

# REPUBLIC OF KENYA



## ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED DRILLING OF BOREHOLES AND ERECTION OF ELEVATED STEEL TANKS IN INDUSTRIAL AREA, UMOJA AREA AND NAIROBI CBD AREA FIRE FIGHTING STATIONS IN NAIROBI CITY COUNTY OF THE NAIROBI METROPOLITAN REGION



### **PROPONENT**

**Ministry of Transport, Infrastructure, Housing and Urban Development  
State Department of Housing & Urban Development  
Nairobi Metropolitan Services Improvement Project, NaMSIP  
P.O. BOX 30450 – 00100  
NAIROBI.**

**August 23, 2017**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED  
DRILLING OF BOREHOLES IN INDUSTRIAL AREA, UMOJA AREA AND NAIROBI CBD AREA  
STREET FIRE FIGHTING STATIONS IN NAIROBI COUNTY.**

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**Certificate of Declaration and Document Authentication**

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

This report is prepared for and on behalf of:

**The Proponent**

**The Senior Principal Superintending Engineer (Transport)**, Ministry of Transport, Infrastructure, Housing and Urban Development, State Department of Housing and Urban Development,

P.O. Box 30130-00100,  
**Nairobi - Kenya.**

Designation -----

Name -----

Signature -----

Date -----

**Lead Expert**

**Boniface Musulu Musembi** is a registered Lead Expert on Environmental Impact Assessment/Audit (EIA/EA) by the National Environment Management Authority –NEMA (Reg. No. 7515), confirms that the contents of this report are a true representation of the Environmental & Social Impact Assessment of the proposed drilling of boreholes and erection of elevated steel tanks in Industrial area, Umoja area and Nairobi CBD area fire fighting stations in Nairobi County for the Nairobi Metropolitan Region. This report is issued without prejudice.

Lead Expert – **Boniface Musulu Musembi**

Signature: \_\_\_\_\_

## EXECUTIVE SUMMARY

### I. Project

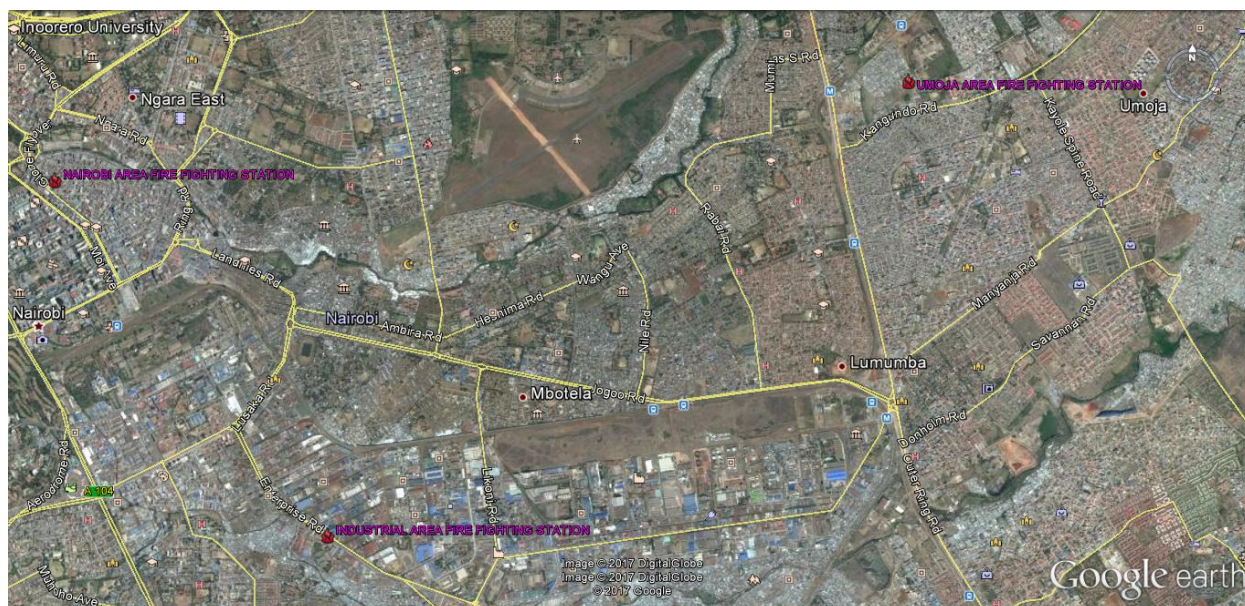
The Project is proposed drilling of boreholes and elevated tanks in Industrial area, Umoja area and Nairobi CBD area fire fighting stations to provide reliable water for firefighting emergencies and supplement domestic water in the stations with approximately additional 20.0m<sup>3</sup> per day,

The Project is planned to be financed under the Nairobi Metropolitan Services Improvement Project (NaMSIP) which is a Project funded jointly by the World Bank and Government of Kenya. The Project was approved by the Bank in May 2012 for a period of five years, and further extended for an additional 18 months until 2019. The Project lead implementing agency is the State Department of Housing and Urban Development under the Ministry of Ministry of Transport, Infrastructure, Housing & Urban Development (MTIH&UD). The Project is financing investments in infrastructure and service delivery in the Nairobi Metropolitan Region, the main Project Development Objective (PDO) is to strengthen urban services and infrastructure in the Nairobi metropolitan area.

### II. Project location / Ownership

The Project sites are located at Industrial area, Umoja area and Nairobi CBD area fire fighting stations. The Industrial Area Fire Station is off Enterprise Road, Opposite Isiolo Road junction. Umoja Area Fire Station is off Kangundo Road while the Nairobi CBD area fire fighting station is along Tom Mboya Street. The land Parcel belongs to Nairobi County Government. Also, during stakeholder engagement forums, the site ownership was verified by stakeholders as Nairobi County Government. ESIA field assessment identified that the sites are free from encroachment and therefore no Resettlement issues will be triggered as described in the World Bank Policy on Involuntary Resettlement (OP) 4.12

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**Figure 1: Google earth image showing fire fighting station where the proposed project sites are located**

### **III. Policy and Legal Regulatory Instruments**

The ESIA Report preparation was guided by provision of relevant policies, legislation and institutional frameworks that guide preparation of ESIA in Kenya and the World Bank Safeguards Policies. These instruments are presented in **1 below:**

**Table 1: National Policy and Legal Instruments**

<b>Policy Provision</b>
<ul style="list-style-type: none"> <li>• National Policy for Disaster Management in Kenya 2009</li> <li>• National Disaster Response Plan, 2009,</li> <li>• Constitution of Kenya 2010</li> <li>• Kenya Vision 2030</li> <li>• Nairobi metro 2030</li> <li>• The Sustainable Development Goals</li> <li>• National Environment Policy (NEP)</li> <li>• National water policy</li> <li>• National Land Policy</li> <li>• HIV and AIDS Policy 2009</li> <li>• Gender Policy 2011</li> </ul>
<b>Acts of Parliament</b>
<ul style="list-style-type: none"> <li>• Environmental Management and Coordination Act (EMCA) 1999 amended in 2015</li> <li>• Public Health Act (Cap.242)</li> </ul>

- Water Act 2002 amended in 2016
- Environmental and coordination (water quality) regulation
- Physical Planning Act 1996 (286)
- Occupational Health and Safety Act (OSHA 2007),
- Urban areas and cities act 2011
- Works Injuries and Benefits Acts (2007)

**International Safeguard Policies and Standards**

- World Bank OP 4.01 on Environment Assessment
- International Finance Cooperation (IFC) Performance Standard (PS) 2: Labour and Working Conditions
- World Bank Group Environment, Health and Safety Guidelines

#### **IV. Project cost**

Each project has a total project cost of Kshs. **3,000,000**. The implementation of the ESMMP is included into the BOQ.

#### **V. Project description**

The proposed project will involve to drilling and equipping boreholes at industrial area, Umoja area and Nairobi CBD area fire fighting stations for ground water abstraction which will be used both for fighting fire emergencies and domestic use. Each of the boreholes will be 203mm (8”) in diameter and 220 m depth. In addition the project will also involve construction of elevated Steel water tanks at these fire fighting stations for water storage.

Project Activities will involve:

1. Drilling of three boreholes 203mm(8”) diameter and 250 m deep in Industrial area, Umoja area and Nairobi CBD area street fire fighting stations
2. Installation of Borehole screen and casing with centralizers which should be at least 6 Meters interval within the borehole.
3. Top and bottom Sealing off gravel packed section with clay (2m)
4. Construction of an elevated steel water tank
5. Carry out pump testing
6. Installation and commissioning of pumps

#### **VI. Project Justification**

Disaster management is a key challenge in urban areas. Disaster events along with chronic events such as individual building collapse, fires, and terrorism impacts disproportionately impact the urban poor who live in overclouded and poorly constructed houses.

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The Nairobi City is growing first and the current water demand is more than supply provided by Nairobi City Water and Sewerage Company. The current water supply is from Nairobi Water is therefore unreliable due water rationing.

During recent fire incidences, after the fire engine uses the water in the tank, there is a challenge of going to look for water as in most cases; the water pipes may be dry because of the water rationing. It is against the back ground that NaMSIP conceptualized a project of drilling boreholes and purchasing three water (3) water bowsers to support disaster management in Nairobi County.

