ENVIROMENTAL IMPACT ASSESSMENT
FULL STUDY REPORT

REHABILITATION OF OUTFALL DRAIN AND
DRAINAGE INFRASTRUCTURE ON MANYANI
ROADS IN MANYANI ESTATE OF NAIROBI CITY
COUNTY

August 2014

PROPOSAL
Ministry of Land, Housing & Urban
Development (MoL&UD)
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CERTIFICATION OF DECLARATION AND DOCUMENT AUTHENTICATION

This Environmental and Social Impact Assessment Report has been prepared in accordance to 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)
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Directorate of Nairobi Metropolitan Development
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NAIROBI - KENYA

Designation: ____________________________________
Name: __________________________________________
Signature: _______________________________________
Date: ___________________________________________

Lead Expert
Eng. Stephen Mwaura is a registered Lead Expert on Environmental impact Assessment/Audit by NEMA (Reg. No. 0193), confirms that the contents of this report are a true representation of the Environmental and Social Impact Assessment (ESIA) of the proposed rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County.

Lead Expert: Eng. Stephen Mwaura
Signature: _______________________________________
Date: ___________________________________________
Do hereby certify that this report was prepared based on the information provided by the proponent, various Government agencies as well as that collected from other primary and secondary sources and on the best understanding and interpretation of the facts by the Environmental assessors. It is also based on the outcomes of the Public Participation & Consultation that was conducted involving the surrounding community and a church in the project area. It is issued without any prejudice.
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<th>Description</th>
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<tr>
<td>ASL</td>
<td>Above Sea Level</td>
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<tr>
<td>DEO</td>
<td>District Environment Officer</td>
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<td>DRE</td>
<td>District Roads Engineer</td>
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<td>DoNMED</td>
<td>Directorate of Nairobi Metropolitan Development</td>
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<td>EHS</td>
<td>Environmental Health and Safety</td>
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<td>EHSO</td>
<td>Environmental Health and Safety Officer</td>
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<td>ESIA</td>
<td>Environmental Social and Impact Assessment</td>
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<td>EMCA</td>
<td>Environmental Management and Co-ordination Act</td>
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<td>EMMP</td>
<td>Environmental Management &amp; Monitoring Plan</td>
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<tr>
<td>HIV/AIDS</td>
<td>Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome</td>
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<td>MoLH&amp;UD</td>
<td>Ministry of Land, Housing and Urban Development</td>
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<td>LN</td>
<td>Legal Notice</td>
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<td>NaMSIP</td>
<td>Nairobi Metropolitan Services Improvement Project</td>
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<td>NEMA</td>
<td>National Environment Management Authority</td>
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<td>OHS</td>
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<td>OSHA</td>
<td>Occupational Safety and Health Act</td>
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<td>PPC</td>
<td>Public Participation &amp; Consultation</td>
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<td>PCR</td>
<td>Physical Cultural Resources</td>
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<td>PD</td>
<td>Public Disclosure</td>
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<td>PPE</td>
<td>Personal Protective Equipment</td>
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<td>SEA</td>
<td>Strategic Environmental Assessment</td>
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<td>TOR</td>
<td>Terms of Reference</td>
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<td>VCT</td>
<td>Voluntary Counseling &amp; Testing</td>
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EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) project report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8 of 1999, and more specifically to the Environmental Impact Assessment & Audit Regulations, Legal Notice No. 101, 2003 of the Republic of Kenya. It was also prepared to meet the requirements of World Bank Safeguard OP4.01 (Environmental Assessment). More so it is a way of promoting benign environmental management for sustainable development. It is for this reason that this ESIA was commissioned. The Lead Expert registered with NEMA was contracted by the proponent to undertake the study with the objective of identifying both the negative and the positive impacts of the proposed project and identify areas that are likely to be impacted on by the project in accordance with the laid down environmental legislation and guidelines, carry out a systematic ESIA report that should contain among other issues, identification of key environmental aspects, recommendations on appropriate mitigative measures to minimize or prevent adverse impacts and develop an Environmental Management and Monitoring Plan (EMMP).

The proponent aims to rehabilitate the outfall drain and drainage infrastructure on Manyani roads, off Waiyaki Way in Nairobi City County. This will be coupled with improvement of the interspersing roads within the area of Manyani Estate.

The proponent is required to present this report in order to comply with the Environment Management Co-ordination Act 1999 and in particular part II of the Environmental (Impact Assessment and Audit) Regulations, 2003. The report has provided a summary statement of the likely environmental effects of the proposed rehabilitation.

The expert’s investigation examined the potential impacts of the project on the immediate surroundings with due regard to all the phases from construction through to completion and operational phase. It encompassed all aspects pertaining to the physical, ecological, socio-cultural, health and safety conditions at the site and its environs during and after construction. The study was based on laid down scientific qualitative procedures with the most recent methodologies and analysis required in ESIA and, strictly adheres to the relevant legislative framework governing the construction industry. Reference was also made to ESIA reports dealing with similar projects from other parts of the world.
Where possible, photographs and site maps and applications to local authorities to support findings or show the depth of investigations are as attached in the annexure.

The proponent of the proposed project has proposed to follow the laid down regulations, standards, laws and structural drawings as put out and proposed by the relevant authorities and professionals respectively. Our conclusion is that the project is important for the residents of Manyani Estate and the surrounding area as it assists in better storm-water management in the area as well as helping to curb erosion of soil, balancing environmental considerations and benefits. Adequate measures to mitigate the negative impacts and an Environmental Management and Monitoring Plan (EMMP) has been proposed as summarized in this report that the Proponent and the Contractor will adhere to during project implementation, commissioning, operations and decommissioning in the unlikely event it will ever be decommissioned.
TERMS OF REFERENCE

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

1. The project development impacts on the ecology. This will in essence cover:-
   i. The impacts of the development on biodiversity both within and outside the project development site.
   ii. Impacts due to loss of vegetation cover if any
   iii. Impacts on habitat quality and issues of habitat disruption.
   iv. Microclimate modifications and change.
   v. Surface run-off water, containment and flood control.

2. Social implications of the development within the locality, region and nationally will include: -
   i. Employment during project implementation.
   ii. Economic implications of the development.
   iii. Impact on livelihoods.
   iv. Demand and development of infrastructure and social amenities.
   vi. Public health implications.

3. Assess the impacts of development on landscape and land use such as: -
   (a) Examine the compatibility and complementarity of the development with the surrounding land uses.
   (b) Determine the impact on change on civic shape, scenery, aesthetic modifications.

