries to workers .............................. 47
7.2.9 Reduction of energy consumption ............................................................... 47
7.2.10 Minimization of water use ......................................................................... 47
7.5 Mitigation of operation phase impacts ............................................................. 48
7.5.1 Management of storm-water runoff ............................................................ 48
7.6 Mitigation of decommissioning phase impacts ............................................... 48
7.6.1 Efficient solid waste management ............................................................... 48
7.6.2 Reduction of dust concentration ................................................................ 48
7.6.3 Minimization of noise and vibration ............................................................ 48

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND
MONITORING PLAN (ESMMP) ........................................................................... 50
8.1 Significance of an ESMMP ........................................................................... 50
8.1.1 Pre-Construction & Construction Phases ESMMP ................................. 50
Table 3: The ESMMP for the Construction of Kenol Hospital Road in Murang’a County
51
8.1.2 Operational Phase ESMMP .................................................................... 60
Table 4: ESMMP for the Operational Phase of the Project ............................... 60
8.1.3 Decommissioning Phase .......................................................................... 61
8.2 Duties of the Proponent .................................................................................. 63
8.3 Duties of the Contractor ................................................................. 63

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS............... 65
EXECUTIVE SUMMARY

1. Introduction

This Environmental & Social Impact Assessment (ESIA) report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8 of 2015, and the Environmental Impact Assessment Regulations 2003. It is also in line with the World Bank Safeguards Policies, OP4.01 (Environmental Assessment). These safeguard policies are a set of instruments to ensure that the Bank supported lending operations minimize any adverse impacts on local people, their livelihoods, culture and the environment and are a mandatory mechanism for evaluating Bank financed projects during design, implementation and completion, mainly through environmental and social impact assessments. This Project Report gives the findings of the Environmental and Social Impact Assessment Study undertaken as an integral part of the design and construction process. The project highlights salient social, economic and environmental issues associated with the design, construction and operational aspects of the proposed rehabilitation and improvement of Quarry Roads in Mulolongo area of Machakos County the Nairobi Metropolitan Region.

2. Scope of the Project Report

This Environmental & Social Impact Assessment (ESIA) project report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8, 2015 and more specifically to Environmental Impact Assessment Regulations 2003. It is also in line with the World Bank Safeguard Policies and specifically OP4.01 (Environmental Assessment). These Safeguard policies are a set of instruments to ensure that the Bank supported lending operations minimize any adverse impacts on local people, their livelihoods, culture and the environment and are a mandatory mechanism for evaluating Bank financed projects during design, implementation and completion, mainly through environmental and social impact assessments.

The study process leading to this project report was further designed to address client expectations as stipulated in the Terms of Reference.

3. Objectives of the Project Report Study

The main objective of the Study was to identify environmental and social impacts associated with the proposed rehabilitation and improvement of Quarry Roads and to recommend an appropriate environmental management strategy for the project. Thus, a core outcome of the Study is an Environmental and Social Management and Monitoring Plan (ESMMP) for the project.
4. Study Approach and Methodology

The systematic investigative and reporting methodology specified for conduct of Project Report Studies (Legal Notice 101 of EMCA) was adopted in this Study. Baseline data on project design was generated through discussion with the client and review of project documentation. Opinions formed were revalidated through field work entailing site investigations and interviews with potentially affected people and secondary stakeholders.

To identify, predict, analyze and evaluate potential impacts that may emanate from the project, diverse study methods and tools including use of checklists, matrices, expert opinions and observations were employed. An Environmental and Social Management and Monitoring Plan comprising of an impact mitigation plan and modalities for monitoring and evaluation were then developed to guide environmental management during all phases of project development.

Once approved by the World Bank and NEMA, the Project Report will be disclosed as required.

5. Policy, Legal and Regulatory Framework

This Project Report has been developed to ensure that the proposed rehabilitation and improvement of Quarry Roads is in conformity with national policy aspirations towards securing sustainable development. Specifically, this report has been developed to ensure compliance with requirements of the Environmental Management and Coordination Act (EMCA) 2015-Kenya’s supreme environmental law and the National Constitution. Section 58 of EMCA requires that all proposed development in Kenya to be subjected to environmental impact assessment and to be conducted in line with the Second Schedule (of EMCA) and the Legal Notice 101 (Regulations for Environmental Assessment and Audit) of June 2003. The entire study process has been designed to conform to the regulatory framework stipulated by the National Environment Management Authority (NEMA)-the body that will review this report and make decisions on grant of an environmental license to the development.

6. Project Description

6.1 Project Location

The works are located off Mlolongo Township in Machakos County within the jurisdiction of the Nairobi Metropolitan Region. The road in this project covers approximately a length of 600m.

6.2 Topography

The project roads traverse a generally rolling terrain with gentle slopes
6.3 Climate
The project area experiences a highland equatorial type of climate with a mean annual rainfall in the region of 905mm. The main rainfall seasons are March to May and October to December. In between these periods, the area is generally dry with occasional showers. The mean annual temperature ranges from a minimum of 13°C to a maximum of 29°C. The coolest period is from June to September and the warmest period October to March.

6.4 GPS Coordinates

Latitude: Degrees: S1° 22' Decimal: -1.381366
Longitude: Degrees: E36° 37' Decimal: 36.943907

Altitude: 1596 masl

7. Project Justification
The broad aim of this sub-project is to enhance mobility, accessibility and transport within Mulolongo Township especially for the vehicles plying between Mulolongo and the quarries. This will greatly assist the utility of the quarries as well as enabling accessibility to the residential houses in the area. The sub-project is also aimed at providing and improving access and traffic flow to the quarries to boost the construction industry.

8. Scope of Works
The works shall include but not limited to :
- Site clearance and earthworks as necessary
- Excavation to remove unsuitable materials
- Filling with approved materials as specified
- Hand packing with approved stone
- Improvement/construction of drainage facilities
- Repairs and/or improvement/construction of footpaths and shoulders
- Laying of asphaltic concrete layer(s) to a consolidated thickness. The materials for construction of this project include the following:
  - Filler material
  - Aggregates for sub-base
  - Bituminous (Asphaltic) mixes of bitumen and aggregate
  - Bitumen (Asphalt)
These materials are purchased from respective dealers where filler materials and aggregates are purchased from approved quarries and borrow pits in the vicinity that are owned by private dealers or individuals. Bitumen is also purchased from bitumen dealers and purchased in drums.

- Laying and/or replacement of kerbs and channel
- Construction of the two road junctions abutting to this road
- Maintenance of the two road junctions abutting to this road
- Traffic management through the works and from the works
- Relocation and/or protection of other services including but not limited to electric poles and
- Any other works as instructed by the Engineer and/or as specified in this report

9. Scope of environmental and social assessment

This Environmental Impact Assessment (EIA) Report considers the following aspects and others that may prove of significance during the study.

- Assess the project’s impacts on ecology. This will in essence cover:-
  - Impacts due to loss of vegetation cover
  - Surface run-off water, containment and flood control.

- Assess social implications of the development within the locality, region and nationally to include: -
  - Economic implications of the development.
  - Security-threats, risk and enhancement.
  - Employment.
  - Public health implications.
  - Demand and development of infrastructure and social amenities.
  - Labour and working conditions.
  - Protection of children.
  - Worksite health and safety
  - Management of construction sites
  - Quarries and borrow pits, if applied.
  - Road safety
  - Gender equity, sexual harassment.
  - Community engagement and communication
  - Grievance redress

- Assess the impacts of development on landscape and land use such as: -
  - Determine the impact on change on civic shape, scenery, aesthetic modifications.
10. Consultations and Public Participation

Public participation and consultative forums were held at the site that included primary stakeholders, quarry users and transport drivers. These are not PAPs but are those who stand to benefit from the rehabilitation and improvement of Quarry roads. The aim of the consultative meetings was to obtain data related to the project for environmental and social analysis, both present and that are significant to the future environmental and social status of the area for management of the project both during and after implementation. The primary stakeholders responded positively to the development as long as mitigation and mending up measures are developed and implemented simultaneously with the project. The key concern that was raised during the consultations was if the project was to include the whole road to the quarries. The other stakeholders included the County Government of Machakos that was represented by its officials in CPP meetings. The record of the consultations is presented in this report in the form of questionnaires, attendance sheets and minutes of meetings held that had been administered to the stakeholders seeking their views on the project and especially as regards environmental management during project implementation.

11. Findings from the Study

(i) Potential positive impacts anticipated:

The core observation of this study is that the proposed road construction project is aimed at assisting the transportation of materials from the quarries. As such, the project in itself is already an activity in mitigation of an existing concern of poor materials transportation owing to the roughness of the existing road. Other positive implications of the project will accrue from its potential to create short-term business and employment opportunities to both professional staff and workers during the design phase while, at construction phase, traders will benefit from opportunities to supply construction material while locals will be employed in works. Upon commissioning, the project will improve the transportation condition and order in the township leading to improved transport services. It will also shorten the time of transportation and lessen the wear and tear of the transport vehicles
that currently use the rough road. Other positive impacts include storm-water drainage improvement as the project encompasses drainage works.