The industrial area, Umoja area and Nairobi CBD area fire fighting stations have metered connections to the local Water Services Provider (Nairobi Water and Sewerage Co.) but the supply is irregular and unreliable which underscores the need for an alternative source of water. To increase efficiency to fight fire disaster reliable water is a key requirement. The proposed project intends to drill boreholes at fire stations in industrial area, Umoja area and Nairobi CBD area which will provide water both for fighting fire emergencies and domestic use.

## **VII. Project Impacts**

The Project impacts during the assessment were generated based on the analysis of the proposed project activities in relation to the Project area environment. The impacts arising during each of the phases of the proposed development namely; construction, operation and decommissioning, were categorized into:

- Impacts on biophysical environment;
- Health and safety impacts; and
- Social-economic impacts

Below is a summary of the Project impacts, both positive and negative, discussed in this report.

### **Project Positive Impacts**

The City of Nairobi is characterized by fast developing economy, rapid improvement of people's living standards; all these are triggered by rapid urbanization and population density. Therefore, the proposed fire station Project is a necessity, the fire station will be associated with the following positive impacts to the people living in the eastern parts of Nairobi.

- Creation of employment opportunities during construction and operation project phases
- Minimize loss of lives and property associated with fires.
- Alternative water supply source to fire fighting crew and people surrounding the project sites

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- Improvement of micro economy of residents through direct and indirect business
- Reduced poverty levels due to available water to put off fires down in case of fire outbreak.

**Negative Impacts and Mitigation Measures during Project Construction Period**

The Project Construction Phase is associated with less significant negative impacts to both human and natural environment, this impacts and proposed mitigation measures are summarized in **table 2**. The impacts are presented in three categories of environment namely: Biophysical, Socio Economic and Occupational Health and Safety setting.

**Biophysical Environment Setting**

The project impacts on Biophysical environment setting of the Project area identified during the assessment is presented in **table** below

**Table 2: Negative Impacts on Biophysical Environment and proposed Mitigation measure during Construction**

<b>Impacts</b>	<b>Proposed Mitigation</b>
Destruction of Vegetation along the Pipeline Route and Storage Reservoir Site	<ul style="list-style-type: none"> <li>• Site Clearance and Construction activities will be limited to the area set-out by the Project engineer; this will be done in order to minimize destruction to vegetation cover.</li> <li>• Reinstatement of the project sites to their original state to be carried out once construction works are completed to allow growth of vegetation.</li> </ul>
Contamination of Surface Water Sources by Effluents from Construction Plant and Equipment	<ul style="list-style-type: none"> <li>• Ensure Construction Equipment is well maintained and serviced according to manufacturers' specifications to prevent oil leaks.</li> <li>• Cleaning / repair of Construction Plant and Equipment to be carried out at designated yards</li> <li>• Contractor to have designated storage areas for oils, fuels etc. that is protected from rain water and away from nearby surface water courses</li> </ul>
Soil Erosion resulting to loss of top soil	<ul style="list-style-type: none"> <li>• The risk of Soil Erosion is low as the design of the Project has incorporated measures to minimize this risk through provision of Erosion prevention structures i.e. gabions and other structures of runoff containment</li> </ul>
Solid Wastes Generation from Construction Activities	<ul style="list-style-type: none"> <li>• Construction wastes (residual earth, debris and scrap materials) to be collected at designated points and Contractor to dispose to designated Solid Waste</li> </ul>

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<b>Impacts</b>	<b>Proposed Mitigation</b>
	<p>Dumping Sites approved by the Nairobi County Government</p> <ul style="list-style-type: none"> <li>• Contractor's Camps and Construction Sites to have designated waste collection points,</li> <li>• Environmental Management, Health and Safety Training Programmes to be conducted for Contractor's Staff to create awareness on proper solid wastes management</li> </ul>
Air Pollution and Dust Generation.	<ul style="list-style-type: none"> <li>• The contractor shall comply to the provisions of EMCA 2015 (Air Quality Regulations 2014)</li> <li>• Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications</li> </ul>

**Social Economic Environment Setting**

The project impacts on Social Economic environment setting of the Project area identified during the assessment is presented in **table 3** below

**Table 3: Negative Impacts on Social Economic Environment and proposed Mitigation measure during Construction**

<b>Impacts</b>	<b>Proposed Mitigation</b>
Influx of Workers during Project Construction	<ul style="list-style-type: none"> <li>• Adhere to provisions of Works Injuries and Benefits Act (WIBA 2007) and International Finance Cooperation Performance standard 2 on Labour and Working Conditions.</li> </ul>
Increased Transmission of HIV/AIDS	<ul style="list-style-type: none"> <li>• HIV/AIDS Awareness Program to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising. This will involve periodic HIV/AIDS Awareness Workshops for Contractor's Staff</li> <li>• Access to Contractor's Workforce Camps by outsiders to be controlled</li> <li>• Contractor to provide standard quality condoms to personnel on site</li> </ul>
Increased Crime and Insecurity	<ul style="list-style-type: none"> <li>• Contractor and Supervision Team to liaise regularly with the Local Administration and Police Service to address any security and crime arising during project implementation.</li> <li>• Contractor to provide 24 hours security to Workforce Camps, Yards, Stores and to the Supervising Team's Offices</li> </ul>

### **Occupational Health and Safety Setting**

The Project impacts on Occupational Health and Safety environment setting of the Project area identified during the assessment is presented in **table 4** below

**Table 4: Negative Impacts on Occupational Health and Safety Setting and proposed Mitigation measure during Construction**

<b>Impact</b>	<b>Proposed Mitigation</b>
Noise and Excessive Vibrations.	<ul style="list-style-type: none"> <li>• Contractor will comply with provisions of EMCA 2015 (Noise and Excessive Vibrations Regulations of 2009)</li> <li>• The Contractor shall keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas</li> <li>• Hospitals and other noise sensitive areas such as schools shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity</li> </ul>
Risk of Accidents at Work Sites	<ul style="list-style-type: none"> <li>• Contractor to provide a Healthy and Safety Plan (HSP) prior to the commencement of works to be approved by the Supervising Engineer.</li> <li>• Provide Personal Protective Equipment (PPE) including gloves, gum boots, overalls and helmets to workers, use of PPE to be enforced by the Supervising Engineer.</li> <li>• Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles</li> </ul>
Risk of Traffic Accidents along the Pipeline Route	<ul style="list-style-type: none"> <li>• Strict use of warning signage and tapes where the trenches are open and at other active construction sites</li> <li>• Contractor to employ and train Road Safety Marshalls who will be responsible for management of traffic on site</li> <li>• Contractor to provide a Traffic Management Plan during construction to be approved by the Supervising Engineer</li> </ul>

### **Negative Impacts and Mitigation Measures during Project Operation Period**

Table 5 below presents a summary of potential negative impacts likely to be experienced by Nairobi County Government during operation of the boreholes.

**Table 5: Potential Negative Impacts and proposed Mitigation measure during Operation**

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Issue	Action required
Ground water pollution	<ul style="list-style-type: none"> <li>• Groundwater quality must be safeguarded by a correct territorial planning and protection of surface waters since these are strictly linked to ground water resources.</li> <li>• Ensure that all potential sources of pollution are eliminated for example by ensuring that the sewage disposal system are well protected and does not leak even during exhaustion</li> <li>• The proponent will adhere to the regulations set by the WRMA,</li> </ul>
Ground water depletion	<ol style="list-style-type: none"> <li>a) The borehole should be installed with a Master Meter and an Airline/Piezometer to monitor ground water abstraction and to facilitate regular measurements of the static water level in the borehole, respectively</li> <li>b) The maximum ground water abstraction permitted from the borehole is limited to the authorized volume per day for the domestic/industrial use only subject to availability from 60% of the tested yield for a maximum abstraction period not exceeding ten (10) hours per day</li> <li>c) Install auto-shut water taps to reduce water wastage</li> </ol>

## **VIII. Findings and Recommendations**

### **Assessment findings**

The assessment described in the report identified the below listed main findings:

- The project design has ensured that the project is constructed within existing public land and no private land will be acquired.
- The world Bank Operation Policy OP 4.12 is not triggered due to the fact that the proposed site is clear land free from encroachment.
- The Environmental and Social Screening undertaken for the project revealed that the investment will result in low impact on both social and biological environment; therefore, this project is categorized as **a category B** project. The level of ESIA assessment required is at Project Report Stage which should be approved at the Nairobi NEMA office.
- Provisional Budget of **KES 2,436,000** is required for implementation of mitigation measures of potential negative environmental impacts identified in the report.
- The overall objective of project is of drilling boreholes in Industrial area, Umoja area and Nairobi CBD area fire fighting stations is to provide reliable water for firefighting emergencies and to supply domestic water of approximately 20.0m<sup>3</sup> per

day to augment water for fire fighting activities at the stations.

### **Assessment Recommendation**

The project is recommended for implementation provided the mitigation measures identified in the study for the potential negative impacts are implemented, the recommendations will also form part of Environment Licence that will be issued for the Project.