4. Assess the impacts of the development on power demands, water demands, and access road congestion as well as possible impacts on surface and ground water qualities and quantities.
5. Develop an Environmental Management and Monitoring Plan (EMMP) that would mitigate possible negative impacts to the environment during project implementation, operations and decommissioning.
CHAPTER ONE: INTRODUCTION

1.1. Background
The proponent proposes to rehabilitate the outfall drain and drainage infrastructure on Manyani Roads in Manyani Estate of Nairobi City County. Manyani Estate outfall drain starts at Waiyaki Way behind Shell Petrol Station and drains to Musa Gitau Road through an earth drain for a distance of 120m. It crosses Musa Gitau Road through a 450mm ø culvert. The drain is diverted towards Waiyaki Way through 450mm ø and then to the original alignment through the access road between SaiSyra Centre and Deloitte & Touche Building. The drain then crosses the road through a 375mm diameter culvert to the Tabernacle Church where it is connected to another 450mm IBDs in-fall drain from Waiyaki Way. Then it runs through the Church and residential compounds as a 375mm ø closed drain to Manyani Road where it is joined by another in-fall from Karbarsiran Avenue before it runs as an open side drain for 50m. It is then joined by another in-fall from Waiyaki Way through Manyani West as it crosses Manyani Road through 600mm ø pipe to the drain into the way leave as an earth drain then crosses James Gichuru Road through swampy natural ground to the river near Muthangari Police Station for a total distance of 1550m.

1.2 Need for the Project
The culverts in the outfall drain lack capacity while the earth drain is blocked by vegetation which makes the storm water to overflow into the roads and flood the estate hence the need for intervention.

The proposed interventions on this outfall include the following:

a) Bush clearing, drain excavation and installation of 600mm ø IBDs between Waiyaki Way and Musa Gitau Road.

b) Installation of 600mm ø cross culvert at Musa Gitau Road with headwalls.

c) Construction of box culvert on the drain way leave between Musa Gitau Road and the Tabernacle Church.

d) Installation of 900mm ø cross culvert at the access road between SaiSyra Centre and the Tabernacle Church with headwalls.

e) Construction of rectangular reinforced concrete drain between the Tabernacle Church and other compounds to Manyani Road and then construction of 750mm ø IBDs, open drain on Manyani Road to the cross culvert.

f) Installation of 900mm ø cross culvert at Manyani Road with headwalls.
g) Finally, a trapezoidal canalized open drain with in-situ concrete reinforced by a layer of BRC mesh will be constructed for a distance of 1550m to connect the drain to the river near the junction of James Gichuru Road and Karbarsiran Avenue.

A Public Participation and Consultation exercise carried out by the Lead Expert to this report confirmed that the residents of the whole of Manyani Estate and the Institutions therein would cherish an environment that meets the following criterion:

- A functional drain so that no flooding occurs as has been happening when it rains
- Upgraded roads with adequate security lighting

The responses as received from the residents and other affected institutions in the area are as attached in the questionnaires in this report. The need therefore exists for rehabilitation of the outfall drain and drainage infrastructure on Manyani Roads in Manyani Estate of Nairobi City County.

1.3 Scope and Content

The ESIA project investigates and analyzes the anticipated environmental and social impacts of the proposed development in line with the Environmental (Impact Assessment and Audit) 2003 regulations. Consequently, the report will provide the following;

Nature of project

- The location of the project including the physical environment that may be affected by the projects activities.
- The activities that shall be undertaken during the project implementation
- The materials to be used, products and by-products including wastes 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 undertaken during and after the implementation of the project.
- 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 economic and social cultural impacts to local community and the nation in general
- The project budget
- Any other information that the proponent may be requested to provide by NEMA or the World Bank
All these aspects will be considered accordingly. 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 1999, and Environmental (Impact Assessment and Audit) Regulations 2003 as well as World Bank OP4.01 (Environmental Assessment) and other regulations.

The report emphasizes the duties of the proponent and contractor during the construction phase as well as the operation phase of this project.

1.4 Duties of the Proponent

It will be the duty of the proponent to ensure that all legal requirements 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 is also the one to fund the project or to arrange for its funding
- The proponent is also the one who has initiated the project and will also ensure its satisfactory implementation

1.5 Duties of the Contractor

- The contractor is to comply with all regulations and by-laws of the local Authority including serving of notices and paying of the fees.
- Prepare and maintain an approved progress chart, showing clearly the period allowed for each section of the work
- During the night and 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 on site.
- The contractor shall make good at his own expense any damage he may cause to public and private roads, drainages and pavements in the course of carrying out his work.
- The project manager shall define the area of the site, which may be occupied by the contractor for use as storage, on the site.
- 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 need be.
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 any subcontractors in the first instance.

The contractor shall take all possible precautions to prevent nuisance, inconvenience or injury to the surrounding community and to the public generally, and shall use proper precaution to ensure the safety of wheeled traffic and pedestrians.

All work operations which may generate noise, dust, vibrations, or any other discomfort to the workers and the neighborhoods must be undertaken with care, with all necessary safety precautions taken. No working at night after 6pm is allowed and not before 6am should work start.

The contractor shall take all effort to muffle the noises from his tools, equipment, trucks 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 and the residents. 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 shrubs, trees, bushes or underground thicket shall be removed except with the express approval of the proponent.

No blasting shall be permitted without the prior approval of the proponent and the relevant local authorities.

The standard of workmanship shall not be inferior to the current British codes of practice and /or the Kenya Bureau of Standards 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.
All the materials and workmanship used in the execution of the works shall be of the best quality and description. Any materials condemned by the resident engineer shall be immediately removed from the site at the contractors cost.

Environmental concerns need to be part of the planning and development process and not an afterthought; it is therefore advisable to avoid land use conflicts with the surrounding area residents. Finally, a comprehensive Environmental Management and Monitoring Plan (EMMP) is mandatory for a project of this magnitude and has been provided in this report. It is the duty and responsibility of all involved to comply with the requirements of this EMMP.
CHAPTER TWO: LEGAL AND LEGISLATIVE FRAMEWORK

2.1 Environmental Management and Coordination Act No. 8 of 1999
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 addition 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:

2.2 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. There should be provision for clean and sanitary working conditions. More so there must be also provision of quality and quantity wholesome drinking water.

2.3 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 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.

2.4 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.

**2.5 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.

**2.6 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 in to sewers. The code also prohibits construction of structures or building on sewer lines.