(ii) Potential adverse impacts:
Construction activities will introduce nuisances such as dust, noise, vibrations and fumes which however can be effectively managed through shortening the construction period. Storm water management and soil erosion may be exacerbated by the project. Social vices associated with influx of job seekers can disturb the social order and even lay the ground for escalation of HIV/AIDS cases whose impacts are likely to be prolonged in prevalence. The notable potential negative environmental impacts that were identified include among others:

i. Air pollution, mainly owing to dust during construction
ii. Trucks diversions;
iii. Material sourcing and supply for the construction and maintenance works;
iv. Any effects from uncontrolled storm-water run-off and/or soil erosion

These have to be mitigated sufficiently for the project to progress. Mitigation measures include dust abatement, traffic management, material sourcing from licensed quarries and abatement of soil erosion during project implementation in the likelihood of rains. The mitigation measures to manage these impacts are as identified in the Environmental and Social Management and Monitoring Plan (ESMMP) in the report.

(iii) Residual and cumulative impacts:
These include operations and maintenance impacts – solid waste management, maintenance of lighting and drainage – and these will be managed by the county government after project completion and commissioning and during operations.

12. The ESMMP
An ESMMP has been developed whose pursuit can greatly improve the overall net effect of the project. This report observes that the bulk of adverse impacts will manifest at the construction stage in which case, the core effort in mitigation will be concentrated in the contract for construction. This report therefore requires that the ESMMP be integrated into the design report with appropriate allocation of funds in the Bills of Quantities. The contract for construction should bear clauses binding the contractor to implement impact mitigation as part of the civil works. The NaMSIP’s PCT will mount own internal monitoring to ascertain environmental and social sensitivity at all stages of project development. During project development, a grievance redress mechanism will also be in place to handle all complaints and there will be creation of awareness and sensitization on HIV-AIDS. The EMMP budget is estimated at about Kshs. 1.5 Million. Moreover, this project’s potential benefits and positive impacts far outweigh the negative impacts.
12. Total Cost of the Project

Total cost of the project is approximated to be **Kshs. 116,628,285**.

13. Conclusions and Recommendations of this Project Report

Our conclusion is that the project is important for economic development of Mulolongo Township in Machakos County and has balanced environmental considerations and benefits. The ESIA team has given adequate measures to mitigate the negative impacts and a management plan proposed which the proponent should adhere to.

In the view of this study, the project as currently proposed is environmentally sound. An ESMMP has been outlined to guide resolution of potential adverse impacts while enhancing the positive ones. Further, all negative impacts need to be mitigated and it is recommended that this project is granted NEMA licensing and other clearances to pave way for implementation.
CHAPTER ONE: PROJECT DESCRIPTION

1.1 Project Background

1.1.1 Project Location

The works are located off Mlolongo Township in Machakos County within the jurisdiction of the Nairobi Metropolitan Region. The road in this project covers approximately a length of 600m.

1.1.2 Topography

The project roads traverse a generally rolling terrain with gentle slopes.

1.1.3 Climate

The project area experiences a highland equatorial type of climate with a mean annual rainfall in the region of 905mm. The main rainfall seasons are March to May and October to December. In between these periods, the area is generally dry with occasional showers. The mean annual temperature ranges from a minimum of 13°C to a maximum of 29°C. The coolest period is from June to September and the warmest period October to March.

1.1.4 GPS Coordinates

Latitude: Degrees: S1° 22’ Decimal: -1.381366

Longitude: Degrees: E36° 37’ Decimal: 36.943907

Altitude: 1596 masl

1.1.5 Detailed Scope of Works

The works provided for under this project consist of the execution of reconstruction, rehabilitation, remedial and improvement works on the road, drainage rehabilitation and construction, street lighting, construction of parkings, construction of walkways within the area of jurisdiction of the Nairobi Metropolitan Region. The works shall include but not limited to;

- Site clearance and earthworks as necessary
- Excavation to remove unsuitable materials
The design of the works includes drainage improvement works and has appropriate landscape measures to prevent soil erosion. The main works will encompass building a box culvert of reinforced concrete and improving the approaches to the culvert from both ends of the road by doing a road to bituminous finish.

The main activities are as detailed below.

1.1.5.1 Site Clearance and Earth Works

This includes;
- Site clearance of all overburden on road shoulders
- Top soil stripping along walkways and carriageways
- Excavation for the road carriageway

1.1.5.2 Drainage Works

This includes;
- Excavation for open and closed drains
o Construction of 600mm diameter pipes
o Introduction of sustainable open drainage system along the road

1.1.5.3 Passage of Traffic
This includes;
   o Passage of traffic through the works for the duration of the contract.

1.1.5.4 Pavement Works
This includes;
   o Construction of sub-grade, sub-base, base and surfacing of a new carriageway
   o Laying of asphaltic concrete

1.1.5.5 Walkways
This includes;
   o Stripping and removal of top soil along the footpath areas
   o Construction of 100mm thick gravel base for 2m/3m wide footpath
   o Application of 25mm asphaltic concrete surfacing

1.1.5.6 Road Furniture & Ancillary Works
This includes;
   o Provision and installation of standard and non-standard road signs
   o Application of road markings as appropriate
   o Construction of kerbs and channels as necessary
   o Improvement of plot accesses where applicable and control of undesirable access

1.1.5.7 Street Lighting Works
This includes;
   o Street lighting along the project roads

1.1.5.8 Other Works
This includes;
1.2 Study Approach and Methodology

The systematic investigative and reporting methodology specified for conduct of Project Report Studies (Legal Notice 101 of EMCA) was adopted in this study. Baseline data on project design was generated through discussion with the client and review of project documentation. Opinions formed were revalidated through field work entailing site investigations and interviews with potentially affected people and secondary stakeholders.

To identify, predict, analyze and evaluate potential impacts that may emanate from the project, diverse study methods and tools including use of checklists, matrices, expert opinions and observations were employed. An Environmental and Social Management and Monitoring Plan comprising of an impact mitigation plan and modalities for monitoring and evaluation were then developed to guide environmental management during all phases of project development.

Once approved by the Ministry of Transport, Infrastructure, Housing and Urban Development, NEMA and the World Bank, the Project Report will be disclosed as required.

Consequently, this report provides the following:

- The location of the project including the physical environment that may be affected by the project’s activities.
- The activities that shall be undertaken during the project design, construction, operation and of the project
- The materials to be used, products and by-products including waste to be generated by the project and the methods of disposal.
- The potential environmental and social impacts of the project and mitigation measures to be taken during and after the implementation of the rehabilitation and improvement of Quarry Roads.
- An action plan for prevention and management of possible accidents during the project cycle
- A plan to ensure the health and safety of the workers and the neighboring communities
- The project cost – Kshs. 116,628,285
- Any other information that the proponent may be requested to provide by NEMA

This report also seeks to ensure that all the potential environmental and social impacts are identified and that workable mitigation measures are adopted. The report also seeks to ensure compliance with the provisions of the EMCA 2015, Environmental (Impact
Assessment and Audit) Regulations 2003 as well as other regulations and World Bank OP 4.12.

Finally, a comprehensive Environmental and Social Management and Monitoring Plan (ESMMP) is mandatory for a project of this nature to ensure monitoring and mitigation of negative environmental and social impacts during the different phases of the project.

1.3 Project Justification

The broad aim of this sub-project is to enhance mobility and transportation of quarry materials from the quarries to various construction sites located in different parts of the metropolitan region and beyond. The sub-project is also aimed at providing and improving access to Mombasa highway around Mulolongo Township.

1.4 Scope of Works

The works provided for under this project consist of the execution of reconstruction, rehabilitation, remedial and improvement works on the road, drainage rehabilitation and construction, street lighting, construction of parkings, construction of walkways within the area of jurisdiction of the Nairobi Metropolitan Region. The works shall include but not limited to;

- Site clearance and earthworks as necessary
- Excavation to remove unsuitable materials
- Filling with approved materials as specified and directed.
- Hand packing with approved stone as specified and directed
- Base repairs as specified and directed
- Repairs to existing drainage structures as specified and directed
- Improvement/construction to the drainage facilities as directed
- Repairs and/or improvement/construction to footpaths and shoulders as directed
- Laying of Asphalitic concrete layer(s) to a consolidated thickness directed
- Laying and/or replacement of kerbs and channel as specified and directed
- Grading and/or improvement/construction of unpaved roads as directed
- Construction of road junctions abutting to these roads
- Maintenance of the works during the construction and maintenance periods specified
- Traffic management through the works and from the works
- Relocation and/or protection of other services including but not limited to water pipes, sewer pipes, street lighting, power and telephone
- Installation/rehabilitation of streetlights
- Any other works as instructed by the Engineer and/or as specified in this document

1.5 Description of the Project’s Construction Activities

1.5.1 Pre-construction investigations

The implementation of the project’s design and construction phase will start with thorough investigation of the site biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle.