## **IX. Report Structure**

This Report has been prepared under the following chapters:

- Chapter 1: Background Information: This Chapter gives description of the Project background, location, purpose, objectives, study methodology, previous studies
- Chapter 2: Project Description: This Chapter gives a description of the status of the Project in the Project cycle, specifically during construction, operation and decommissioning.
- Chapter 3: Baseline Information: This Chapter gives description of the environmental setting of proposed Project and surrounding areas, e.g., climate, soils, geology, vegetation, fauna, land use, human populations and socio-economics of the Project area.
- Chapter 4: Project Alternatives: This chapter gives a description of the Project details of the proposed Project, alternative options, designs and implementation strategies.
- Chapter 5: Policy, Legal and Institutional Framework: This chapter outlines the overview of legislative framework, regulatory, international guidelines and conventions relevant to this project.
- Chapter 6: Stakeholder Consultation: This Chapter gives description of the objectives, methods used and summary of results of the public consultation activities.
- Chapter 7: Environmental and Social impacts Assessment and mitigation measures: This chapter presents the analysis of beneficial and adverse impacts of the Project on the biophysical and human (social, cultural and economic) environments. The analysis covers anticipated impacts during the construction, operation phases and decommissioning phases and also describes the enhancement and mitigation measures proposed to enhance benefits or prevent, minimize, mitigate or compensate for adverse impacts as well as the estimated cost of mitigation.
- Chapter 8: Environmental and Social Management and Monitoring Plan: This Chapter presents the Environmental and Social Management and Monitoring Plan prepared for the project.
- Chapter 9: Conclusion and Recommendations: This Chapter briefly presents the environmental and social acceptability of the project, taking into account the impacts,

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**FACT SHEET**

<b>Programme Name</b>	Nairobi Metropolitan Service Improvement Project (NAMSIP)
<b>Project Name</b>	Proposed drilling of boreholes and erection of elevated steel tanks in Industrial area, Umoja area and Nairobi CBD area fire fighting stations
<b>Lead Implementing Agency</b>	Ministry of Transport, Infrastructure, Housing and Urban Development (MOTIH&UD) - State Department for Housing and Urban Development (SDFH&UD)
<b>Funding Agencies</b>	World Bank and Government of Kenya
<b>Project Components</b>	Proposed drilling of boreholes in Nairobi County 3 firefighting stations will involve: <ul style="list-style-type: none"> <li>▪ Drilling of three boreholes 203mm(8”) diameter and 250 m deep in Industrial area, Umoja area and Nairobi CBD area street fire fighting stations</li> <li>▪ Installation of Borehole screen and casing with centralizers which should be at least 6 Meters interval within the borehole.</li> <li>▪ Top and bottom Sealing off gravel packed section with clay (2m)</li> <li>▪ Construction of an elevated steel water tank</li> <li>▪ Carry out pump testing</li> <li>▪ Installation and commissioning of pumps</li> </ul>
<b>Project Location</b>	Nairobi County – Nairobi CBD area, Industrial area and Umoja area
<b>Lead Expert</b>	<b>Boniface Musulu Musembi</b> Registration No. 7515

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## CHAPTER ONE: INTRODUCTION AND BACKGROUND INFORMATION

### 1.1 Project background

The Nairobi Metropolitan Region (NMR) is susceptible to numerous disasters such as fire outbreaks, floods, pandemics, epidemics as well as road, rail and air accidents. Disaster management is a key challenge in urban areas. Disaster events along with chronic events such as individual building collapse, fires, and terrorism impacts disproportionately impact the urban poor who live in overclouded and poorly constructed houses.

The Nairobi City is growing first and the current water demand is more than supply provided by Nairobi City Water and Sewerage Company. The current water supply is from Nairobi Water is therefore unreliable due water rationing.

The Ministry of Lands, Housing and Urban Planning is charged with the responsibility of providing policy direction and coordinating all matters related to lands, housing and urban development in the country. The ministry partly through NaMSIP is systematically strengthening and expanding its capacity and undertaking major infrastructure projects to address challenges as a way of attaining its mandate. To this end, the ministry is partnering with various development partners, which are providing funding and technical assistance for various projects. The ministry secured World Bank funding for the proposed Metropolitan Region Services Improvement project through which it proposes to drill and equip boreholes at Umoja area and Nairobi CBD area fire fighting stations for ground water abstraction which will be used both for fighting fire emergencies and domestic use in Nairobi County of Nairobi metropolitan region (NMR). In addition the project will also involve construction of elevated Steel water tanks at these fire fighting stations for water storage.

The proposed project will provide reliable water for firefighting emergencies and supply domestic water of approximately 20.0m<sup>3</sup> per day to augment water for firefighting activities at the stations. This will enable the region reduce the extent of damages caused by fires and time spent to fetch water for domestic use. Further, this will directly be translated into amounts of money saved by investors in terms of property and lives and the economy at large. The Proposed projects fall under the category of '*Urban Development*' and further under the general provisions of second schedule of the EMCA 1999 enacted in 2015. The act requires that an ESIA is undertaken for proposed activities that are likely to have a significant adverse impact on the environment.

### 1.2 Project justification and benefits

Disaster management is a key challenge in urban areas. Disaster events along with chronic events such as individual building collapse, fires, and terrorism impacts disproportionately impact the urban poor who live in overclouded and poorly constructed houses.

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The Nairobi City is growing first and the current water demand is more than supply provided by Nairobi City Water and Sewerage Company. The current water supply is from Nairobi Water is therefore unreliable due water rationing.

During recent fire incidences, after the fire engine uses the water in the tank, there is a challenge of going to look for water as in most cases; the water pipes may be dry because of the water rationing. It is against this background that NaMSIP conceptualized a project of drilling boreholes and purchasing three water (3) water bowsers to support disaster management in Nairobi County.

The industrial area, Umoja area and Nairobi CBD area fire fighting stations have metered connections to the local Water Services Provider (Nairobi Water and Sewerage Co.) but the supply is irregular and unreliable which underscores the need for an alternative source of water. To increase efficiency to fight fire disaster reliable water is a key requirement. The proposed project intends to drill boreholes at fire stations in industrial area, Umoja area and Nairobi CBD area which will provide water both for fighting fire emergencies and domestic use.

### **1.3 Objectives of the ESIA**

This ESIA assessment has been conducted in compliance with the Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 2003 established under the Environmental Management and Coordination Act (EMCA), 2015 of Kenya. The Environmental & Social Impact Assessment (ESIA) is expected to achieve the following objectives:

- i. To identify all potential significant environmental and social impacts of the proposed Project and recommend measures for mitigation.
- ii. To assess and predict the potential impacts during site preparation, construction and operational phases of the project.
- iii. To verify compliance with environmental regulations.
- iv. To generate baseline data for monitoring and evaluation of how well the mitigation measures will be implemented during the project cycle.
- v. To allow for public participation.
- vi. To give an Environmental Management Plan to mitigate the identified impacts so as to ensure sustainability of the proposed Project.
- vii. To recommend cost effective measures to be implemented to mitigate against the expected impacts.

### **1.4 Study approach and methodology**

The systematic investigative and reporting methodology specified for conduct of ESIA Report Studies (Legal Notice 101 of EMCA) was adopted in this Study. Baseline data on project

design was generated through discussion with the client and review of project documentation. Opinions formed were revalidated through field work entailing site investigations and interviews with potentially affected people and secondary stakeholders.

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

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

Consequently, this report provides the following;

- The location of the project including the physical environment that may be affected by the project's activities.
- The activities that shall be undertaken during the project design, construction, operation and of the project
- The materials to be used, products and by-products including waste to be generated by the project and the methods of disposal.
- The potential environmental and social impacts of the project and mitigation measures to be taken during and after the implementation of the road construction 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 neighbouring communities
- The project cost for each site is – Kshs. 3,000,000
- Any other information that the proponent may be requested to provide by NEMA

This report also seeks to ensure that all the potential environmental and social impacts are identified and that workable mitigation measures are adopted. The report also seeks to ensure compliance with the provisions of the EMCA 2015, Environmental (Impact Assessment and Audit) Regulations 2003 as well as other regulations and World Bank Safe Guard Policies. Finally, a comprehensive Environmental and Social Management and Monitoring Plan (ESMMP) is mandatory for a project of this nature to ensure monitoring and mitigation of negative environmental and social impacts during the different phases of the project. The total ESMMP cost for the three boreholes is estimated at Kshs. 2,466,000.

### **1.5 Project description**

The proposed project will involve drilling and equipping boreholes at industrial area, Umoja area and Nairobi CBD area fire fighting stations with hand pumps and an elevated water tank for fire fighting activities and community water supply.

#### **The Scope of works entails the following activities:**

- Conducting an Hydro geological survey (Survey report attached)

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- Application for Authorization to drill from the Water Resources Management Authority in Nairobi Sub-region (Authorization letter attached)
- Drilling the boreholes
- Installation of gravel pack
- Test pumping
- Recovery testing
- Installation of permanent surface casing
- Water quality analysis
- Installation of pumps and commissioning of the boreholes
- Construction of an elevated tank

### **1.6 Project cost**

The summary of the certified Bills of Quantities (BOQ) that form the budget of the project is as shown below. The total project cost is Kshs. 3,000,000 for each of the proposed fire fighting station. The implementation of the ESMMP is to be included into the BOQ and the ESMMP presented in the construction contract.