**2.7 Other Relevant Laws**

**2.7.1 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 during construction which will need to be managed through reuse, recycling or appropriate disposal. It is therefore anticipated that, the amount of materials to be discarded as waste during the project implementation will be minimum. It is recommended that the proponent should 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. It is further recommended that the proponent should consider the use of recycled or refurbished construction materials including those excavated from existing road. Purchasing and using recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste. To comply with the requirements of the regulations the proponent should undertake the following in addition to the above-mentioned recommendations;
i. Should not dispose any waste on the highway, street road, recreational area and public places;

ii. Segregate waste and group them according to their similarity for example plastics, toxic, organic etc;

iii. Ensure all waste is 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 possess 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. Implement cleaner production principles of waste management strategy namely reduce, reuse and recycle;

vi. Label all hazardous wastes 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 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.

2.7.2 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 are found under annex 2 of this report. 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, 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 are 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 EIA.

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, institutions in some sections it is therefore recommended that the construction team develop mitigation to reduce noise propagation in the project area.

2.7.3 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 this section 8 of the Act 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 alternations will be done at his/her costs.

2.7.4 Public Roads and Roads of Access Act (Cap 399)
Section 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. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

2.7.5 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. The project is under the provision of the Act.

2.7.6 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 EIA license if it considers that all the issues relevant to the project have identified and mitigation measures to manage them proposed.

2.8 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):

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

(b) 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 falling under Category B.

(c) 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.

(d) 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 particular 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 outfall drain and drainage infrastructure 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</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: DESCRIPTION OF THE PROJECT

3.1 Introduction and Project Objectives
Rapid urbanization has left Kenyan cities with huge unmet demand for critical infrastructure and basic services. This has constrained the productivity of businesses and negatively impacted the quality of life of residents. This uncoordinated urbanization has led to massive expansion of overcrowded and impoverished informal settlements; waste of many man hours in daily traffic jams due to lack of mass transport; uncollected solid waste, which end up blocking drainage systems, and contributing to periodic flooding; and sewage seeps into ground water, contaminating rivers and streams. Further, most major cities are financially fragile or insolvent, and have weak management structures, while key institutions lack adequate capacity.

Nairobi Metropolitan Service Improvement Project (NaMSIP) is part of a wide municipal development initiative by the Government and the development partners to address these problems. NaMSIP is an initiative of the Kenya Government with the support of the World Bank under the Country Partnership Strategy (CPS). The CPS emphasizes the themes of growth, equity, and environment, with a special emphasis on governance. NaMSIP contributes to the governance, growth, and improved environmental management agendas. It seeks to strengthen structures of governance in the metropolitan area, including the county administration and the new metropolitan authorities. NaMSIP contributes to the CPS’s growth objective by supporting design and implementation of critical urban services—including transport, sanitation, and solid waste management—that will allow the metropolitan area to meet the needs of businesses and residents. Investment in infrastructure also contributes to the growth agenda by improving the competitiveness of Kenya’s cities as places to live and invest.

NaMSIP is intended to improve services in the metropolitan area which are critical for economic development that include solid waste management, transport systems, storm water management, water supply and sanitation, disaster management and security/street lighting among many others. In addition, the implementation of the project will give the Ministry an opportunity to build its human resource and technical capacity in carrying out metropolitan-wide activities. NaMSIP is in line with the Government’s national development priorities and policies as well as ongoing public sector reform agenda. The project also supports strengthening of public sector management and accountability.
3.2 Description of the Project Area

Manyani Roads (Manyani Road, Manyani West Road, Manyani East Road, Manyani Close Road and Ewaso Ngiro Road) are located in Lavington area within Nairobi City County. The adjacent Manyani estate is on the west of Central Business District and is bordered by Karbarsiran Avenue to the south, Waiyaki Way to the north, Musa Gitau Road to the west and James Gichuru Road to the east.

3.3 Scope of Works

Manyani Road that is 0.5km long links James Gichuru Road with Kabarsiran Avenue and has the following characteristics;

a) The road is 500m long and 6m wide with channels on both sides.
b) The road formation is a combination of both cross-fall and camber with open drains.
c) The shoulders are 2m wide on both sides with overburden and grass.
d) There are several access culverts and cross culverts which are fully blocked and with no headwalls.
e) The carriageway pavement has potholes, ruts and cracks.

The proposed interventions on this road include the following;

a) Overburden removal, gravelling and laying of asphaltic concrete surfacing on the walkways.
b) Replacement of broken channels as edge restraints and to segregate walkways from carriageway.
c) Replacement of 300mm diameter IBDs and side slabs with 450/650mm diameter IBDs and installation of access and cross culverts with headwalls.
d) Pothole patching, regulation and overlay with asphaltic concrete.
e) Road markings and provision of traffic signs and road names.
f) Provision of traffic calming measures.
g) Installation of street lights.

Manyani West Road that is 0.1km links Waiyaki Way to Manyani Road and has the following characteristics;

a) The road is 100m long and 6m wide with channels on both sides.
b) The road formation is camber with open drain on both sides.
c) The shoulders are 2m wide with overburden and grass.
d) The carriageway pavement has potholes and ruts.
e) There are several access culverts and cross culverts which are fully blocked with no headwalls.

The proposed interventions on this road include the following:

a) Overburden removal on shoulders, gravelling and laying of asphaltic concrete surfacing.
b) Replacement of broken channels as edge restraints and to segregate walkways from carriageway.
c) Replacement of broken IBDs and side slabs with 450mm diameter IBDs and provision of access and cross culverts with headwalls.
d) Pothole patching, regulation and overlay with asphaltic concrete.
e) Road markings and provision of traffic signs and road names.
f) Provision of traffic calming measures
g) Installation of street lights

**Manyani East Road** that is 0.85km links James Gichuru Road to Karbarsiran Avenue and has the following characteristics;

a) The road is 850m long and 6m wide with channels on both sides as edge restraint.
b) The road formation is camber with 300mm ø open drain on both sides.
c) The shoulders are 2m wide with overburden and grass on both sides.
d) The carriageway pavement has cracks, ruts and potholes.
e) There are several access culverts and cross culverts which are fully blocked with no headwalls.

The proposed interventions on this road include the following:

a) Overburden removal on walkways, gravelling and laying of asphaltic concrete surfacing.
b) Replacement of broken channels as edge restraints and to segregate walkways from carriageway.
c) Replacement of 300mm ø IBDs with 450/650mm ø IBDS and installation of access and cross culverts with headwalls.
d) Pothole patching, regulation and overlay with asphaltic concrete.
e) Provision of traffic calming measures.
f) Road markings and provision of traffic signs and road names.
g) Installation of street lights
Manyani Close that is 0.52km long is a cul-de-sac off Manyani Road and has the following characteristics;

a) The road is 520m long and 6.5m wide with channels on both sides.
b) The road formation is camber with 300ø IBDs with side slabs on both sides.
c) The shoulders are 1.5m wide on both sides with overburden and grass.
d) The carriageway pavement has ruts, base failures and potholes.
e) There are several access culverts and cross-culverts which are fully blocked with no headwalls.