1.5.2 Demolition works

Any wastes or debris arising from any demolitions will be transported to licensed site for disposal.

1.5.3 Sourcing and transportation of construction materials

Construction materials will be transported to the project site from their extraction, manufacture, or storage sites using transport trucks. The materials to be used in construction of the project will be sourced from areas of Machakos County including the quarries to be served by this road. Greater emphasis will be laid on procurement of construction materials from within the local area, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles, and also increase the income of local dealers of such materials.

1.5.4 Storage of materials

Construction materials will be stored on site, if need be. Bulky materials such as rough stones, ballast, sand etc will be brought to site only when needed owing to space constraints. To avoid piling large quantities of materials on site, the contractor should order bulky materials such as sand, gravel and stones in batches.

1.5.5 Excavation and foundation works

Excavation will be carried out to prepare the site for construction of foundations, pavements, culverts and drainage systems. This will involve the use of heavy earthmoving machinery, human effort and appropriate equipment.
1.5.6 Construction
This involves putting different layers – sub-base, base and final finish – in aggregates as specified and a final finish in bituminous mixes and bitumen. It also involves compaction as required at different levels. The project will result in construction of the road, its drainage and related works.

1.6 Description of the Project’s Operational Activities

1.6.1 General repairs and maintenance
The road will be repaired and maintained by Machakos County during its operational phases.

1.7 Description of the Project’s decommissioning activities

1.7.1 Demolition works
Upon decommissioning (which is unlikely), the project components including pavements and drainage systems will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste disposal company.

1.7.2 Site restoration
Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil.

1.8 Presentation of the Report
The ESIA study report as indicated above culminated with the production of this Project Report designed to ensure that the proposed development project complies with Environmental Management and Coordination Act (EMCA, 2015). The report is arranged in 10 chapters as outlined below:

Chapter 1: Introduction of the project which include project Background, Scope of the ESIA Study, Study Methodology and Presentation of the report.

Chapter 2: Gives the Policy, Legal and Regulatory Framework Policy, Legal, Institutional and Administrative Framework.

Chapter 3: Project Description.

Chapter 4: Baseline Information of the Study Area.

Chapter 5: Outcome of the Public Participation and Consultation process.

Chapter 6: Alternatives to the Project.

Chapter 7: Identification of Potential Impacts and mitigation measures of the project.
Chapter 8: Mitigation Measures of Potential Impacts of the Project.

Chapter 9: Environmental and Social Management and Monitoring Plan (ESMMP)

Chapter 10: Concludes the project and states the core recommendations.

Section 10(2) of Part II of Legal Notice 101 allows for approval of proposed projects at the Project Report Stage and has been effectively used by NEMA to grant Environmental Licenses to small projects without requiring a full EIA. This is the process and stage at which the ESIA process for rehabilitation and improvement of Quarry Roads project is expected to end.
CHAPTER TWO: LEGAL AND INSTITUTIONAL FRAMEWORKS

2.1 National, Legal and Institutional Framework

Kenya has approximately 77 statutes that guide on environmental management and conservation. Most of these statutes are sector-specific, covering issues such as public health, soil conservation, protected areas conservation and management, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use among other issues.


2.2 Environmental Management and Coordination Act of 2015 (Amended)

This project report has been undertaken in accordance with the Environment (Impact Assessment and Audit) regulation 2003, which operationalize the environment management and coordination act 1999. The report is prepared in conformity with the requirements stipulated in the environmental management and coordination act no 8 of 1999 (EMCA) and the Environmental Impact Assessment and audit regulations 2003 regulation7 (1) and the second schedule. Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean environment for all, new projects listed under the second schedule of Section 58 of EMCA No 8 of 1999 shall undergo an Environmental Impact Assessment. This includes development activities such as this new project. In additional to the legal compliance above, the following legal aspects have also have been taken into consideration or will be taken into consideration before commencement of construction:
2.3 Occupational Health and Safety, 2007

The said Act requires that before any premises are occupied or used a certificate of registration should be obtained from the chief inspector. The occupier must keep a general register with provision for health, safety and welfare of workers on site. For safety, fencing of the premise and dangerous parts must be done for this project. This has been included in the design. There should also be provision for clean and sanitary working conditions. More so, the project must ensure provision of quality and quantity wholesome drinking water.

2.4 Public Health Act Cap 242

Part IX section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that local authorities shall take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health. This will have to be provided for this project.

2.5 Physical Planning Act, 1999

The said Act section 29 empowers the local authorities to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section allows for prohibition or control of the use and development of an area.

Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority. This project has been integrated with the planning of Mulolongo township by Machakos County.

2.6 Land Planning Act Cap 303

Section 9 of the subsidiary legislation (the development and use of land Regulations 1961) under which it requires that before the local authority submits any plans to the minister for approval, steps should be taken as may be necessary to acquire the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should be submitted, which intends to reduce conflict of interest with other socio economic activities. There will be no land acquisition for this project. There is adequate room to construct the paved road and the drainage.
2.7 Building Code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the Local Authority for permit to connect to the sewer line and all the wastewater must be discharged into sewers. The code also prohibits construction of structures or building on sewer lines. There is no sewer along the road corridor.

2.8 Other Relevant Laws

2.8.1 EMCA (Waste Management) Regulations, 2006

These Regulations guides on the appropriate waste handling procedures and practices. It is anticipated that, the proposed project will generate large quantity of solid waste (mostly excavated top soil) during construction which will need to be managed through reuse, appropriate disposal. Others include solid waste from the generated from construction materials such as cement bags, bitumen, empty drums, among others. This regulation requires that:-

i. The contractor should not dispose any waste on the highway, street road, recreational area and public places;

ii. Waste should be segregated and grouped according to their similarity for example plastics, toxic, organic etc;

iii. All waste should be deposited in a designated dumping area approved by the local authority;

iv. All waste handlers engaged by the proponent should be licensed by NEMA and posses all relevant waste handling documents such as waste transport license, tracking documents, license to operate a waste yard, insurance cover, vehicle inspection documents among others;

v. Contractor should implement cleaner production principles of waste management strategy namely reduce, reuse and recycle;

vi. All hazardous wastes are labeled as specified in section 24 (1-3) of the regulation.

vii. The fourth schedule lists wastes considered as hazardous and solvents, emulsifiers/emulsion, waste oil/water and hydrocarbon/water mixtures. Road and bus parks projects involve use of inputs which are likely to generate the mentioned wastes and thus will need to be handled as required by the regulations.

This law requires that all wastes generated by this project in all its phases are managed in an environmentally friendly manner.

2.8.2 EMCA (Noise and Vibrations Control) Regulations, 2009

These Regulations provides guidelines for acceptable levels of noise and vibration for different environments during the construction and operation phase. Section 5 of the
regulation warns on operating beyond the permissible noise levels while section 6 gives 
guidelines on the control measures for managing excessive noises and copy of the first 
schedule indicating the permissible noise levels for different noise sources and zones. The 
project team should observe the noise regimes for the different zones especially when 
working in areas termed as silent zones which are areas with institutions and worship 
places. These areas are permitted exposure to sound level limits of not exceeding 40 dB 
(A) during the day and 35 dB (A) at night. The regulation states that a day starts from 6.01 
a.m. to 8.00 p.m. while night starts from 8.01 p.m. – 6.00 a.m. Construction sites near the 
silent zones are allowed maximum noise level of 60 dB (A) during the day and night levels 
are maintained at 35 dB (A). The time frame for construction sites is adjusted and the day 
is considered to start at 6.01 a.m. and ends at 6.00 pm while night duration from 6.01 p.m. 
to 6.00 a.m. Part III of the regulation gives guidelines on noise and vibration management 
from different sources. Sections 11, 12 and 13 of the stated part give guidelines on noise 
and vibration management from machines, motor vehicles and night time construction 
respectively. Section 15 requires owners of activities likely to generate excessive noise to 
conduct an ESIA to be reviewed and approved by NEMA. It is anticipated that the 
proposed project will generate excessive noise and/or vibration due demolition of the 
existing road this noise will originate from the construction equipments, vehicles and the 
workers since the road neighbors homesteads and institutions in some sections. The 
project proponent has developed mitigation measures to reduce noise propagation in the 
project area and such as to ensure that the project works are only conducted during the 
day.

2.8.3 EMCA (Air Regulations), 2014

This Act is meant to ensure that all activities at least maintain ambient quality standards of 
air and any pollution to air (in particulate matter, dust or obnoxious and poisonous gases) 
needs to be sufficiently mitigated. The project proponent has proposed regular watering 
of the construction site to minimize dust during the construction period.

2.8.4 Way Leave Act Cap 292

Section 3 of the Act states that the Government may carry any works through, over or 
under any land whatsoever, provided it shall not interfere with any existing building or 
structure of an ongoing activity. Notice, however, should be given one month before 
carrying out any such works (section 4) with full description of the intended works and 
targeted place for inspection.