Proposed project site /Description	Industrial area fire fighting station	Umoja area fire fighting station	Nairobi CBD area Street fire fighting station
Land	0.00	0.00	0.00
Civil works, drilling	3,000,000	3,000,000	3,000,000
Total project cost	3,000,000	3,000,000	3,000,000
Total ESMMP Cost	2,466,000		

### **1.7 Proposed project location**

The proposed project sites locations are as shown in the table below and map 1 below;

Proposed project site	L.R. NO	ELEVATION	GPS Coordinates	
Industrial area fire fighting station	209/4881	1645 Masl	260082	9855258 S
Umoja area fire fighting station	209/14311	1613 Masl	264983	9859082S
Nairobi CBD area Street fire	209/2323	1670 Masl	257777	9858247S

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**Figure 1: Map showing fire fighting station where the proposed project sites are located**

## **CHAPTER TWO: PROJECT DESCRIPTION**

### **2.1 Drilling procedure**

In each of the proposed project site;

- A borehole measuring 8.5” diameter and 250m in depth will be drilled and 6” steel plain casing installed up to the bottom depending on the productivity of the borehole.
- 2-4mm gravel pack will be installed between the borehole walls and the casings. This is very essential as it filters water from the rocks (aquifers) before going into the screens. Borehole development follows after gravel packing with the use of compressor to flush water out continuously for several hours until the water is clean.
- Test pumping will then be carried out by performing a 24 hour continuous discharge test to ascertain the exact yield of each borehole in m<sup>3</sup>/hr.
- Recovery test will be done immediately after constant discharge test. The boreholes will then be covered by installation of permanent surface casing and
- Finally a sample of water will be collected in each of the boreholes after test pumping and taken to government chemist to check on the quality of water.

### **2.2 Hydro geological survey**

The survey report annexed to this ESIA report contains the following information;

- a) Location of the drilling point
- b) Anticipated yield per hour
- c) Recommended depth
- d) Location map sheet, elevation and coordinates
- e) Hydrogeology of the area
- f) Geophysical measurement results

### **2.3 Equipping**

This includes installation of a submersible pump, control panel, misc cables, GI pipes, electrodes etc. The work will be completed after the pump and the necessary accessories are installed in each of the borehole.

### **2.4 Time frame**

After obtaining all the relevant permits/ licenses drilling is estimated to take 5 days comprising 3 days for drilling and 2 days for pump testing if no hard rock is encountered in each of the proposed fire fighting stations. Drilling will be done between 8 am to 5 pm daily.

## CHAPTER 3: BASELINE INFORMATION/ENVIRONMENTAL SETTING

### 3.1 Introduction

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

- To understand key biological, physical, ecological, social, cultural, economic, and political conditions in areas potentially affected by the proposed project;
- To understand the expectations and concerns of a range of stakeholders on the proposed development ;
- To inform the development of mitigation measures;
- To benchmark future socio-economic changes/ impacts and assess the effectiveness of mitigation measures.

### 3.2 Proposed borehole drilling at Industrial Area, Nairobi CBD and Umoja Area Fire fighting Station

#### Physical Environment for the Sites

##### 3.2.1 Climate

Rainfall is evenly distributed in Nairobi and its environs with most of the precipitation being received in the bimodal distribution pattern. The rainfall is experienced in what is respectively referred to as the short and long rains. The climate of the Nairobi area is of interest on account of its bearing on the interpretation of the climatic trends. It exhibits quite a narrow range from the warm spells to the moderate low temperatures in the months of July. The diurnal temperature ranges – from the low of 12<sup>0</sup>C to the maximum of 21<sup>0</sup>C. The climate is tropical humid. Temperatures are highest in the months of January – March before the rainy season and lowest in the months of July – August.

##### 3.2.2 Topography& Geology

Four prominent physiographic units are recognized in the project areas, reflecting the volcanic rock types and the tectonic movements, which have affected them and resulted to the inherent contrasting topographical contrasts. They include the lava plains; the Kikuyu Highlands, the rift flanks and the Ngong’ Hills. The project site falls within the Ngong’ hills extension to the west of Nairobi. The area is to the east of Ngong hills.

The project areas are covered by Dark Gray volcanic derived soils; underlain by tertiary volcanic rocks. Some volcanic rocks (trachytic rocks) are exposed on the surface. The soils are loose and permeable and there is little evidence of substantial run-off or erosion. It can, therefore, be assumed that most of the precipitation falling on the farm site area and its environs infiltrates to the groundwater store.

### **3.2.3 Hydrology**

Nairobi's main drainage follows the regional slope of the volcanic rocks towards the east, while subsidiary internal drainage into the Rift region is confined to the western part. The lava plains east of the line Ruiru-Nairobi-Ngong are underlain by a succession of lava flows alternating with lakebeds, streams deposits, tuffs and volcanic ash. These plains, comprising mainly the Athi plains and the northern section of the Kapiti plain, extend westwards, rising from 4900 feet (1493 m) at the Athi River to 6000 feet (1829 m) in the faulted region near Ngong. The lava plains are crisscrossed with steep-walled gullies and canyon-like gorges, such as those along the Mbagathi valley. Further east this valley widens slightly where soft material is being actively eroded (Saggerson, 1991). Water draining eastward from the hill area accumulates on the low-lying ground between Parklands in the north and Nairobi South estate, forming a perched water table above the Nairobi phonolite. The Kerichwa Valley Tuffs lying to the east of the highway function like a sponge and the contact between them and the underlying impermeable phonolite thus forms a perfect aquifer, so much so that a number of channels containing water occur beneath Nairobi.

### **3.2.4 Demography**

According to the 2009 National Housing and Population Census, Nairobi County had 3,134,265 people which are projected to rise to 4,247,770 by year 2017. The inter-censal growth rate is 3.8%. The population is projected to hit 5,212,500 by 2030 with an annual growth rate of 2.4%. The project site is in a high density residential zone with an ever increasing population marching the rate of developments in Nairobi. The population is composed of both high and middle income class of people who are mostly tenants.

### **3.2.5 Living standards**

The Nairobi CBD area fire fighting station is surrounded by commercial business centres. The industrial area fire fighting station and Umoja Area fire fighting stations are surrounded by both residential and commercial business centres. The living standard of the residing population living around Umoja Area fire fighting station and Industrial Area fire fighting project areas are within the standard of the average Kenyan.

#### **Socio- Economic attributes**

### **3.2.6 Land use**

The land use in the Nairobi CBD area fire fighting station is for commercial purposes while land use for Umoja Area is residential and Industrial Area fire fighting station is for commercial/Industrial purposes.

### **3.2.7 Infrastructure**

The Nairobi CBD area, Industrial area and Umoja area fire fighting stations are located in areas that have developed road network system. Industrial area and Umoja area fire fighting stations are not far from the CBD hence are connected to the well developed roads that lead to Nairobi City. This has ensured that the roads are well maintained to ease the flow of traffic in and out

of the town. The Nairobi CBD area fire fighting station is connected along a developed network system (Tom Mboya Street).

### **3.2.8 Drainage**

The main drainage in the proposed project sites is consequent upon the regional slope of volcanic rocks towards the east. The Nairobi River and Ngong' River are the most important rivers in the project areas, which flows throughout the year from recharge emanating from the west. The Nairobi CBD area fire fighting station is well connected to the storm water system in the CBD which drains into Nairobi River. The Industrial Area Site is connected to a drainage system recently constructed during rehabilitation of the fire station a NaMSIP Project. Kangundo Road Fire Stations served by Kangundo Road Drainage Systems.

### **3.2.9 Archaeological set up**

The project sites have no cultural element worth conserving or taking into consideration. The sites were initially under development as a result of the growth of Nairobi business district.

## **3.3 Project Location**

### **i. Industrial Area Fire Station**

The project site is located in Industrial Area Fire Station, off Enterprise Road, Opposite Isiolo Road junction. The site lies at an approximate elevation of 1645 m above sea level on coordinates E260082 and S9855258.