The proposed interventions on this road include the following:

a) Overburden removal on shoulders, gravelling and laying of asphaltic concrete surfacing.
b) Replacement of broken channels as edge restraints and to segregate walkways from carriageway.
c) Replacement of 300ø IBDs with 450/650mmø IBDs and provision of access and cross culverts with headwalls.
d) Construction of reinforced concrete rectangular drain on the RHS to help retain the embankment
e) Base repair, pothole patching, Regulation and overlay with asphaltic concrete.
f) Road markings and provision of traffic signs and Road Names.
g) Provision of traffic calming measures
h) Installation of streetlights

Ewaso Ngiro Road that is 0.12km is a cul-de-sac off Manyani Road and has the following characteristics;

a) The road is 120m long and 6m wide with channels on both sides.
b) The road formation is cross fall with 300mmø IBDs open drain on one side.
c) There are several access and cross culverts which are fully blocked with no headwalls.
d) The shoulders are 1m wide on both sides with overburden, bushes and grass.
e) The carriageway pavement has potholes, ruts and cracks

The proposed interventions on this road include the following:

a) Overburden removal on shoulders, gravelling and laying of asphaltic concrete surfacing.
b) Replacement of broken channels as edge restraints and to segregate walkways from carriageway.

c) Replacement of 300mm ø IBDs with 450mm ø IBDs and installation of access and cross culverts with headwalls.

d) Pothole patching, regulation and laying of overlay with asphaltic concrete

e) Road markings and installation of traffic signs and road names

f) Provision of traffic calming measures

g) Installation of street lights
CHAPTER FOUR: BASELINE INFORMATION OF THE STUDY AREA

4.1 Introduction

Nairobi lies at an altitude of 1680m above sea level, but this height ranges from 1500m (to the east) to 2300m (to the West). It is located at longitude 36° 50’ East and latitude 1° 18’ South about 140 km South of the Equator placing its high affect for the cooler air to keep its temperatures moderate. Nairobi City has experienced rapid growth both in terms of population and physical expansion. The physical area of Nairobi has been expanding tremendously from 3.84 Km² in 1900 to 684 Km² in 1963 which is the current official size of the City.

Nairobi City lies in the Athi River Drainage Basin. The major rivers that cross the City include Nairobi, Ruaraka, Ngong, Athi and Mathare River. All these drain from the West and flow towards the Eastern direction as dictated by the topographical features. As the rivers pass through the City, industrial effluents, municipal waste and siltation heavily pollute them.

4.2 Climate

The average daily temperature throughout the year varies slightly from month to month with average temperatures of around 17 degrees Celsius during the months of July and August to about 20 degrees Celsius in March. But, the daily range is much higher, with the differences between maximum and minimum temperatures each day around 10 degrees in May and up to 15 degrees in February. Between the months of June to September, southeast winds prevail in the coastal parts of Kenya and last up to several days without a break. The clouds cause day temperatures to remain low and most times the maximum temperature stay below 18 degrees Celsius. The minimum temperatures also remain low during cloudy nights, usually hovering around 8 degrees Celsius and sometimes even reaching 6 degrees Celsius. Clear skies in January and February also bring colder nights. The highest temperature ever reached in Nairobi was 32.8 degrees Celsius and the lowest was 3.9 degrees Celsius.

Because of Nairobi’s location just south of the equator in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end. This is not to say that values are always high, since the easterly winds coming off the Indian Ocean tend to keep the temperatures standard throughout the country; therefore the “warm sticky” feeling
is usually not associated with Nairobi as much as one would think. In the summer to autumn months of January to April, relative humidity values have been known to plummet to anywhere from 10% to 20%. The typical day, humidity-wise, starts off with nearly saturated in the morning hours, and steadily decreases throughout the remainder of the day. With these routinely high relative humidity figures, it is not surprising that the Nairobi climate is one that produces much rain annually. In fact, from the past 50 years, the expected amount of rain could be anywhere in the range of 500 to 1500 mm, with the average ringing in at 900 mm. The majority of these rainfall figures crash down in Nairobi in one major and one minor monsoon seasons respectively. The major monsoon season occurs within the months of March to May, and is called the “Long Rains” by the locals. The minor monsoon seasons emerges within the October to December Months, and is called the “Short Rains” by the Nairobi citizens. That is what the meteorologists as a whole know about the monsoon seasons. What they do not know is exactly when these seasons will start. There is usually not an indication of when these rainy seasons will start, since it is difficult to determine when one starts and when the other finishes. Consequently, a person may think there is only one rainy season when looking at the annual rainfall amounts.

4.3 Infrastructure

Due to such rapid urban growth, provision of basic infrastructure for all has become an important concern of development planners in Nairobi. Basic infrastructural services that have deteriorated due to such rapid increase in population include: Solid Waste Management (SWM) system; water and sewage systems; drainage and flood protection; roads; mass transportation; electric installations; and telecommunications. Greater environmental pollution, congestion and other problems have been the result of under-provision of such basic services. Manyani Estate is within the larger Nairobi and less than five kilometers from the Central Business District.

The city is well served, with good communication and transport network such as air, road, and railway. It is centrally located to serve the Eastern African countries. Bus and train stations are within an easy walk of the City Centre. The main railway line runs from Mombasa to Malaba though Nairobi City. This network facilitates transportation of agricultural products from western Kenya to the coast. The city is a hub of road transport connecting other major towns in the country.
On air transport Jomo Kenyatta International Airport (JKIA) is used to transport goods and persons from all over the world into the country and vice versa.

4.4 Population – Social Baseline Information of Project Area

The cosmopolitan capital of Kenya, currently houses over 3.5 million people with a growth rate estimated at 7% which represents 51% of the country’s urban population. Nairobi City has one of the highest urban population densities in the country of up to 3,079 persons per square kilometer, bringing with it the associated needs for residential facilities. Such needs can be catered for by establishment of adequate transportation and drainage facilities within residential areas that will provide adequate habitation for the ever-increasing population. The project area of Manyani consists of large residential areas with several gated communities with the estate interspersed with several access roads. Most of those residing in the area are businessmen and various professionals mainly engaged in their activities in Nairobi City. Most of these residents were involved in the public participation & consultation where they gave their views supporting the project. Within the project area is also a church. At the end of this report is a map of the area showing the orientation of the drain whose capacity will be improved and enhanced for better management of storm-water.

4.5 Economic Activities

Nairobi city is the centre of commercial, manufacturing and industrial development in East Africa. The major economic activities in Nairobi City include trade. Like most modern cities, Nairobi has crowded markets and trading areas, middle class suburbs, and spacious mansions for the rich and powerful. It also has vast overcrowded tenements and slums, exploitation, and high unemployment.