Any damages caused by the works would then be compensated to the owner as per 
Section 8 of the Act that states that any person whom without consent causes any building 
to be newly erected on a way leave, or cause hindrance along the way leave shall be 
guilty of an offence and any alterations will be done at his/her costs. The project will 
comply with this provision by ensuring that there will be minimal disruption of utilities in the
area. This project has no land acquisition and hence no need for a resettlement action plan.

2.8.5 Public Roads and Roads of Access Act (Cap 399)
Sections 8 and 9 of the Act provides for the dedication, conservation or alignment of public travel lines including construction of access roads adjacent to lands from the nearest part of a public road. Sections 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads. This road project is being built to fulfill, in addition to other benefits, the provisions of this Act.

2.8.6 Traffic Act Chapter 403
This Act consolidates the law relating to traffic on all public roads. The Act also prohibits encroachment on and damage of roads including land reserved for roads. This road project is under the provisions of the Act.

2.8.7 County Governments Act, 2012
This Act delineates the roles and responsibilities of county governments with their administrations as well as the role of county citizens in public participation and consultations regarding projects at the county level. CPP is part of this road project involving the county government and other stakeholders.

2.8.8 HIV Aids Prevention and Control (Cap 246A)
This Act is to promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS. It also seeks to positively address and seek to address conditions that aggravate the spread of HIV infection. In the road project, there will be awareness creation and sensitization on the workers and other persons on the risks of infections to foster prevention and control.

2.9 National Policy Framework
Several policies have been developed over the years to guide the development and management of proposed projects to ensure both economic and social sustainability these policies are discussed below.

2.9.1 The National Poverty Eradication Plan (NPEP)
The objective of the NPEP is to reduce the incidences of poverty in both rural and urban areas by 50 percent by the year 2015, as well as to strengthen the capabilities of the poor and vulnerable groups to earn income. It also aims to narrow gender and geographical disparities and create a healthy, better-educated and more productive population. This plan has been prepared in line with the goals and commitments of the World Summit for Social Development (WSSD) of 1995.
The plan focuses on the four WSSD themes of poverty eradication; reduction of unemployment; social integration of the disadvantage people and creation of an enabling economic, political, and cultural environment which can be achieved through developing the transport and communication sector. The plan will be implemented by the Poverty Eradication Commission (PEC) formed in collaboration with Government ministries, Community Based Organization (CBO), private sector, Non-Governmental Organization (NGO), bilateral and multilateral donors.

2.9.2 The Poverty Reduction Strategy Paper (PRSP)

The PRSP has the twin objectives of poverty reduction and enhancing economic growth. The paper articulates Kenya’s commitment and approach to fighting poverty with the basic rationale that the war against poverty cannot be won without the participation of the poor themselves. The proposed project through improving transport in the area will, contribute towards economic growth, as well as relieve the daily pressure of poverty for sustainable number of people by enabling them reach the construction materials markets and suppliers on time.

2.9.3 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy whose main effort is to integrate environmental considerations into the country’s economic and social development.

The integration process was to be achieved through multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources forms an integral part of societal decision-making.

The application of this plan is widening as the government through NEMA does not approve a development project unless the impacts of the proposed project are evaluated and mitigation measures proposed for incorporation in the project’s development plan which is in line with the requirements of the NEAP.

2.9.4 Environmental and Development Policy (Session Paper No.6 1999)

As a follow-up to the foregoing, the goal of this policy is to harmonize environmental and developmental goals so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development.

2.9.5 International Policy Framework

Kenya is a signatory as well as a party to various international conventions, treaties and protocols relating to the environment which aims at achieving sustainable development. According to the Registrar of International Treaties and other Agreements in Environment (UNEP 1999), there are 216 treaties, 29 of which are of interest to Kenya. The country is a signatory to 16 such agreements, which range from use of oil, protection of natural resources and protection of the atmosphere. The agreements are both regional and
international and became legally binding on Kenya upon ratification thereof by the rightfully designated Kenyan Authority. The agreements of interest to Kenya can be categorized as those for protecting natural resources, atmosphere and social wellbeing of man.

2.9.6 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and, co-ordination of all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment. The Authority shall review the project report for the proposed project, visit the project site to verify information provided in the report and issue an ESIA license if it considers that all the issues relevant to the project have been identified and mitigation measures to manage them proposed.

2.10 World Bank Environmental and Social Safeguard Policies

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) will be respected for the purposes of this project implementation. WB classifies its projects into four Environmental Assessment categories according to the likely impacts on the environment they will have. This classification is as follows (only main conditions mentioned):

(i) Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts.

(ii) Category B: A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—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 mitigatory measures can be designed more readily than for Category A projects. This particular NaMSIP subproject has been categorized as B.

(iii) Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.

(iv) Category FI: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts; this case, in any way, is not applicable to the NaMSIP project.

The table below shows the applicability of World Bank Operational Safeguards as it applies to this project.
### Table 1: Applicability of WB OPs

<table>
<thead>
<tr>
<th>OP</th>
<th>Title</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.01</td>
<td>Environmental Assessment</td>
<td>Applicable. As a result of environmental and social screening, the project was identified as a Category B project due to its road rehabilitation and other activities, as described</td>
</tr>
<tr>
<td>4.04</td>
<td>Natural Habitats</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>4.09</td>
<td>Pest Management</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>4.10</td>
<td>Indigenous Peoples</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>4.11</td>
<td>Physical Cultural Resources</td>
<td>Not applicable. Site visits and inventories have not indicated the presence of any cultural (historical, archaeological) sites in the sample settlements. However, to manage “chance finds” an appropriate procedure is included in this ESIA. Such procedure to be followed by contractors during the construction phase.</td>
</tr>
<tr>
<td>4.12</td>
<td>Involuntary Resettlement</td>
<td>Not applicable as there will be no relocation or displacements of persons or interruption of livelihoods.</td>
</tr>
<tr>
<td>4.36</td>
<td>Forests</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>4.37</td>
<td>Safety of Dams</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>7.50</td>
<td>Projects on International Waterways</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>7.60</td>
<td>Projects in Disputed Areas</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>
CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

Baseline conditions cover all the biophysical and socio-economic conditions in the project area. Gathering of baseline data is necessary to meet the following objectives:

- To include sections on the biological/ecological interest of the area within and immediately surrounding the works site as well as the cultural heritage, water resources, social;
- To provide data to predict, explain and substantiate possible impacts;
- To understand the expectations and concerns of a range of stakeholders on the proposed development;
- To inform the development of mitigation measures;
- To benchmark future socio-economic changes/impacts and assess the effectiveness of mitigation measures.

3.2 Topography

The project roads traverse a generally rolling terrain with gentle slopes.

3.3 Climate

The project area experiences a highland equatorial type of climate with a mean annual rainfall in the region of 905mm. The main rainfall seasons are March to May and October to December. In between these periods, the area is generally dry with occasional showers. The mean annual temperature ranges from a minimum of 13°C to a maximum of 29°C. The coolest period is from June to September and the warmest period October to March.

3.4 GPS Coordinates

Latitude: Degrees: S1° 22’ Decimal: -1.381366
Longitude: Degrees: E36° 37’ Decimal: 36.943907
Altitude: 1596 masl

3.5 Rainfall

There are two rainfall seasons i.e. Long rains (March – May) and Short rains (October - November) receiving between 1400mm and 1600mm. The rainfall is reasonably reliable and well distributed throughout the year and is adequate for cultivation.
3.6 Community Organizations/Non-State Actors

Majority of the county’s population is organized into community self-help groups, and both producer and marketing cooperative societies. There are a number of other non-state actors operating in the county including local and international Non-Governmental Organizations whose objective is to improve the socio-economic well-being of the local people.

3.7 Gender

Gender disparities are minimal in primary and secondary education where enrolments are 50 per cent for both boys and girls. Women have been discriminated against when it comes to access to ownership of property and finances. 80 per cent of women constitute the agricultural workforce but only a small percentage of them hold title deeds to land. This imposes a great constraint on their ability to make major land-related investment decisions including obtaining credit using title deeds as collateral.

3.8 Poverty

The county has high poverty levels which according to the 2005/2006 Kenya Integrated Household Budget Survey, about 42 per cent of the population live below the poverty line. The poor are not able to access the basic necessities of life such as food, shelter and education.

3.9 HIV and Aids

HIV and AIDS pandemic poses a serious threat to the development of the area as the prevalence rate stands at 3.6 per cent for Machakos County compared to 4.6% for the country as whole. The scourge is on the increase virtually in all the constituencies of the county. AIDS related deaths are common and those mainly affected are those within the productive age group of 15-49 years of age. Also, the number of HIV/AIDS orphans is on the increase. HIV/AIDS in the county is also linked to peer pressure and ignorance of the youth based on age and sex distribution and commercial sex due to economic hardships.