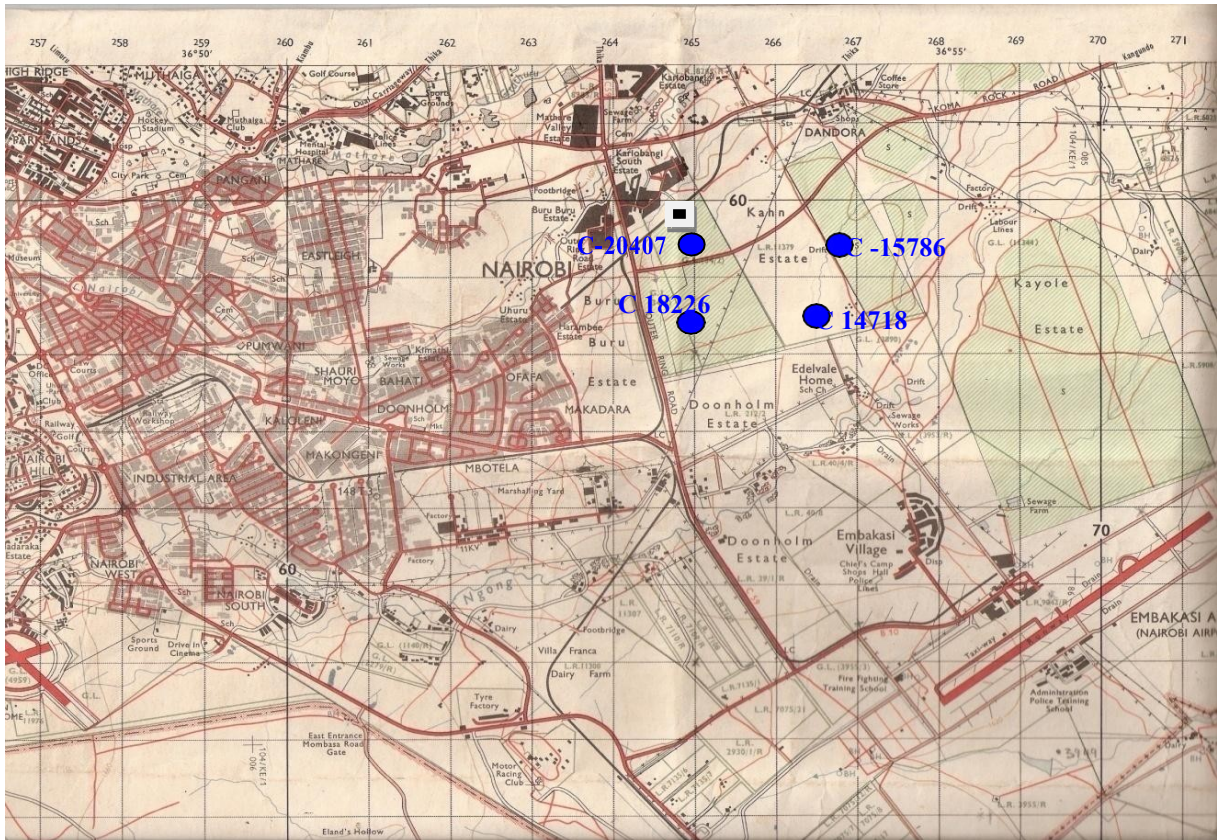


**Figure 2: Location Map showing proposed Industrial Area borehole site**

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**ii. Umoja Area fire station**

The project site is located in Umoja Area Fire Station, off Kangundo Road. The site lies at an



approximate elevation of 1613 m above sea level on coordinates E264983 and S9859082.

**iii. Nairobi CBD (Tom Mboya) area fire station**

The project site is located in Nairobi CBD Area Fire Station, off Tom Mboya Street. The site lies at an approximate elevation of 1670 m above sea level on coordinates E257777 and S9858247.

**Figure 3 : Location Map showing proposed Umoja borehole Site**

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Figure 4: location map showing proposed Nairobi CBD borehole

## **CHAPTER FOUR: PROJECT ALTERNATIVES**

### **4.1 Introduction**

Regulation 18(1) of Legal Notice 101 specifies the basic content of an Environmental Impact Assessment Study / Project Report subsequent to which, subsection (i) requires an analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site. Therefore, this section analyses the Project alternatives in terms of site, technology scale and waste management options. However, under this study the alternative that was considered for the Project was focused on:

1. “No-action” Alternative
2. Relocation Alternative
3. Alternative drilling Technology
4. Alternative water sources
5. Comparative alternative
6. Mitigation measure alternative
7. The Proposed Development as described in the ESIA Report

### **4.2 No Action Alternative**

This alternative describes a situation where the proposed projects will not be put up. It is advantageous in that there will be no negative impacts to the environment. The flip side of this is that there will be continuous water problems for the project proponent, serious dangers in the neighborhood in case of fire and hinder future expansion plans for disaster management.

### **4.3 Relocation Alternative**

No other site will be ideal for implementation of the proposed projects, as the hydrological survey team has approved the selected sites as the most suitable for drilling the boreholes. Surrounding areas are under private ownership and it would be costly to acquire alternative sites for relocation especially in CBD and Industrial Area. The Authorization to drill boreholes will also state that boreholes must be drilled at the selected sites.

### **4.4 Alternative Drilling Technology**

The technology for use in this type of facility is fairly simple and well established. The Down-The-Hole (DTH) rotary drilling machine is one of the best in the industry. Its one major advantage is that it can drill boreholes up to 350m deep producing minimal residues in the process. The other alternative is percussion method that is cumbersome, slow, noisy and very unreliable when the drilling meets major rock formation.

### **4.5 Alternative Water Sources**

Surface water sources within Nairobi are constrained by the high rate of contamination through effluent discharge rendering it unusable. Rain water cannot be considered as an alternative as

there is no mechanism for harvesting while purchasing water from NWC will not be economical in the long run.

#### **4.6 Comparison of Alternatives**

Under the proposed development alternative, the project would enhance expansion of the proponent's access to water and would provide employment directly and indirectly to the Kenyan population both at construction and during commissioning. Under the No Action alternative, there would be no development at all, no impacts on the environment and serious losses to the project proponent and the employment losses to the general public.

Provided the Environmental Impact mitigation measures are implemented and sound construction measures adopted, negative effects on water, soil, air, sound, sewerage and drainage systems will be avoided.

#### **4.7 Mitigation measure alternative**

Mitigation measures include proper handling of waste material during construction. The application or adoption of standard construction management practices is fundamental. Conflicts arising from unforeseen negative impacts will be solved by following the prescribed mitigation measures and through consultations with the relevant authorities and the public. In addition, the mitigation measures would be appropriately designed and implemented to protect the environment. The proponent must conduct an Environmental Audit in the first year of operation measuring the parameters stated under water for construction use and submit the same to NEMA. Such monitoring records shall be in the prescribed form as set out in the second schedule to the water quality regulations.

## **CHAPTER 5: ENVIRONMENTAL POLICY, LEGISLATION AND REGULATORY FRAMEWORK**

The environmental laws and regulations of Kenya relevant to the proposed boreholes are listed and commented upon below.

### **5.1 Introduction**

In 1993, the National Environmental Action Plan (NEAP) was finalized under the ministry of Environment and Natural Resources. The NEAP's major objective was to address environmental and conservation challenges through appropriate legislative and institutional measures. In 1996, NEAP guided the drafting of the Environmental Management and Coordination Bill that was enacted into law as the Environmental Management and Coordination Act, 1999.

The main objective of the Act is to provide for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. The Act further aims to improve the legal and administrative coordination of the diverse sectoral in the field of environment so as to enhance the national capacity for its effective management.

### **5.2 Policy frame work**

#### **5.2.1 Environmental Policy**

Sessional Paper No. 6 of 1999 on Environment and Development since adoption by parliament in 1999 has been in use and influenced the formation of EMCA in 1999. However, since it has been surpassed by time it is therefore under revision to comprehensively cover areas that were previously left out to augment it. The revised draft of the National Environmental Policy, dated April 2012, sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, and recognizes that natural systems are under intense pressure from human activities particularly for critical ecosystems including forests, grasslands and arid and semi-arid lands. The objectives of the Policy include developing an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools, supporting the implementation of the Forests Act 2005, and developing national standards and appropriate forest-based development mechanisms in emerging carbon markets. This ESIA study has developed an ESMMP for the project which should be implemented to mitigate the resulting impacts during the construction and implementation phases of the project.

#### **5.2.2 National Water Policy**

The National Water Policy was promulgated in April 1999 as Sessional Paper No. 1 of 1999 and calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of

communities in order to improve efficiency in service delivery. The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social well-being of the people through sustainable water resource management. The policy recognizes importance of Water resources in determining the economic and social development agenda in Kenya and also as a vital element in maintaining the ecosystem, wildlife and recreation, hydropower production, and maritime transportation.

Under the policy objective, *“To ensure a comprehensive framework for promoting optimal, sustainable, and equitable development and use of water resources for livelihoods of Kenyans”*, the policy encourages enhancement of inter-basin water transfer in Kenya as a strategic intervention for optimized use of water resources. It recognizes that some areas in the country are less endowed with water resources, and accordingly, the Regulatory Authority shall play a major role in the conservation and equitable distribution in national interest and in the realization of the right to water.

Under the policy objective, *‘To progressively achieve universal rights to water supply and sanitation for all by 2030 in the rural and urban areas’*, one of the policy statements is to ensure access to water and sanitation according to rights. All relevant public sector institution and each WSP shall progressively enhance the rights to safe, reliable and affordable water and sanitation for all (100% service coverage by 2030).

The proposed project is in line with this sectoral policy as the increase of access to water will be beneficial to people around the project site.

### **5.2.3 Land Policy**

The National Land Policy in Chapter 3 under section 3.4, Environmental Management Principles, provides for the policy actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution of air, water and land. The policy advocates for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has also been indicated as key in the monitoring and protection of the environment.