4.6 Waste Management

Solid waste must be disposed of in accordance with Nairobi City County by laws and good environmental practice. The anticipated waste management related activities of the project area include solid waste deposition into receptacles in the area and later collected by registered solid waste handlers (registered with NEMA) whilst wastewater is channeled in Nairobi City County sewer line for onward treatment at Ruai sewerage works.
CHAPTER FIVE: POTENTIAL ENVIRONMENTAL IMPACTS

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 rehabilitation of the outfall drain and drainage infrastructure and also during the operational phase of this 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 impacts of construction activities

5.2.1 Extraction and use of construction materials

Construction materials such as the culverts, rough stone, ballast, bitumen, sand and cement required for the rehabilitation of the outfall drain and drainage infrastructure will be obtained from dealers (hardware). Since substantial quantities of these materials will be required for this project, the availability and sustainability of such resources at the extraction sites will be negatively affected, as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.

5.2.2 Dust emissions

During construction, the project may generate substantial quantities of dust at the site and its surrounding. The sources of dust emissions will include excavations (if in dry weather), 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 particulates along the way as a result of diesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts. Because large quantities of building materials are required, some of which are sourced outside Nairobi, such emissions can be enormous and may affect a wider geographical area. 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 movements 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 JCBs (or 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. This is particularly so since a large area of the project site is under residential dwellings.

5.2.5 Risks of accidents and injuries to workers
Because of the construction activities including excavations and clearance of existing drains, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from injuries from hand tools and construction equipment, cuts from sharp edges or heavy objects falling on toes and the risk of vehicular accidents.

5.2.6 Increased soil erosion
Clearance of land and excavation works will lead to possibility of increase in soil erosion at the project site and release of sediments into the drainage systems. Uncontrolled soil erosion can have adverse effects on the local river.

5.2.7 Solid waste generation
Large quantities of solid waste may be generated as a result of excavations and removal of parts of existing drains for replacement. Such waste will consist of rejected materials, surplus materials, surplus soil, excavated materials, paper bags, empty cartons, among others. Such solid waste materials can be injurious to the environment through blockage of drainage systems, choking of
water bodies and negative impacts on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as paints, cement, adhesives and bitumen, while some of the waste materials including plastic containers are not biodegradable and can have long-term and cumulative effects on the environment.

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 is supplied by Nairobi Water and Sewerage Company. Water will mainly be used for concrete mixing, dust suppression and sanitary and washing purposes. Excessive water use may negatively impact on the water source and its sustainability.

5.2.10 Social disturbance
As mentioned before, the project area is a residential area with fenced and gated households. There is a likelihood of disturbance to local residents during construction together with interaction of non-local workers with the residents. This disturbance is mainly in the area of movement of trucks moving in and out of the project area bringing in construction materials and carting away any materials that may have some noise to the residents, especially those that may be at home during the day when the works are going on. The orientation of the drain whose capacity will be enhanced in the works is on the lower side of the residential areas and will not interfere with the residences. A picture of the orientation of the drain is attached to this report. Improvement of the storm-water drains along the access roads in Manyani may also somewhat interfere with the movement of vehicles for the residents as they leave or get back to their houses, though this will be minimal. This will be minimized as the contractor will carry out the works during the day when most residents
have already left their residences for their various engagements in the city. The drain that is being improved with enhancement of its capacity already exists and there are no new excavations.

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 quite high in Nairobi and the 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 locally in Nairobi City and the surrounding areas. 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 storm water flow
The drainage system will lead to increased volume and velocity of storm water or run-off flowing across the area covered by the project. 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 and if the drainage channels are not of adequate capacity.

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 for the materials suppliers and contractor, the rehabilitation project will contribute towards the national and local revenue earnings.
5.6 Negative environmental impacts of decommissioning activities

5.6.1 Solid waste
In the unlikely event of demolition of the interspersing roads within the project area and the drainage infrastructure, large quantities of solid waste are likely to result. The waste will contain the materials used in construction including concrete, metal, kerbs, bitumen, stones, broken culvert sections 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.

5.6.2 Dust
Large quantities of dust will be generated during demolition works, especially if they are undertaken during dry weather. This will affect demolition staff as well as the neighboring residents.

5.6.3 Noise and vibration
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.
CHAPTER SIX: ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, technology, scale 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 for the rehabilitation of outfall drain and drainage infrastructure in Manyani roads in Nairobi City County.

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 the county and the community as a whole. The Manyani Estate roads will continue flooding intensely during rains with concomitant soil erosion into the river. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The drainage status of the Manyani area would remain unchanged.
- No employment opportunities will be created for workers who will work in the project area.
- Increased urban poverty and crime in Kenya.
- Discouragement for investors and loaners
- Development of infrastructural facilities (outfall, drains and associated infrastructure) will not be undertaken.
- Lost opportunity for materials suppliers

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, Kenyans, 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. Equipment that saves energy and water will be given first priority without compromising on cost or
availability factors. The drainage works will be made using locally sourced stones, cement, sand (washed and clean) or pre-fabricated culverts, all which meet the Kenya Bureau of Standards requirements.

6.4 Solid waste management alternatives
A lot of solid wastes will be generated from the proposed project. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness programme in the management and the staff. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, the proponent will need to establish agreement with the Nairobi City Council to ensure regular waste removal. This last option is the most feasible.
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 activities 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 matrix in this report.

7.2 Mitigation of construction phase impacts
7.2.1 Efficient sourcing and use of raw materials
The selected 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 Demolitions
There will be minimum demolitions in this project. However, old drainage may be demolished to give way to new more suitable drainage. Possibility of reuse of removed old drainage culverts needs to be explored or use of them as filler material in another construction site.
7.2.3 Minimization of run-off and soil erosion
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 where possible 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.

7.2.4 Minimization of construction waste
It is recommended that 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 contractor 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 contractor 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.

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. Dusty 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.

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 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. 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 as outlined in the EMMP. It is recommended that a Safety Officer is engaged by the contractor to be on site throughout.

7.2.9 Reduction of energy consumption
Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts.

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.

7.3 Mitigation of operation phase impacts

7.3.1 Management of storm-water runoff
The contractor will ensure that proper drainage is provided and regularly maintained for storm-water run-off management taking advantage of the outfall drain rehabilitation for better storm-water management

7.4 Mitigation of decommissioning phase impacts

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

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

7.4.3 Minimization of noise and vibration
Significant impacts on the acoustic environment will be mitigated as described.
8.1 Significance of an EMP
An Environmental Management and Monitoring Plan (EMMP) 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 EMMP is a vital output of an Environmental and Social Impact Assessment as it provides a checklist for project monitoring and evaluation. The EMMP outlined below will address the identified potential negative impacts and mitigation measures of the Project based on the chapter on impacts and their mitigation.