3.10 Sensitive Receptors

The road to be constructed passes through bare land with some residential houses. The key environmental receptors include motorists, pedestrians and businesses located near the project corridor.
CHAPTER FOUR: PUBLIC PARTICIPATION AND CONSULTATION

4.1 Introduction

Legal Notice 101 of EMCA 1999 (The Environmental Regulations, 2003) requires that all environmental assessment process in Kenya to incorporate public consultations and public participation. The aim is to ensure that all stakeholder interests are identified and incorporated in project development, implementation and operation. Of necessity, stakeholder consultations should take place alongside project design and implementation to ensure that the project puts in place measures to cater for stakeholder concerns in all project phases.

4.2 Approach to Public Participation and Consultations

In case of the proposed Quarry Roads, public participation and consultations followed these steps:

1) Identification of Stakeholders

Like in all civil works projects, the core stakeholders comprise people to be directly served by the road and then comprise residents along the road corridor, motorists, businessmen and service providers who rely on the road. Along the road are no dwellings. The key primary stakeholders are users and owners of the quarries and the transportation trucks.

This study also identified a second category of stakeholders comprised of county officers. Each category of stakeholders called for a different approach to consultation.

4.3 Modalities for stakeholder consultation

The following techniques and instruments were used for public participation and consultation;

- Photography and direct observation

Photography was particularly useful as it captured the real situation on the ground that was relevant to the study. Direct observation involved site viewing of the proposed project location to see the extent of development on it and the condition of the existing road as shown on the plates below.
Existing Road

Business owners part of primary stakeholders

- **Site checklists**
  
  Checklists were used to assess the suitability of the site where the proposed project is to be located and the negative impacts it might have on the environment.

- **Public meetings (barazas)**
  
  This involved scheduled meetings with the persons and companies who are directly affected by or will benefit directly from the proposed project. The aim was to get their views concerning the proposed project; how it will affect them and the environment. Such a meeting was held near the project site.

- **Scheduled interviews**
  
  This involved face-to-face interaction between the consultants/experts and the stakeholders of the project. An interview guide was used to solicit information from the primary stakeholders.

4.4 **CPP Methodology**

Interviews were carried out in the project area by the use of questionnaires, to find out all the views from the stakeholders on the proposed project. The main objective was to find out if the stakeholders support the project and have no objection to it. The questionnaire was to initially give introduction and make the residents aware of the proposed project.
Afterwards, the ESIA team enquired on the acceptance of the project and whether the project would cause any negative impacts on the following:

a) Businesses; b) Ecology of the area; c) Human environment;
d) Recreational and leisure facilities; e) Public health and safety; f) Effect on water resources and quality; g) Effect on the soils; h) Effect on road transport and; i) Waste disposal. The said parameters were directly mentioned to foresee which had intense negative impacts. The meeting of the key stakeholders (NaMSIP, County Government) assessed the need for the project and its attendant benefits. During such meetings, it was emphasized that high environmental, occupational health and safety standards would be adhered to during project implementation.

4.5 Stakeholder Analysis

A sample of the questionnaires from those that attended the meeting including the attendance sheet are as attached in the appendix. Those that attended the meeting included:

- Businessmen in quarrying
- Drivers of vehicles along the road

The ESIA consultations included disclosure of the design and project status that was done by the appointed resident engineer. They all welcomed the proposed project. The main issue raised was if the project scope would be expanded.

Minutes, questionnaires and photographs of the public participation and consultation meeting are attached to this report.
CHAPTER FIVE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

5.1 Introduction

This chapter outlines the potential negative and positive impacts that will be associated with the project. The impacts will be related to activities to be carried out during construction of the project and the operation stage of the project. The operational phase impacts of the project will be associated with the activities carried out within the premises. In addition, closure and decommissioning phase impacts of the project are also highlighted.

The impacts of the project during each of its life cycle stages (construction, operation and decommissioning) can be categorized into: impacts on the biophysical environment; health and safety impacts and socio-economic impacts.

5.2 Negative environmental and social impacts of construction activities

5.2.1 Extraction and use of construction materials

Construction materials such as rough stone, ballast and bitumen required for construction of the roads project will be obtained from quarries and bitumen dealers. Since substantial quantities of these materials will be required for construction of the roads, the availability and sustainability of such resources at the extraction sites will be negatively affected, as they are not renewable in the short term.

5.2.2 Dust emissions

During construction, the project will generate substantial quantities of dust at the construction site and its surrounding. The sources of dust emissions will include excavation and leveling works, and to a small extent, transport vehicles delivering building materials. Emission of large quantities of dust may lead to significant impacts on construction workers and the local residents, which will be accentuated during dry weather conditions.

5.2.3 Exhaust emissions

The trucks used to transport various building materials from their sources to the project site will contribute to increases in emissions of CO₂, NO₂ and fine particulate along the way as a result of diesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent running of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas.
5.2.4 Noise and vibration

The construction works, delivery of construction materials by heavy trucks and the use of machinery/equipment including bulldozers, generators, tippers and concrete mixers will contribute high levels of noise and vibration within the construction site and the surrounding area. Elevated noise levels within the site can affect project workers and the residents, passers-by and other persons within the vicinity of the project site.

5.2.5 Risks of accidents and injuries to workers

Because of the engineering and construction activities including minor excavations, concrete work, sub-base stone laying among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from the hand tools and construction equipment and risk of vehicular accidents to local residents.

5.2.6 Increased soil erosion

Excavation works associated with this project may lead to increased soil erosion at the project site and release of sediments into the drainage systems, especially if construction is done during the rainy seasons. Uncontrolled soil erosion can have adverse effects on any local water bodies.

5.2.7 Solid waste generation

Some quantities of solid waste will be generated as a result of clearances, excavations and the final construction of the selected roads. Such waste will consist of surplus materials, surplus soil and excavated materials among others. Such solid waste materials can cause negative impacts to the environment through blockage of drainage systems, choking of water bodies and negative impacts on human and animal health.

5.2.8 Energy consumption

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

5.2.9 Water use

The construction activities will require large quantities of water that will be supplied mainly from the town council. Water will mainly be used for concrete mixing, dust suppression and sanitary and washing purposes. There is adequate water for the project from the town
council, and if need be, there is a nearby river located a few metres away which can be used as a source after obtaining approvals and licenses from WARMA.

The construction activities will require quantities of water that will be supplied from the town council. Water will mainly be used for concrete mixing, dust suppression and sanitary and washing purposes. There is therefore adequate water for the project.

5.2.10 Social disturbance

The construction works may cause disturbance to the local population with interactions of non-local workers with residential communities. The movement of trucks and other equipment in the project area during the works implementation will cause noise and dust if the works will be in dry weather. This noise and dust may also affect the businesses in the vicinity of the construction works.

5.2.11 HIV-AIDS

This project may lead to an influx of commercial sex workers into the township or lead to contractor workers and other personnel engage in risky sexual behavior that may lead to infections in HIV-AIDS or other sexually transmitted diseases.

5.2.13 Operation of quarries and borrow pits

The contractor will mainly source this from private quarries but all in all this degrades the environment.

5.2.14 Traffic management

Flow of traffic along or near the proposed area will be affected and diversions will need to be done to manage traffic. There will also be safety barriers and warning signs erected for safety. There will be half width working with signalized traffic control.

5.3 Positive environmental impacts of construction activities

5.3.1 Creation of temporary employment opportunities

Several employment opportunities will be created for construction workers during the construction phase of the project. This will be a significant impact since unemployment is currently generally high in Kenya and in most urban and surrounding areas.

5.3.2 Provision of market for supply of construction materials

The project will require supply of large quantities of construction materials most of which will be sourced from neighboring or surrounding areas around Mulolongo and others within the County. This provides ready market for construction material suppliers such as quarrying companies, hardware shops and individuals with such materials.
5.3.3 Increased business opportunities
The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the construction site.

5.4 Negative environmental impacts of operational activities

5.4.1 Increased traffic
It is expected there will be more traffic using this road and this may lead to more accidents. It will also lead to heightened noise levels. This will mainly be due to increased traffic from the construction vehicles and equipment.

5.4.2 Increased storm-water
The pavements will lead to increased volume and velocity of storm water or run-off flowing across the area covered by the roads. This will lead to increased amounts of storm water entering the drainage systems, resulting in overflow and damage to such systems in addition to increased erosion or water logging in the neighboring areas if not adequately mitigated.

5.5 Positive environmental impacts of operational activities

5.5.1 Revenue to national and local governments
Through payment of relevant taxes, rates and fees to the government and the local authority, the roads project will contribute towards the national and local revenue earnings from those using the improved facilities like the traders who will set up businesses along the road.

5.5.2 Reduction of Dust Emissions
This may emanate from the fact that there will now be tarmacked road as opposed to an earth road.