Section 3.4.3.3 advocates for the Implementation of the polluter pays principle which ensures that polluters meet the cost of cleaning up the pollution they cause, and encourage use of cleaner production technologies.

In section 131 (d) the government undertakes to provide mechanisms for resolving grievances arising from human/wildlife conflicts for sustainable management of land based natural resources. The proposed works shall implement the ESMMP from this environmental

assessment to ensure that all the rivers and streams within the project area are not polluted by the subsequent activities during construction and operational phases

National Policy for Disaster Management in Kenya 2009

The policy sets out the goal and objectives of Disaster Management (DM) in Kenya, arrangements for effective management, roles and responsibilities of different stakeholders at different levels. It provides an implementation framework and guiding principles for (DM).

The overall goal of the policy is to “build a safe, resilient and sustainable society”, incorporating the following objectives:

- (a) To establish a policy/legal and institutional framework for management of disasters, including promotion of a culture of disaster awareness and for building the capacity for disaster risk reduction, at all levels;
- (b) To ensure that institutions and activities for disaster risk management are co-ordinated, focused to foster participatory partnerships between the Government (including mainstreamed and emergency disaster-related activities by sectoral Ministries) and other stakeholders, at all levels, including international, regional, sub- regional Eastern African, national and sub-national bodies;
- (c) To promote linkages between disaster risk management and sustainable development for reduction of vulnerability to hazards and disasters;

### ***Relevance of the Policy***

The Proposed boreholes once commissioned will enable the government gradually achieve the policy goal of building a safe, resilient and sustainable society. The Project once operational will reduce the response time taken by the County Government to source for water to suppress fire often reported in the Nairobi County.

#### **5.2.4 National Disaster Response Plan, 2009,**

The plan seeks to ensure that disaster preparedness for response is carried in a coordinated and collaborative manner, ensuring the greatest protection of life, property, health and environment.”

The plan establishes a system of operating procedures associated with day-to-day operational response to emergencies by relevant actors when disasters occur.

The plan contains hazard specific and departmental or thematic contingency plans and emergency procedures in the event of a disaster, and provides for:

- (a) The allocation of responsibilities to the various role players and coordination

- in the carrying out of those responsibilities;
- (b) Effective early warning linked to early response and relief; and
  - (c) Early recovery linked to longer-term development after disaster.”

### **5.2.5 Constitution of Kenya**

Article 24, Part 1, Article 14, Part 2, Fourth Schedule provides that “Disaster management” is included as a function of both the national and county governments.

Article 42 of Bill of Rights of the Kenyan Constitution provides that every Kenyan has a right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislation and other measures.

Part II of Chapter 5 of the Constitution (Environment and Natural Resources), (I) the State clearly undertakes to carry out the following:

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection and conservation of the environment; Protect genetic resources and biological diversity;
- Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and

Part (II) “Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Chapter 5 on Land and Environment Emphasizes on the following:

- Land use and management shall by law benefit local communities
- Community land is protected from encroachment by State.
- Law shall protect Rivers, forests and water bodies.
- Equitable access to land.
- All lawful land rights are secured; only someone who has stolen land needs to

worry.

- County governments will manage land in trust of the people in accordance with the constitution.

### ***Relevance***

The constitution of Kenya provides for sound management and sustainable development of all of Kenya's projects, both public and private investments. It also calls for the duty given to the Project proponent to cooperate with State organs and other persons to protect and conserve the environment as mentioned in Part II.

#### **5.2.6 Kenya Vision 2030**

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy of Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. Gross Domestic Product (GDP) growth rose from 0.6% to 7% in 2007, but dropped between 1.7% and 1.8% in 2008 and 2009 respectively.

The objective of the vision 2030 is to "transform Kenya into a middle income country with a consistent annual growth of 10% by the year 2030". One of this aims is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar.

Kenya's transformation into a middle income country will be achieved by bringing and improving basic infrastructure and services namely: roads, street lights, storm water drains, footpaths, and water and sanitation facilities among others. This Project aims at improving the sanitation services in Nairobi Metropolitan area through the drilling of boreholes in the proposed sites and construction of elevated tanks.

#### **5.2.7 Nairobi metro 2030**

Nairobi Metro 2030 was developed in the year 2008 to provide a guide for the (Nairobi Metropolitan Region (NMR) play its role in the National growth strategies under the Kenya Vision 2030. It is a transitional document that brings into focus challenges faced under urban growth and development. The document provides forum to achieve sustained rates of economic growth necessary for successful economic and social development. The Metro 2030 provides links with the Central Government through Kenya Vision 2030 and other development plans as well as seeking to strengthen the Local Authorities as part of the devolvement of power and recognizing need for ensuring efficient and effective management of resources at the grassroots.

Nairobi Metro 2030 carries the vision for Nairobi Metropolitan Region to be a World Class African Metropolis supportive to the overall national agenda under the Kenya Vision 2030. The agenda to achieve this vision is the need to enhance mechanisms for economic growth,

employment creation, improved lifestyles and improved infrastructure. Therefore, the proposed project contributes to the Nairobi Metro 2030 by providing development that will contribute to the economic and employment growth within the metropolitan.

### **5.2.8 The Sustainable Development Goals (SDGs)**

The 2030 Agenda comprises 17 new Sustainable Development Goals (SDGs), or Global Goals, which will guide policy and funding for the next 15 years, beginning with a historic pledge to end poverty.

The concept of the SDGs was born at the United Nations Conference on Sustainable Development, Rio+20, in 2012. The objective was to produce a set of universally applicable goals that balances the three dimensions of sustainable development: environmental, social, and economic.

The Global Goals replace the Millennium Development Goals (MDGs), which in September 2000 assembled the world around a common 15-year agenda to tackle the indignity of poverty.

The MDGs established measurable, universally-agreed objectives for eradicating extreme poverty and hunger, preventing deadly but treatable disease, and expanding educational opportunities to all children, among other development imperatives. The MDGs drove progress in several important areas:

- Income
- Poverty
- Access to improved sources of water
- Primary school enrolment
- Child mortality

With the job unfinished for millions of people, we need to go the last mile on ending hunger, achieving full gender equality, improving health services and getting every child into school. Now we must shift the world onto a sustainable path. The Global Goals aim to do just that, with 2030 as the target date. This new development agenda applies to all countries, promotes peaceful and inclusive societies, creates better jobs and tackles the environmental challenges of our time particularly climate change.

Nationally, the GOK has taken bold steps to domesticate the SDGs as illustrated by:

- i) Investment in the Poverty Reduction Strategy Paper (PRSP) process through which participatory mapping of poverty incidence at both District and National Level was undertaken,
- ii) Implementation of the Economic Recovery Strategy for Wealth and Employment Creation, and
- iii) Implementation of projects that directly confront specific aspects of the SDGs. By anchoring the

Economic Pillar of Vision 2030 which seeks to generate resources needed to address SDGs, implementation development of the proposed project is attuned to the national and indeed global agenda for economic and social development.

Industrial area fire fighting station, Umoja Area fire fighting station and Nairobi CBD area fire fighting drilling of boreholes and construction of elevated tanks project contributes to the policy by creating direct and indirect employment opportunities for many people that will be served by the operation of the Fire station.

### **5.2.9 HIV and AIDS Policy 2009**

The proposed project is to be implemented in Nairobi County which have high freelance cases of HIV and Aids. This policy shall provide a framework to both the project proponent and contractor to address issues related to HIV and Aids. In Summary the policy provides a mechanism for:

- Setting Minimum Internal Requirements (MIR) for managing HIV and AIDS
- Establishing and promoting programmes to ensure non-discrimination and non-stigmatization of the infected;
- Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS;
- Ensuring adequate allocation of resources to HIV and AIDS interventions;
- Guiding human resource managers and employees on their rights and obligations regarding HIV and AIDS.

### **5.2.10 Gender Policy 2011**

The overall goal of this Policy Framework is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya

The policy provides direction for setting priorities. An important priority is to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality

This policy will be referred to during project implementation especially during hiring of staff to be involved in the project, procuring of suppliers and sub consultants and sub contractors to the project

## **5.3 Legal frameworks**

### **5.3.1 Environmental Management and Coordination Act, 2015 (EMCA)**

The EMCA provides for the undertaking of Environmental Impact Assessment (E.I.A) of all projects listed under schedule II with the likelihood of causing adverse potential impacts on the environment.

The Act Empowers the Authority to:

- Issue permits to the person responsible for undertaking any enterprise, construction or development of a prescribed category in a prescribed area [Section 9]. This section, the Prescribed Area Order, designates all of Kenya as being within the prescribed area;
- Issue licenses for discharge of trade or sewage effluent or for construction or modification of any works for such discharge [Section 12 (1) (a) and (b)];
- Request information or documents as the Authority thinks fit [Section 10 (1) (a)];
- Request an Environmental Impact Assessment (E.I.A) containing such information as may be prescribed [Section 10 (1) (b)];
- Request information on pollution control facilities [Section 17];
- Revoke or suspend permits.

#### **Relevance to the Projects**

This applies in all aspects of the proposed project “Drilling of boreholes at Industrial area, Umoja area and Nairobi CBD area fire fighting stations.