8.1.1 Pre-Construction & Construction Phases EMMP
The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase of the project are outlined in Table 3 below:
Table 3: The EMMP for the Rehabilitation of Outfall Drain and Drainage Infrastructure in Manyani 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 suppliers who use environmentally friendly processes in their operations.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<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>
<td>-</td>
</tr>
<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></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>5,000</td>
</tr>
<tr>
<td>2) Run off and soil erosion</td>
<td>▪ Apply soil erosion control measures to reduce run-off velocity and increase infiltration of storm water into the soil, e.g. silt traps, barriers, tree planting.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site.</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>
</tr>
<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>
</tr>
<tr>
<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 weather</td>
<td>Contractor</td>
<td>One-off</td>
<td>20,000</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>4) Air/ Dust pollution</td>
<td>▪ Sprinkle water on dusty access routes each day to reduce dust generation by construction vehicles</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>10,000/month</td>
</tr>
<tr>
<td></td>
<td>▪ Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas. Switch off or keep vehicle engines at these points</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>
</tr>
<tr>
<td></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>
</tr>
<tr>
<td>6) Noise Pollution</td>
<td>▪ Sensitize construction drivers to avoid gunning of vehicle engines or hooting</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<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>
</tr>
<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>10,000</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>
</tr>
<tr>
<td>8) Exploitation of water resources</td>
<td>▪ Promote recycling and reuse of water as much as possible. ▪ Organize collection of rainwater on site.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td>9) Accidents</td>
<td>▪ Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.</td>
<td>Contractor</td>
<td>Continuous</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></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></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>10) Hygiene</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>20,000</td>
</tr>
<tr>
<td>11) 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>12) 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>5,000 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>2,000 per examination</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>2,000 per examination</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that materials (cement bags, aggregates, bitumen drums, prefabricated culverts) 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>5,000</td>
</tr>
<tr>
<td>13) 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>
</tbody>
</table>
### Objective/Plan

<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>14) 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>2,000</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that adequate provisions are in place to immediately stop any operations where there in an imminent and serious danger to health and safety and to evacuate workers</td>
<td>Contractor</td>
<td>One-off</td>
<td>10,000</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>
</tr>
<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>
</tr>
<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>5,000</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>▪ 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></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</td>
<td>Contractor</td>
<td>Continuous</td>
<td>-</td>
</tr>
<tr>
<td>15) Provisions of PPE to Workers.</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>
</tbody>
</table>
Environmental and Social Impact Assessment Report for the Rehabilitation of Outfall Drain and Drainage Infrastructure in Manyani Roads in Nairobi City County

<table>
<thead>
<tr>
<th>Objective/Plan</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Monitoring Mechanism</th>
<th>Approximate Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<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></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>▪ 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 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>5,000</td>
</tr>
<tr>
<td></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>5,000</td>
</tr>
<tr>
<td>16) Sanitary</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>26) 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>
</tbody>
</table>

The key responsibilities regarding compliance to the above EMMP 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 EMMP

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 in the Table 3 below.

<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) Storm Water Run-off Management</td>
<td>• Provide proper storm water drainage from the paved roads to take advantage of the rehabilitated outfall drain and drainage infrastructure.</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) Health and Safety Risks.</td>
<td>• Implement all necessary measures to ensure health and safety of workers and the general public during operation of the office project as stipulated in the 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 in Tables 2 and 3 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 in the Table 5 below.
### Table 5: EMMP 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>
<tr>
<td></td>
<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. Otherwise, Nairobi City County should be contacted to assist in the wastes disposal.</td>
<td>Contractor</td>
<td>One-off</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>• Donate reusable demolition waste to charitable organizations, individuals and institutions</td>
<td>Contractor</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td>Degeneration of vegetation at the construction site</td>
<td>• Implement an appropriate re-vegetation programme to restore the site to better status</td>
<td>Contractor</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consider use of indigenous plant species in re-vegetation</td>
<td>Contractor</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.</td>
<td>Contractor</td>
<td>Once-off</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER NINE: AUXILIARY INFORMATION

9.1 Budget
The works are estimated to cost about $2,115,534.

9.2 Monitoring Guidelines
Continuous observations and assessment is essential so that if unforeseen safety dangers are noticed, alternatives must be sought for. Risk assessment of accidents, and other adverse impacts should not be ignored in the construction plan. Waste management in the construction should be strictly followed. Mitigation measures of storm water management are essential. Safety standards should constantly be maintained, with indicators like condition of equipment, contractor compliance with the set regulations, and tracking of accidents on-site logged regularly.

9.3 Reporting
Constant reporting by the contractor to the proponent is necessary to ensure the project is executed as per the plans and drawings. The safety officer should always remain on site to report any safety concerns for urgent mitigation. The officer should also at all times enforce safety requirements as per the relevant legislation. The contractor must consult the proponent to maintain a clear understanding of all the aspects of the project. Nairobi City County Government should be involved where necessary in early stages of the project to increase acceptance and ensure necessary partnership is in place (e.g. waste removal requirements).
CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

During the preparation of this ESIA report for the rehabilitation of outfall drain and drainage infrastructure in Manyani Roads in Nairobi City County it is observed and established that most of the negative impacts on the environment can be mitigated and have potentially no significant effect. The positive impacts are highly rated and will benefit all stakeholders and the Manyani residents at large. The project proponents have proposed to adhere to prudent implementation of the environmental management and monitoring plan. The contractor is 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 subject to annual environmental audits once it has been commissioned. This will be in compliance with the Environmental Management and Coordination Act of 1999 and the Environmental Impact Assessment and Audit regulations, 2003.
REFERENCES


Kenya gazette supplement Acts Building Code 2000 by government printer, Nairobi

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Kenya gazette supplement Acts Local Authority Act (Cap. 265) government printer, Nairobi

Kenya gazette supplement Acts Penal Code Act (Cap.63) government printer, Nairobi

Kenya gazette supplement Acts Physical Planning Act, 1999 government printer, Nairobi

Kenya gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi


The Environmental Management & Coordination Act 1999 (EMCA 1999).
Annexure

- Plate of Photographs
- Site Plan
- Orientation of Drain
- Sample Chance Find Procedures
- Site Drawings (Certified by Local Authority – Municipal Council Engineer)
- Public Participation & Consultation Questionnaires of Surrounding Community
Plate of Photographs

Part of the road in Manyani Estate that will be rehabilitated with the drains

Part of the outfall and drains for rehabilitation in Manyani
Another part of the outfall and drains for rehabilitation in Manyani