5.5.3 Emergency preparedness and response access
The presence of a tarmacked road especially leading to the quarries will lead to better driving conditions and ameliorating emergency response and disaster preparedness.

5.5.4 Other positive impacts of operational activities
The operational activities after this project is commissioned will have several positive long-term social impacts that include easier accessibility and cleaner and orderly environment.
5.6 Negative environmental impacts of decommissioning activities

5.6.1 Solid waste
Demolition of the road and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, kerbs, bitumen, stones and ballast. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

5.6.2 Dust Emissions
Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighboring residents.

5.6.3 Noise and vibrations
The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas.

5.7 Positive environmental impacts of decommissioning activities

5.7.1 Rehabilitation
Upon decommissioning the project, rehabilitation of the project site will be carried out to restore the site to its original status. This will include replacement of topsoil that will lead to improved visual quality of the area.

5.7.2 Employment Opportunities
Several employment opportunities will be created for demolition staff. There therefore will be citizen and community engagement that requires a communication and community engagement plan.
CHAPTER SIX: ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, technology and waste management options.

6.1 Relocation Option

Relocation option to a different site is not an option available for the project implementation as this project is to improve accessibility. Several alternatives were considered to improve other roads in the area, but this one was selected because it is more beneficial to the needs of the accessibility of the quarries after the development. Other options were considered before considering to improve this particular road.

6.2 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, involve several losses both to Mulolongo and the community as a whole. The township will continue to have an earth road and this will not help maximize usage and utilization of this township and its facilities. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of Kenyans and the local people would remain unchanged.
- The road and surroundings would remain largely under-utilized as it is currently.
- No employment opportunities will be created for the local residents who will work in the project area.
- Increased urban poverty and crime in the area.
- Discouragement for investors and loaners at Kenol
- Development of infrastructural facilities (roads and associated infrastructure) will not be undertaken.

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, County government of Machakos, and the Government of Kenya.

6.3 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. The road-works will be made using locally sourced materials that meet the Kenya Bureau of Standards requirements.
The alternative technologies available include the conventional concrete roads, prefabricated concrete panels, or even temporary structures. These may not be desirable from a cost and durability perspective. The technology to be adopted will be the most economical and one sensitive to the environment.
CHAPTER SEVEN: IMPACTS MITIGATION AND MONITORING

7.1 Introduction

This chapter highlights the necessary mitigation measures that will be adopted to prevent or minimize significant negative environmental, health and safety impacts associated with the project during its construction, operation and decommissioning phases. Allocation of responsibilities, time frame and estimated costs for implementation of these measures are presented in the Environmental and Social Management and Monitoring Plan (ESMMP).

7.2 Mitigation of construction phase impacts

7.2.1 Efficient sourcing and use of raw materials

The contractor will source construction materials such as sand, ballast and hard core from registered quarry and sand mining firms, whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated. To reduce the negative impacts on availability and sustainability of the materials, the contractor will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

In addition to the above measures, the contractor shall consider reuse of construction materials and use of recycled materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

7.2.2 Excavations

The existing earth road will have to be excavated to make for new road and associated facilities and the removed materials will be taken to licensed sites or reused.

7.2.3 Minimization of run-off and soil erosion

The project design has incorporated construction drainage to avoid instances of standing water and manage run-off. The contractor will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include silt traps, barriers, vegetation planting, terracing and leveling the project site to reduce run-off velocity and increase infiltration of rainwater into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to
reduce run-off. This is especially relevant to the area close to the road, which is located in a low lying area likely to have standing water during the rainy season.

7.2.4 Minimization of construction waste

It is recommended that demolition and construction waste is properly collected, stored, recycled or reused to ensure that materials that would otherwise be disposed off as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed off. The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal. Additional recommendations for minimization of solid waste during construction of the project include:

- 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.
- Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to weather elements
- Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
- Use of construction materials containing recycled content when possible and in accordance with accepted standards.

7.2.5 Reduction of dust generation and emission

Dust emission during construction will be minimized through strict enforcement of on-site speed controls as well as limiting unnecessary traffic within the project site. Traffic routes on site have to be sprinkled with water regularly to reduce amount of dust generated by the construction trucks.

7.2.6 Minimization of exhaust emissions

This will be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road. In addition truck drivers will be sensitized to avoid unnecessary racing of vehicle engines at loading/offloading areas, and to switch off vehicle engines at these points. The vehicles are also to be maintained to manufacturers’ specifications.
7.2.7 Minimization of noise and vibration

Noise and vibration will be minimized in the project site and surrounding areas with strict adherence to NEMA designated working hours; and through sensitization of construction truck drivers to switch off vehicle engines while offloading materials. In addition, they will be instructed to avoid running of vehicle engines or hooting especially when passing through sensitive areas such as residential areas and schools. In addition, construction machinery shall be kept in good condition to reduce noise generation. It is recommended that all generators and heavy duty equipment be insulated or placed in enclosures to minimize ambient noise levels.

7.2.8 Reduction of risks of accidents and injuries to workers

The contractor will have to be committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act, OSHA 2007. The WBG EHS guidelines will have to be adhered to as a minimum standard to manage, especially, occupational health and safety. In this regard, the contractor is committed to provision of appropriate personal protective equipment, as well as ensuring a safe and healthy environment for construction workers and local residents as outlined in the ESMMP and these WBG EHS Guidelines.

7.2.9 Reduction of energy consumption

The proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

7.2.10 Minimization of water use

The contractor shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water usage to minimize pressure on the local water resource. Water will be sourced externally, including using the nearby river after obtaining licenses from WARMA.

The contractor shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water usage.

7.3 Gender mainstreaming

There will be a mechanism sexual and gender based violence and adequate mechanisms in place to protect local vulnerable population especially women and minors from risks associated with influx of workers (harassment, underage sex). There will also be a code of
conduct established for Contractor employees and contract workers acknowledging a zero tolerance policy towards child labor and child sexual exploitation.

7.4 HIV/AID awareness and prevention
To prevent spread and HIV-AIDS infection owing to the project, there shall be a behavior changes communication and awareness and sensitization on sexually transmitted diseases to construction workers.

7.5 Mitigation of operation phase impacts

7.5.1 Management of storm-water runoff
The County Government will ensure that the drainage is regularly maintained for storm-water runoff management.

7.5.2 Maintenance of the road
The County Government will ensure that the drainage is regularly maintained for storm-water runoff management.

7.5.3 Residual and cumulative impacts:
These include operations and maintenance impacts – solid waste management, maintenance of lighting and drainage – and these will be managed by the county government after project completion and commissioning and during operations.

7.6 Mitigation of decommissioning phase impacts

7.6.1 Efficient solid waste management
Solid waste resulting from demolition or dismantling works will be managed as described above.

7.6.2 Reduction of dust concentration
High levels of dust concentration resulting from demolition or dismantling works will be minimized as described earlier.

7.6.3 Minimization of noise and vibration
Significant impacts on the acoustic environment will be mitigated as described.

7.7 Grievance redress system
A grievance redress mechanism as attached in the annexure will be used to handle any complaints mainly during project implementation.
7.8 Social Protection
There will adequate mechanisms in place to protect local vulnerable population especially women and minors from risks associated with influx of workers (harassment, underage sex). This system will ensure having security on site provided by the contractor as well as sensitization and enforcement by the contractor. There will also be a code of conduct established for Contractor employees and contract workers acknowledging a zero tolerance policy towards child labor and child sexual exploitation.

Additionally, the contractor will employ their skilled staff and apply unskilled construction labour from the local population as far as possible to minimize on influx of foreigners into the community. This will ensure project support during the construction process. This being a relatively small project, it is unlikely to have any significant labour influx.
8.1 Significance of an ESMMP

An Environmental and Social Management and Monitoring Plan (ESMMP) for developing projects is used to provide a logical framework within which identified negative environmental impacts can be avoided, mitigated and monitored. In addition the EMMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The ESMMP is a vital output of an Environmental and Social Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMMP outlined below will address the identified potential negative impacts and mitigation measures of the Project based on the chapters on Environmental Impacts and Mitigation Measures of the Negative Impacts.