### **5.3.2 Public Health Act**

Part IX, section 15 of the act states that no person/ institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonable practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.

Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into the public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances also include accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin

#### **Relevance to the proposed projects**

**Section 115-** During construction, a nuisance is prohibited especially for all conditions liable to be injurious or dangerous to health.

**Section 118-** Outlines nuisance liable to be dealt with i.e. accumulation or deposit of refuse, offal, manure or any other which is offensive or injurious or dangerous to health and an accumulation of stone, timber or other machine likely to harbour rats or rodents. **Section 126 rule 62 – Drainage & latrine rules-** It is a statutory requirement that drainage, latrines, septic and conservancy tanks and any other pre-treatment methods of sewerage effluents seek written permission or/and approval from the local authority and be built in conformity to provisions of sub-rules (a) to (e) of this section. **Sections 136 – 143 Breeding places of mosquitoes-**The civil and building contractors will ensure that during construction, breeding places of mosquitoes and nuisance yards are kept free from bottles, whole or broken. The project area shall not be overgrown by grass, the wells etc to be covered together with the less pits. The gutters may be perforated; larva destroyed to eradicate mosquitoes completely as mere presence of mosquito larvae is an offence. **Section 163 – Powers of entry and inspection -**It should be noted that a medical officer, health inspector or a police officer above the role of an inspector shall enforce compliance and offences are punishable by law.

### **5.3.3 The Water Act**

Part II section 18 of this act provides for the national monitoring and information systems on water resources. Sub-section 3 of this allows the water resources management authority to demand from any person or institution, specified information samples or raw material on water resources. Under these rules, specific records may require to be kept by a site operator and the information made available to the authorities as and when required.

Section 73 of the act allows a person with a license to supply water to make regulations for purposes of protecting against degradation of water resources. Section 75 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water within their jurisdiction.

The new Water Act (2002) of the Laws of Kenya seeks to make better provision for the conservation, control of pollution, apportionment and use of the water resources in Kenya, and for purposes they are incidental thereto and connected therewith. The Act vests ownership and control of water in the government subject to any rights of user. Under this provision the responsibility to regulate access, use and control of water resources is vested in the water resources management authority (WRMA).

The water Act protects water bodies and sources from pollution and controls their use by the project. It ensures that the project required amount of water that can be provided for by the existing water system and that the project design will work to conserve the available water resources both during construction and operation phases.

### **Relevance to the proposed projects**

Water is significant to the general operation of the proposed projects. The construction would mean that more water would be needed for various activities. Management of this resource is therefore significant for the success of operations of the projects. Pollution of other sources of water in the proposed project areas should also be avoided.

#### **5.3.4 The Environmental Management and Co-ordination (Water quality) Regulations**

The regulations set stringent controls to protect sources of water for domestic use. Section 4(1&2) states that “Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of these regulations” and 2 states that “No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution”. Section 5 states that”. All sources of water for domestic uses shall comply with the standards set out in the first schedule to these regulations”.

The regulations also prohibit abstraction of ground water or carrying out any activity near any lakes, rivers, streams, springs and wells that is likely to have any adverse impact on the quantity and quality of water, without an environmental impact assessment license issued in accordance with the provision of the Act in section 6.

The regulations invest in the authority (NEMA) in consultation with the relevant agency, the powers to maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations.

### **Relevance to the proposed projects**

The proponent must ensure that the borehole water will meet the quality standards for sources of domestic water as set out in the first schedule of the regulations. The standards are as follows.

#### **QUALITY STANDARDS FOR SOURCES OF DOMESTIC WATER**

<b>Parameter</b>	<b>Guide Value (maximum allowed)</b>
Ph	6.5-8.5
Suspended solids	30(mg/L)
Nitrate-NO <sub>3</sub>	10(mg/L)
Ammonia-NH <sub>3</sub>	0.5(mg/L)
Nitrate-NO <sub>2</sub>	3(mg/L)
Total dissolved solids	1200(mg/L)
E.coli	Nil/100ml
Fluoride	1.5(mg/L)

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Phenols	Nil/(mg/L)
Arsenic	0.01(mg/L)
Cadmium	0.01(mg/L)
Lead	0.05(mg/L)
Selenium	0.01(mg/L)
Copper	0.05(mg/L)
Zinc	1.5(mg/L)
Alkyl benzyl sulphonates	0.5(mg/L)
Permanganate value (PV)	1.0(mg/L)

### **5.3.5 Physical Planning Act**

The local authorities are empowered under section 29 of the act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore, allows for prohibition or control of use and development of land and buildings in the interest of proper and orderly development of an area.

Section 30 states that any person who carries out development without the 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.

Finally section 36 states that if in connection with a development application, the local authority is of the opinion that the proposed development will have injurious impact on the environment; the applicant shall be required to submit together with the application, an Environmental and Social Impact Assessment (E.S.I.A).

### **Relevance to the proposed projects**

This Act provides for order in terms of development execution which each region; it's the guiding document, which gives direction to the kind of investments' to be implemented in the area, in relation to land.

### **5.3.6 Compliance with Existing Legislation**

By carrying out this Environmental Impact Assessment, the proponent has already complied with the Environmental Management and Coordination Act, 2015 (EMCA) and the Environmental Management and Co-ordination (Water quality) Regulations which require that an ESIA must be carried out for a project of such magnitude.

### **Relevance to the proposed projects**

The project proponent also applied for authorization to drill a borehole from the Water Resources Management Authority (WRMA) in fulfilment of the Water Act and Physical Planning Act and has agreed to dump the waste in NEMA approved sites in regards to the Public Health Act, Local Government Act and the Councils By-Laws.

### **5.3.7 Occupational Safety and Health Act, 2007**

Occupational Safety and Health Act (OSHA) is an Act of Parliament that provides for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to: • Secure the safety, health and welfare of persons at work; and • Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work. OSHA Kenya Gazette Supplement No. 111 (Acts No.15) dated October 26, 2007 revokes the Factories and Other Places of Work Cap.514. The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions, factories, and plantations. It establishes codes of practices to be approved and issued by the Directorate of Occupational Safety and Health Services (DOSHS) for practical guidance of the various provisions of the Act. The contractor will be required to comply with all the provisions of the Act throughout the project cycle

#### **Relevance to the Project**

The Act is relevant during construction of the project due to the fact that the project will involve workers at all stages. Various health hazards are likely to emanate from the proposed project's activities such as workplace accidents. Health issues will therefore be integrated into the project to ensure safety of workers.

### **5.3.8 The Urban Areas and Cities Act 2011**

This law passed in 2011 provides legal basis for classification of urban areas (City when the population exceeds 500,000; a municipality when it exceeds 250,000; and a town when it exceeds 10,000) and requires the city and municipality to formulate County Integrated Development Plan (Article 36 of the Act). Under Article 36, the integrated development plan so developed is required to be the central pillar in public administration of the city or municipality this forming the basis for:

- the preparation of environmental management; preparation of valuation rolls for property taxation plans;
- provision of physical and social infrastructure and transportation;
- preparation of annual strategic plans for a city or municipality;
- disaster preparedness and response;
- overall delivery of service including provision of water, electricity, health, telecommunications and solid waste management; and
- The preparation of a geographic information system for a city or municipality.

The strategy plan as stated above denotes an annual plan to be adopted in the county assembly following the integrated development plan, and the Act requires the board of town

committee to formulate the strategy plan soon after the adoption of the integrated development plan (Article 39). The integrated development plan as stipulated in the Act has to reflect:

- vision for the long term development of the city or urban area;
- An assessment of the existing level of development;
- Any affirmative action measures to be applied; development priorities and objectives;
- Development strategies which shall be aligned with any national or county sectoral plans and planning requirements;
- A spatial development framework;
- Operational strategies; and
- Applicable disaster management plans
- A regulated city and municipal agricultural plan;
- A financial plan and;
- The key performance indicators and performance targets (Article 40).

The integrated development plan thus formulated has to be submitted to the county executive committee, and the committee has to submit the plan to the county assembly with an opinion within 30 days (Article 41).

Proposed drilling of boreholes and Construction of elevated water tanks complies with the urban area and other cities act it's integrated in the County integrated Development plan, and will comply with all the regulations set in the Act especially the clause on Disaster Preparedness and Planning.

### **5.3.9 Work Injury Benefits Act, (WIBA 2007)**

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. An employee is a person who has been employed for wages or a salary under a contract and includes apprentice or indentured learner.

The proposed project will adhere to the provisions of this act throughout the construction period of the project.

## **5.4 Institutional Structure**

### **5.4.1 Ministry of Environment and Natural Resource**

Kenya's Ministry of Environment and Natural Resource is mandated to monitor, protect, conserve and manage environment and natural resources of the country. The Ministry is to achieve this monumental task through sustainable exploitation of natural resources for socio-

economic development geared towards eradication of poverty, improving living standards and maintaining a clean environment for present and future generations.

The Ministry of Transport, Infrastructure, Housing and Urban Development (MTIHUD)

The MTIHUD is the project proponent and is implementing the development drilling boreholes in fire fighting station in Nairobi CBD area, industrial area and Umoja area through Nairobi Metropolitan Services Improvement Project (NaMSIP).