Outfall in Manyani Estate
Environmental and Social Impact Assessment Report for the Rehabilitation of Outfall Drain and Drainage Infrastructure in Manyani Roads in Nairobi City County

Road in Manyani for rehabilitation and drainage improvement

Another road in Manyani for rehabilitation and drainage improvement
Orientation of the Drain to be Improved and Capacity Enhanced in Manyani. This Orientation follows the Old Line.
Sample Chance Find Procedures

Chance find procedures are an integral part of the project EMMP 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.
# Attendance List for Public Participation & Consultation Meeting – Manyani Residents & Surrounding Community on the Rehabilitation of Outfall Drain and Drainage Infrastructure in Manyani Roads in Nairobi City County

Date: ______________________

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Name of Participant</th>
<th>Organization</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUBODH K. SHARMA</td>
<td>MARA RESIDENT</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>M. JAIN (MOHANTY)</td>
<td>MARA RESIDENT</td>
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<tr>
<td>3</td>
<td>A. JAIN (MOHANTY)</td>
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<td>4</td>
<td>Y. ICHEHANE</td>
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<td>5</td>
<td>R. J. KHUR</td>
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<tr>
<td>6</td>
<td>F. D'SOUZA</td>
<td>KIANDA FOUNDATION</td>
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<tr>
<td>7</td>
<td>J. SANTANAI</td>
<td>MARA RESIDENT</td>
<td></td>
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<tr>
<td>8</td>
<td>MOHAN</td>
<td>MARA RESIDENT</td>
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<tr>
<td>9</td>
<td>VRINDA SHARMA</td>
<td>MARA RESIDENT</td>
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<tr>
<td>10</td>
<td>H. MADIRAMMA</td>
<td></td>
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<tr>
<td>No</td>
<td>Name</td>
<td>Designation</td>
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<tr>
<td>11</td>
<td>Patrick Mumbi</td>
<td>WASH Officer</td>
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<td>12</td>
<td>An Olum</td>
<td>DSMC</td>
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<td>13</td>
<td>Festo Winame</td>
<td>Kangemi</td>
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<td>14</td>
<td>Puchpa Chithomba</td>
<td>MARA</td>
<td>Sushpa Kashumba</td>
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<td>15</td>
<td>Jayden Biele</td>
<td>Mara</td>
<td>Jayden</td>
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<tr>
<td>16</td>
<td>Ravi</td>
<td>MARA</td>
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<td>Shadrack Hare</td>
<td>MARA</td>
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<td>18</td>
<td>Njayege Kitsuli</td>
<td>MARA resident</td>
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<td>19</td>
<td>Fred Karanja</td>
<td>MARA</td>
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<td>Elizabeth Mbeze</td>
<td>MARA</td>
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<tr>
<td>21</td>
<td>Amanda Majimis</td>
<td>MARA RESIDENT</td>
<td>Majimis</td>
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<td>22</td>
<td>Sambie Shui</td>
<td>Mara Residency</td>
<td>Sambie</td>
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<td>23</td>
<td>Sheila Padet</td>
<td>Mara Residency</td>
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<td>Elisa Shamp</td>
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<td>Johan Shadari</td>
<td>Mara Residency</td>
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<td></td>
<td>Name</td>
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<tr>
<td>26</td>
<td>Jane Pinda</td>
<td>Masa Resident</td>
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<td>Felix Pia Pinta</td>
<td>Masa Resident</td>
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<td>28</td>
<td>Catherine Wambulu</td>
<td>Maryknoll Fathers</td>
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<td>29</td>
<td>Varun Sharma</td>
<td>Masa Resident</td>
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<td>Rauda Khatib</td>
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<td>31</td>
<td>Dr. Louie Sangale</td>
<td>Masa Resident</td>
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</tr>
<tr>
<td>32</td>
<td>Ben Keshavjee</td>
<td></td>
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<td>33</td>
<td>Layla</td>
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<td>Anne W. Njoroge</td>
<td>Masa Resident</td>
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<td>35</td>
<td>Keziah w Nyinjage</td>
<td>Masa Resident</td>
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<td>36</td>
<td>Joanne Njoroge</td>
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<td>Yvonne Mnyage</td>
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<td>38</td>
<td>John Kibata</td>
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<td>Victoria Kerig</td>
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<td>Shadrack Kerig</td>
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<td>41</td>
<td>Deborah W Kerig</td>
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<td>Name</td>
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<tr>
<td>42</td>
<td>Bernard Michele</td>
<td>143</td>
<td>Mangani</td>
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<tr>
<td>43</td>
<td>Deepu &amp; Kuki Mahajan</td>
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<tr>
<td>44</td>
<td>Deepu Mahajan</td>
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<td>45</td>
<td>Kim Sharr</td>
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<td>46</td>
<td>N. Sauras Chana</td>
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<td>47</td>
<td>Nancy Chung</td>
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<td>48</td>
<td>Siladamere Kurir</td>
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<td>49</td>
<td>Sonjek Jhik</td>
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<td>50</td>
<td>Eng. Stephen Mwaure</td>
<td>NamSIP</td>
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<tr>
<td>51</td>
<td>Eng. K. Wamugumwa</td>
<td>NCCG</td>
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</tr>
</tbody>
</table>

7|Page
## Attendance List for Public Participation & Consultation Meeting –
Manyani Residents Association (MARA) Officials on the
Rehabilitation of Outfall Drain and Drainage Infrastructure in
Manyani Roads in Nairobi City County

**Date:** Friday March 6, 2015

<table>
<thead>
<tr>
<th>S/ No.</th>
<th>Name of Participant</th>
<th>Organization</th>
<th>Signature</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Deepu Mahcijam</td>
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<td>3</td>
<td>Najroqi Kabatia</td>
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<td>4</td>
<td>Sarjew Gal</td>
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<td>Lernos Stu</td>
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<td>6</td>
<td>Khomti Bharti</td>
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<td>7</td>
<td>Dudley Sharma</td>
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<td>8</td>
<td>Shlodwoe Keena</td>
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<td>9</td>
<td>Varun Sharma</td>
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<td>Name</td>
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<tr>
<td>10</td>
<td>Shafiq Shah</td>
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<td>11</td>
<td>Shafiq Haq</td>
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<td>12</td>
<td>Eng. Stephen Mwaura</td>
<td>NaMSIP</td>
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<td>13</td>
<td>Prinda Sharma</td>
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</tbody>
</table>
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

Project Name: Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

Project Proponent: Directorate of Nairobi Metropolitan Development

Date: March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   Yes [ ] No [ ]

2. Do you think this project will affect the normal land use in the area and if so in what way?
   [ ]

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   [ ]

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   [ ]

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   [ ]

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   [ ]

Enhancement of local area and security.
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

None.