8.1.1 Pre-Construction & Construction Phases ESMMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the pre-construction and construction phases of the project are as outlined below.
Table 3: The ESMMP for the rehabilitation and improvement of Quarry Roads

<table>
<thead>
<tr>
<th>Objective/Plan</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Monitoring Mechanism</th>
<th>Approximate Cost (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Increased exploitation of raw materials</td>
<td>▪ Maximize sourcing of construction materials from registered and licensed suppliers</td>
<td>Contractor</td>
<td>Throughout construction period</td>
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<td></td>
<td>▪ Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered</td>
<td>Contractor</td>
<td>Throughout construction period</td>
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</tr>
<tr>
<td></td>
<td>▪ Ensure that damage or loss of materials at the construction site are kept minimal through proper storage</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>2) Run off and soil erosion</td>
<td>▪ Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that construction vehicles are restricted to existing project site to avoid safety, compaction impacts</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
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<tr>
<td></td>
<td>▪ 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.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>3) Solid waste generation</td>
<td>▪ Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of.</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
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</tbody>
</table>
### Recommended Mitigation Measures

<table>
<thead>
<tr>
<th>Objective/Plan</th>
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<th>Responsible Party</th>
<th>Monitoring Mechanism</th>
<th>Approximate Cost (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Ensure that damaged or wasted construction materials will be recovered for refurbishing and use in other projects</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Utilize opportunities for donating recyclable/reusable or residual materials to local community groups, institutions and individual local residents or home owners.</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
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<td></td>
<td>▪ 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</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements</td>
<td>Contractor</td>
<td>One-off</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>▪ Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials</td>
<td>Contractor</td>
<td>Throughout construction period</td>
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<tr>
<td></td>
<td>▪ Use construction materials that have minimal or no packaging to avoid the generation of excessive packaging waste</td>
<td>Contractor</td>
<td>Throughout construction period</td>
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<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
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<tr>
<td>3) Waste disposal</td>
<td>- Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- All wastes will be segregated, collected and stored in appropriate containers, and removed from site at least once per week. The wastes shall be segregated into those for recycling, hazardous waste, and wastes for disposal with general household waste. Only register carriers will be used to remove wastes from the site, and the removed wastes shall be taken to the nearest appropriate facility that is registered to receive that type of waste</td>
<td>Contractor &amp; Nairobi City Council</td>
<td>Throughout construction period</td>
<td>70,000/month</td>
</tr>
<tr>
<td>4) Air/ Dust pollution</td>
<td>- Sprinkle water on graded access routes as necessary to reduce dust generation by construction vehicles</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>30,000/month</td>
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<tr>
<td></td>
<td>- Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas. Switch off vehicle engines when not needed and ensure vehicles are maintained in accordance with manufacturers requirements</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>5) Air pollution</td>
<td>- Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the road</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
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<tr>
<td>Objective/Plan</td>
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<tr>
<td>6) Noise Pollution</td>
<td>▪ Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
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<td></td>
<td>▪ Sensitize construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as residential areas and schools</td>
<td>Contractor</td>
<td>Throughout construction period</td>
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<tr>
<td></td>
<td>▪ Ensure that construction machinery are kept in good condition to reduce noise generation</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
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<tr>
<td></td>
<td>▪ Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>7) Depletion of energy resources</td>
<td>▪ Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
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<td></td>
<td>▪ Monitor energy use during construction and set targets for reduction of energy use.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>8) Exploitation of water resources</td>
<td>▪ Promote recycling and reuse of water as much as possible.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Organize collection of rainwater on site.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td>9) Accidents</td>
<td>▪ Ensure that the premises are insured as per statutory requirements (third party and workman’s compensation)</td>
<td>Proponent</td>
<td>Annually</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Develop, document and display prominently an appropriate SHE policy for construction works</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Monitoring Mechanism</td>
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<tr>
<td>10) Hygiene</td>
<td>• Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer and the workers are represented</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>• Suitable, efficient, clean, well-lit and adequate gender specific sanitary conveniences should be provided for construction workers</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>11) Medical Examinations</td>
<td>• Arrangements must be in place for the medical examination of all construction employees before, during and after termination of employment.</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td>12) Machinery Safety</td>
<td>• 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</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>13) Injuries caused by machineries and equipments.</td>
<td>• Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>• All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>• Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations</td>
<td>Contractor</td>
<td>Continuous</td>
<td>15,000 per training</td>
</tr>
<tr>
<td></td>
<td>• Equipment such as fire extinguishers must be examined by a government authorized person. The equipment may only be used if a certificate of examination has been issued</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>• Reports of such examinations must be presented in prescribed forms, signed by the examiner and attached to the general register</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
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<td></td>
<td>Ensure that materials (cement bags, aggregates, bitumen drums) are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Conduct sensitization campaign for the public on risks related to construction sites.</td>
<td>Contractor</td>
<td>Twice (before construction begins) and a repeated after 1 month.</td>
<td>-</td>
</tr>
<tr>
<td>14) Poor storage of materials</td>
<td>Ensure that items are not stored/stacked against weak walls and partitions</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td>15) Emergencies.</td>
<td>Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency. Such procedures must be tested at regular intervals</td>
<td>Contractor</td>
<td>Every 3 months</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Ensure that adequate provisions are in place to immediately stop any operations where there is an imminent and serious danger to health and safety and to evacuate workers</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
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<tr>
<td></td>
<td>Provide measures to deal with emergencies and accidents including adequate first aid arrangements</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
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<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Monitoring Mechanism</td>
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<tr>
<td></td>
<td>▪ Sensitize the public on potential emergency situations</td>
<td>Contractor</td>
<td>Twice (before construction begins) and a repeated after 1 month.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Fire-fighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.</td>
<td>Contractor</td>
<td>One-off</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>▪ Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained</td>
<td>Contractor</td>
<td>Every 3 months</td>
<td>25,000</td>
</tr>
<tr>
<td></td>
<td>▪ Signs such as “NO SMOKING” must be prominently displayed within the premises, especially in parts where inflammable materials are stored</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Enough space must be provided within the premises to allow for adequate natural ventilation through circulation of fresh air</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Well stocked first aid box which is easily available and accessible should be provided within the premises</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>16) Food and toxins.</td>
<td>▪ Ensure that all chemicals used in construction are appropriately labeled or marked and that material safety data sheets containing essential information regarding their identity, suppliers classification of hazards, safety precautions and emergency procedures are provided and are made available to employees and their representatives</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Monitoring Mechanism</td>
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</tr>
<tr>
<td>17) Provisions of PPE to Workers.</td>
<td>- Keep a record of all hazardous chemicals used at the premises, cross-referenced to the appropriate chemical safety data sheets</td>
<td>Contractor</td>
<td>Continuous</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- There should be no eating or drinking in areas where chemicals are stored or used and should only be in defined areas.</td>
<td>Contractor</td>
<td>Continuous</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- Ensure that workers at the excavation sites and other dusty sites are adequately protected from inhalation of substantial quantities of dust through provision of suitable protective gear (e.g. nose masks)</td>
<td>Contractor</td>
<td>One-off</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- Provide workers in areas with elevated noise and vibration levels, with suitable ear protection equipment such as ear muffs</td>
<td>Contractor</td>
<td>One-off</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc should be made available and construction personnel must be trained to use the equipment</td>
<td>Contractor</td>
<td>Once off</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- Ensure that construction workers are provided with an adequate supply of wholesome drinking water which should be maintained at suitable and accessible points.</td>
<td>Contractor</td>
<td>One-off</td>
<td>15,000/month</td>
</tr>
<tr>
<td></td>
<td>- Provide and maintain adequate and suitable accommodation for clothing not worn during working hours for construction employees</td>
<td>Contractor</td>
<td>One-off</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>- Provide and maintain, for the use of all workers whose work is done standing, suitable facilities for sitting sufficient to enable them to take advantage of any opportunities for resting which may occur in the course of their employment</td>
<td>Contractor</td>
<td>One-off</td>
<td>–</td>
</tr>
<tr>
<td>Objective/Plan</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Monitoring Mechanism</td>
<td>Approximate Cost (Kshs)</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>18) Sanitary</td>
<td>▪ Ensure that conveniently accessible, clean, orderly, adequate and suitable washing facilities are provided and maintained within the site</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ All work places must be kept in a clean state, and free from effluvia arising from any drain, sanitary convenience or nuisance</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Accumulations of dirt and refuse should be cleaned daily from the floors, benches, staircases and passages</td>
<td>Contractor</td>
<td>Daily</td>
<td>-</td>
</tr>
<tr>
<td>19) Insecurity</td>
<td>▪ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the Construction site.</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>▪ Conduct sensitization campaign for the public on risks related to construction sites.</td>
<td>Contractor</td>
<td>Twice (before construction begins) and a repeated after 1 month.</td>
<td>-</td>
</tr>
<tr>
<td>20) HIV-AIDS Management</td>
<td>▪ Awareness creation and sensitization to workers and other persons engaged in the project to reduce or eliminate chances of infections of HIV-AIDS and other sexually transmitted diseases</td>
<td>Contractor</td>
<td>Continuous</td>
<td>Kshs. 1,155,000</td>
</tr>
<tr>
<td>21) Management of complaints and/or grievances</td>
<td>▪ Employ a grievance redress mechanism incorporating a negotiation and/or mediation team or party</td>
<td>Grievance Chairman / Committee (Stewarded by Resident Engineer)</td>
<td>Continuous</td>
<td>-</td>
</tr>
</tbody>
</table>
For items with no budget assigned, the budget is coming from the construction budget and has been allowed for in the Bill of Quantities.

The key responsibilities regarding compliance to the above ESMMP rest on the Contractor. However, it is important that the project proponent ensures adequate monitoring and evaluation for the Contractor for no non-conformances.

### 8.1.2 Operational Phase ESMMP

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

**Table 4: ESMMP for the Operational Phase of the Project**

<table>
<thead>
<tr>
<th>Objective/Plan</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Monitoring Mechanism</th>
<th>Cost (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) <strong>Storm Water Run-off Management</strong></td>
<td>• Provide proper storm water drainage from the paved roads.</td>
<td>Contractor</td>
<td>One-off</td>
<td>Part of project costs</td>
</tr>
<tr>
<td></td>
<td>• Provide regular inspection and maintenance of the drains.</td>
<td>County</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td>2) <strong>Health and Safety Risks.</strong></td>
<td>• Implement all necessary measures to ensure health and safety of workers and the general public during operation of the project as stipulated in OSHA 2007</td>
<td>County</td>
<td>Continuous</td>
<td>-</td>
</tr>
</tbody>
</table>
8.1.3 Decommissioning Phase

In addition to the mitigation measures provided above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined below.

Table 5: ESMMP for the Decommissioning Phase

<table>
<thead>
<tr>
<th>Environmental Impact</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold Waste Generation.</td>
<td>• All removed materials that will not be used for other purposes must be removed and recycled/reused as far as possible</td>
<td>Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
</tbody>
</table>
If any decommissioning is required, the total budget for the decommissioning ESMMP will be included in it as part of the decommissioning costs since the full scope of decommissioning will have to be established and ascertained.

<table>
<thead>
<tr>
<th>Degeneration of vegetation at the construction site</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Where recycling/reuse of the removed materials and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site or arrangements made with Machakos County Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>• Donate reusable demolition waste to charitable organizations, individuals and institutions Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>• Implement an appropriate re-vegetation programme to restore the site to better status Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>• Consider use of indigenous plant species in re-vegetation Contractor</td>
<td>One-off</td>
<td>-</td>
</tr>
<tr>
<td>• Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development. Contractor</td>
<td>Once-off</td>
<td>-</td>
</tr>
</tbody>
</table>
8.2 Duties of the Proponent

It will be the duty of the proponent to ensure that all legal requirements as pertaining to the development are met as specified by the law, including World Bank Safeguards and specifically OP4.01 (Environmental Assessment).

- The proponent shall hand over the site to the Contractor for implementation of the project
- The proponent will fund the project
- The Proponent will acquire the NEMA license
- The proponent will the project and will also ensure its satisfactory implementation
- The proponent shall ensure that there is a functional stakeholder engagement plan and grievance redress mechanism.

8.3 Duties of the Contractor

- Prepare and maintain an approved time and progress work-chart, showing clearly the period allowed for each section of the work.
- The contractor is to comply with all regulations and by-laws of the local authority including serving of notices and paying of the fees.
- During the night, public holidays and any other time when no work is being carried out on-site, the contractor shall accommodate only security personnel and never should a labor camp be allowed onsite.
- The contractor shall make good at his own expense any damage he may cause to the public and private roads, drainages and pavements in the course of carrying out the road work.
- The proponent shall define the area of the site, which may be occupied by the contractor for use as storage, on the site
- The contractor shall include all recommendations from ESIA into the contract.
- The contractor shall provide at his own risk, and cost all water required for use in connection with the works including the work of subcontractors, and shall provide temporary storage tanks , if required
- The contractor shall make his own arrangements for sanitary conveniences for his workmen. Any arrangements so made shall be in conformity with the public health requirements for such facilities and the contractor shall be solely liable for any infringement of the requirements.
- The contractor shall be responsible for all the actions of the subcontractor in the first instance.
- The contractor shall take all possible precautions to prevent nuisance, inconvenience or injury to the neighboring properties and to the public
generally, and shall use proper precaution to ensure the safety of wheeled traffic and pedestrian.

- All work operations which may generate noise, dust, vibrations, or any other discomfort to the workers and/or guests of the client and the neighbors must be undertaken with care, with all necessary safety precautions taken.
- The contractor shall take all effort to muffle the noises from his tools, equipment and workmen to not more than 80dBA.
- The contractor shall upon completion of working, remove and clear away all plant, rubbish and unused materials and shall leave the whole site in a clean and tidy state to the satisfaction of the Proponent. He shall also remove from the site all rubbish and dirt as it is produced to maintain the tidiness of the premises and its immediate environs.
- No blasting shall be permitted without the prior approval of the proponent and the local authorities.
- Borrow pits will only be allowed to be opened up on receipt of permission from the proponent.
- The standard of workmanship shall not be inferior to the Kenya Bureau of Standards and/or current British codes of practice where existing. No materials for use in the permanent incorporation into the works shall be used for any temporary works or purpose other than that for which it is provided. Similarly, no material for temporary support may be used for permanent incorporation into the works.
- The contractor shall maintain good working relationship with the community and implement the stakeholder engagement plan and the grievance redress mechanism.
CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

During the preparation of this report for the development of the proposed project, it is observed and established that most of the negative impacts on the environment can be mitigated and have potentially short term low significant effects. The positive impacts are highly rated and will benefit all stakeholders and the Kenol Township residents at large. The project proponents have proposed to adhere to prudent implementation of the environmental management and monitoring plan. The contractor should be committed to obtaining all necessary permits and licenses from the relevant authorities and have qualified and adequate personnel to do the project as proposed. The proponent has proposed adequate safety and health mitigation measures as part of the relevant statutory requirements.

It is the duty of NEMA to consider licensing the project on condition that the project proponent will carry out annual environmental audits during the construction of the project. This will be in compliance with the Environmental Management and Coordination Act, EMCA of 1999 and the Environmental Impact Assessment and Audit Regulations, Legal Notice No. 101 of 2003.
Annexure

A. Sample Chance Find Procedures  
B. Plate of Photographs  
C. Grievance Redress Mechanism  
D. Public Participation & Consultation Documents – Minutes of Meetings, Attendance Sheets and Questionnaires – Attached separately
Annex A. Sample Chance Find Procedures

Chance find procedures are an integral part of the project ESMMP and civil works contracts. The following is proposed in this regard:

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;
- Notify the supervisor, Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less);

Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the find shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.

Construction work may resume only after permission is given from the responsible local authorities or the Ministry of State for National Heritage and Culture concerning safeguard of the heritage.
Annex B. Plate of Selected Photographs

A section of Quarry Road part of which will be upgraded

Section of Quarry Road

Descent of Quarry Road towards the proposed box culvert area
Environmental & Social Impact Assessment Project Report for the Rehabilitation and Improvement of Quarry Roads in Mulolongo Area of the Nairobi Metropolitan Region

Need for proper drainage for the proposed road

Area of proposed box culvert

Trucks to and from quarries

Need of footpaths for those walking
Environmental & Social Impact Assessment Project Report for the Rehabilitation and Improvement of Quarry Roads in Mulolongo Area of the Nairobi Metropolitan Region

Stretch of Quarry Road

Public participation and consultations
GRIEVANCE RESOLUTION MECHANISM

1. Steps in dealing with grievances

1.1. Complaint received in writing from affected person

1.2. Recording of grievance in standard form

1.3. Reconnaissance site visit with the complainant.

1.4. Submission of detailed complaint to Resident Engineer for resolution by negotiation.

1.5. Submission of detailed complaint to the Grievance Committee for resolution by mediation.

1.6. Submission of complaint to NaMSIP for resolution.

2. Composition of grievance committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Organization</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Eng. G M Wairua</td>
<td>Resident Engineer</td>
<td></td>
<td>Committee Secretary</td>
</tr>
<tr>
<td>2 Eng. G M Nthenge</td>
<td>Assistant Resident Engineer</td>
<td></td>
<td>Committee Assistant Secretary</td>
</tr>
<tr>
<td>3 Site Administrator</td>
<td></td>
<td></td>
<td>Member</td>
</tr>
<tr>
<td>4 Chief</td>
<td></td>
<td></td>
<td>Community Representative</td>
</tr>
<tr>
<td>5 Member of Primary Stakeholder</td>
<td></td>
<td></td>
<td>Community Representative</td>
</tr>
<tr>
<td>6 Community Member</td>
<td>Local communities</td>
<td></td>
<td>Community Representative</td>
</tr>
<tr>
<td>7 Business Member</td>
<td>Business members</td>
<td></td>
<td>Business Representative</td>
</tr>
</tbody>
</table>
GRIEVANCE RESOLUTION PROCEDURE

- **Receipt of Complaint from**
  - Recording of grievance in standard forms
  - Reconnaissance site visit
  - Can the grievance be resolved by the Resident Engineer’s office?
    - Yes – 3 days
  - Can the grievance be resolved by Grievance Committee?
    - Yes – 5 days
  - Submission of grievance to NaMSIP for resolution.
    - Yes
  - **Grievance resolved**

STORAGE OF ALL GRIEVANCE RELATED DOCUMENTS
PUBLIC PARTICIPATION DOCUMENTS – ATTENDANCE SHEETS, MINUTES AND QUESTIONNAIRES – attached separately