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

No.

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

No.

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

None.

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

N/A.

12. In your conclusion, do you welcome the project in the said area?

Definitely.

13. Any relevant observations, recommendations or comments on this project.

Make sure project is done properly.

Project Thalathi

Name (Optional): ........................................

ID Number (Optional): 444444

Telephone (Optional): 0726874689

Signature: (With Company Stamp if Institution)...

For

Petty
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, or required by the National Environment Management Authority, NEMA.

Project Name: Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

Project Proponent: Directorate of Nairobi Metropolitan Development

Date: March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   Yes ☑ No □

2. Do you think this project will affect the normal land use in the area and if so in what way?
   NO

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   NO

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   Drainage will be improved

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   NO

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   Improved Security Aesthetics
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

   NON

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

   NO

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

   NO

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

    NON

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

    NON

12. In your conclusion, do you welcome the project in the said area?

    YES

13. Any relevant observations, recommendations or comments on this project.

    Highly recommended

Name (Optional): Margaret Rade

ID Number (Optional): 7125203

Telephone (Optional): 0722530468

Signature: (With Company Stamp if Institution)
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

Project Name: Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

Project Proponent: Directorate of Nairobi Metropolitan Development

Date: March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   Yes [ ] No [ ]

2. Do you think this project will affect the normal land use in the area and if so in what way?
   Do not think so.

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   Not any I know.

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   I believe the same will be improved.

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   Yes. Wastes to be dumped at designated dumping sites.

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   Drainage and passability of the roads will be improved greatly.
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

Disruption of traffic expected.

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

No.

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

I don't think so.

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

Not any I know.

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

Control noise pollution, waste etc.

12. In your conclusion, do you welcome the project in the said area?

Yes.

13. Any relevant observations, recommendations or comments on this project.

More.

Name (Optional): .................................................................

ID Number (Optional): ...........................................................

Telephone (Optional): .........................................................

Signature: (With Company Stamp if Institution)..........................
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - **Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County**. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

**Project Name:** Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

**Project Proposant:** Directorate of Nairobi Metropolitan Development

**Date:** March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   - Yes [✓]
   - No [ ]

2. Do you think this project will affect the normal land use in the area and if so, in what way?
   - No [ ]

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   - No [ ]

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   - No [ ]

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   - No [ ]

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   - Yes [✓]
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

Road works will cause minor inconveniences but we are happy to accommodate this process.

8. Do you think construction, commissioning, and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

No

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

No

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

None

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

Roads in the area are being resurfaced. I do not foresee any hazard to the environment.

12. In your conclusion, do you welcome the project in the said area?

Yes, very much

13. Any relevant observations, recommendations or comments on this project:

All the residents are looking forward to these works being carried out in the area.

Name (Optional): VRINDA SHARMA

ID Number (Optional): 20767020

Telephone (Optional): 0722-515646

Signature: [Handwritten]

House No: 306, Ewaso Nyiro Park, off Manyani Road
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - **Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County**. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

**Project Name:** Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

**Project Proponent:** Directorate of Nairobi Metropolitan Development

**Date:** March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   - Yes [X]  
   - No [ ]

2. Do you think this project will affect the normal land use in the area and if so in what way?
   - NO. The land use is residential

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   - NONE

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   - NONE

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   - NONE

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   - IMPROVED ACCESS AND SECURITY
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

NIL

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

NO

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

NO. IT WILL IMPROVE THE ENVIRONMENT

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

N/A

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

N/A

12. In your conclusion, do you welcome the project in the said area?

YES, THE COUNCIL IS DOING A GOOD JOB.

13. Any relevant observations, recommendations or comments on this project.

PLEASE ENSURE THE JOB IS DONE PROPERLY AND IN A TIMELY MANNER.

Name (Optional): SUSAN N KIMANZI

ID Number (Optional): 11448032

Telephone (Optional): 0722 606153

Signature: (With Company Stamp if Institution) KIMANZI
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

Project Name: Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

Project Proponent: Directorate of Nairobi Metropolitan Development

Date: March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   Yes [ ] No [ ]

2. Do you think this project will affect the normal land use in the area and if so in what way?
   No. ________________________________________________________________

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   No. ________________________________________________________________

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them
   Improvement of the storm drain. _______________________________________

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   None. _______________________________________________________________

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   Enhancement of security, Beautification of the area, Improved infrastructure.
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

None

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

None

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

None

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

None

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

None

12. In your conclusion, do you welcome the project in the said area?

Yes

13. Any relevant observations, recommendations or comments on this project.

Timely

Name (Optional): Deborah Wang

ID Number (Optional): 300

Telephone (Optional): 1254 700 5266 25

Signature: (With Company Stamp if Institution)
This questionnaire is intended to ensure there is adequate Public Participation & Consultation before implementation of the said project - Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA.

**Project Name:** Rehabilitation of Outfall Drain and Drainage Infrastructure on Manyani Roads in Nairobi City County

**Project Proponent:** Directorate of Nairobi Metropolitan Development

**Date:** March 2014

1. Are you aware of the construction of this project and do you know its exact location?
   - Yes [ ]
   - No [ ]

2. Do you think this project will affect the normal land use in the area and if so in what way?

3. Are there historical or cultural heritage that would be affected by this project? If so, state them.
   - No.

4. Are there hydro-geological (ground-water) or surface water resources condition that will be affected by this rehabilitation project? If so, state them.
   - No.

5. Do you think there will be any wastes generated during this project and how do you propose that is handled?
   - No.

6. What are the expected POSITIVE impacts of the project from construction phase through to commissioning and operations phases?
   - Security will be enhanced. 
   - Access to other areas for business purposes will also be enhanced.
7. What are the expected NEGATIVE impacts of the project from construction phase through to commissioning and operations phases?

[Text: None to our knowledge]

8. Do you think construction, commissioning and operations will cause any problems of aesthetics, noise, lighting etc? Please explain.

[Text: No]

9. Is this construction going to affect the environment negatively in any way you know or think of? Please explain.

[Text: No]

10. What environmental hazards would you associate with this project during construction, commissioning and operations?

[Text: None]

11. What suggestions would you make to mitigate any adverse environmental impacts during the project construction, commissioning and operations?

[Text: None]

12. In your conclusion, do you welcome the project in the said area?

[Text: Yes. Absolutely]

13. Any relevant observations, recommendations or comments on this project.

[Text: We support this noble initiative]

Name (Optional): .................................................................

ID Number (Optional): ...........................................................

Telephone (Optional): ............................................................

Signature: (With Company Stamp if Institution)..............................