#### **5.4.2 The Directorate of Nairobi Metropolitan Development**

In the capacity of employer, the Ministry of Land, Housing and Urban Development, Nairobi Metropolitan Development through the NaMSIP Project Coordinating Team (PCT) has administrative jurisdiction over the ESIA process.

#### **5.4.3 Nairobi County Government**

The mandate of fire Disaster Preparedness and Management within Nairobi City is the responsibility of Nairobi County Government. The proposed projects are located in Nairobi CBD area, industrial area and Umoja area. The fire Disaster Management within the County Government is managed by the Fire Brigade which is a section under City Engineers Department.

#### **5.4.4 Water Resources Management Authority (WRMA)**

Section 11 of the Water Act 2016 provides for establishment of Water Resources Management Authority, this assessment assumes that the current Water Resources Management Authority (WRMA) will assume the roles proposed in the Water Act 2016.

The authority is responsible for sustainable management of the Nations Water Resources:

- Implementation of policies and strategies relating to management of water resources, Develop principles, guidelines and procedures for the allocation of water,
- Development of Catchments level management strategies including appointment of catchments area advisory committees,
- Regulate and protect water resources quality from adverse impact
- Classify, monitor and allocate water resources.

#### **5.5 NEMA Compliance**

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and

supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programmes, plans and projects.

### **5.6 Sectoral Integration**

This integration encourages provision of sustainable development and a healthy environment to all Kenyans. The key functions of NEMA through the NEC include policy direction, setting national goals and objectives and determining policies and priorities for the protection of the environment, promotion of cooperation among public departments, local authorities, private sector, non- governmental organizations and such other organizations engaged in environmental protection programmes and performing such other functions as contained in the act.

### **5.7 World Bank Safeguard policies**

World Bank requires environmental assessment for projects proposed for the Bank financing to help ensure that they are environmentally sound and sustainable, and thus improve on decision making. Projects are screened and assigned categories (A, B, C or FI) depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

- (i) Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts.
- (ii) Category B: A proposed project is classified as Category B if it's 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 mitigation measures can be designed more readily than for Category A projects. **Following screening of the proposed project, it was classified as category B.**
- (iii) Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
- (iv) Category FI: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts; this case, in any way, is not applicable to the NaMSIP project.

The table below shows the applicability of World Bank Operational Safeguards as it applies to this drilling of a borehole at fire stations in industrial area, Umoja area and Nairobi CBD area.

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**Table 1: Applicability of WB OPs**

OP	Title	Comments
<b>4.01</b>	<b>Environmental Assessment</b>	<b>Applicable. As a result of environmental and social screening, the project was identified as a Category B project due to its ground water abstraction and other activities, as described</b>
4.04	Natural Habitats	Not applicable.
4.09	Pest Management	Not applicable.
4.10	Indigenous Peoples	Not applicable.
4.11	Physical Cultural Resources	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.
4.12	Involuntary Resettlement	Not applicable. No business, traders or land is taken to allow for the works as there is adequate road corridor
4.36	Forests	Not applicable.
4.37	Safety of Dams	Not applicable.
7.50	Projects on International Waterways	Not applicable.
7.60	Projects in Disputed Areas	Not applicable.

### **5.7.1 Environmental Assessment OP 4.01**

The Project is planned to be implemented in Nairobi CBD area, industrial area and Umoja area through Nairobi Metropolitan Services Improvement Project (NaMSIP). The area overtime and due to anthropogenic activities have exerted pressure on both natural and social environment therefore, the Project will have less significant impact on physical, biological and social setting within the immediate surroundings. However OP 4.01 will be triggered.

This policy requires Environmental Assessment (EA) of Projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed investment. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property) and Trans-boundary and global environmental aspects.

Operational Policy 4.01 further requires that the EA report must be disclosed as a separate and stand-alone document by the Government of Kenya and the World Bank. The disclosure should be both in Kenya where it can be accessed by the general public and local

communities and at the WB Website of the World Bank and the date for disclosure must precede the date for appraisal of the Project.

In addition, the project and contractor shall adhere to World Bank Environmental, Occupational Health and Safety (WB EHS) guidelines in the works especially during project implementation. Such requirements include observing safety guidelines, provision of protective clothing, clean water, and insurance cover are observed so as to protect all from work related injuries or other health hazards.

**The proposed improvement of the proposed project has been classified as environmental category B and hence requirement for this ESIA Report.**

### **5.7.2 Harmonization of both WB and GOK requirements for social and environmental sustainability**

The World Bank (WB) and Government of Kenya (GoK) require that Projects of such nature are subjected to environmental and social impact assessment as stipulated under EMCA 2015 and its tools; the same process simultaneously fully resolves requirements of OP 4.01. Generally, both requirements are aligned in principle and objective in that:

- Both require Environmental Assessment before project implementation leading to development of comprehensive Environmental and social Management plans to guide resolution of social and environmental impacts as anticipated.
- Both require public disclosure of Project Report and stakeholder consultation during preparation,
- While OP 4.01 of World Bank stipulates different scales of Project Report for different category of projects, EMCA requires Project Report for all sizes of projects, which are required to be scoped as relevant
- Where EMCA requires consultation of Lead Agencies comprising of relevant sectors with legal mandate under GoK laws, the WB has equivalent safeguards for specific interests.
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project which is equivalent to the statutory annual environmental audits at the operation phase of projects in Kenya.
- The understanding of this Project Report is that, pursuit of an in-depth Project Report process as stipulated by EMCA 2015 is adequate to address all World Bank requirements for environmental and social assessment. This is a major guiding principle in this study.

Therefore, in keeping with this trend, public consultation has been done to the stakeholders, and their comments have been incorporated in the final Environmental Assessment and final design of the project. In addition, the Environmental Assessment report will be made publicly

available to all stakeholders through disclosure at the project's proponent website, NEMA, and WB website, as well as copy of the report available at the project site.

### **5.8 International Finance Cooperation (IFC) Performance Standard 2: Labour and Working Conditions**

Drilling of boreholes, construction of elevated tanks and operation of the boreholes will result to employment personnel who will work either on temporal basis or permanent basis. These personnel will be subjected to the requirements of Kenya's Work Place Injuries and Benefits Act (WIBA 2007). Also, provisions of International Finance Cooperation (IFC) Performance Standard 2: Labour and Working Conditions as discussed below.

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN). The objective of the standard is:

- To promote the fair treatment, non discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children

The relevant International Labour Organization (ILO) Conventions that will be applicable to the Project are listed below:

- 1) ILO Convention 87 on Freedom of Association and Protection of the Right to Organize
- 2) ILO Convention 98 on the Right to Organize and Collective Bargaining
- 3) ILO Convention 29 on Forced Labor
- 4) ILO Convention 105 on the Abolition of Forced Labor
- 5) ILO Convention 138 on Minimum Age (of employment)
- 6) ILO Convention 182 on the Worst Forms of Child Labor
- 7) ILO Convention 100 on Equal Remuneration
- 8) ILO Convention 111 on Discrimination (Employment and Occupation)
- 9) UN Convention on the Rights of the Child, Article 32.1
- 10) UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

The Project Contractor shall observe the Standard as presented in the ESMMP of the project to be enforced under the Works Contract.

## CHAPTER SIX: CONSULTATION AND PUBLIC PARTICIPATION

### 6.1 Approach to Public Consultations

Legal Notice of 101 of EMCA 1999 and amended in 2015 (The Environmental Regulations, 2003) requires that all environmental assessment process in Kenya to incorporate Public Consultation. The aim is to ensure that all stakeholder interests are identified and incorporated in project development, implementation and operation. Of necessity, stakeholder consultations should take place alongside project design and implementation to ensure that the project puts in place measures to cater for stakeholder concerns in all project phases.

#### 6.1.1 Legal and Policy Provisions for Stakeholder Consultations

EMCA 1999 amended in (2015) through the Legal Notice No. 101: the Environmental (Impact, Audit and Strategic Assessment) Regulations, 2003

The principle Act of Parliament is the Environmental Management and Coordination Act (EMCA) 1999 amended in 2015 and the subsequent Regulation, the Environmental Impact Assessment and Audit Regulations 2003 amended in 2009.

The regulation requires that during the process of conducting Scoping, Environmental Impact Assessment the Proponent shall in consultation with the Authority here in referred to National Environment Management Authority (NEMA); seek the views of persons who may be affected by the Project. In seeking the views of the public, after the approval of the scoping report, of the proposed project by the Authority, the proponent shall publicize the project and its anticipated effects and benefits by;

- Posting posters in strategic public places in the vicinity of the site of the proposed project informing the affected parties and communities of the proposed project;
- Publishing a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation;
- Making an announcement of the notice in both official and local languages in a radio with a nation-wide coverage for at least once a week for two consecutive weeks.
- Hold at least three public meetings with the affected parties and communities to explain the project and its effects, and to receive their oral or written comments; ensure that appropriate notices are sent out at least one week prior to the meetings and that the venue and times of the meetings are convenient for the affected communities and the other concerned parties; and
- Ensure, in consultation with the Authority that a suitably qualified co-coordinator is appointed to receive and record both oral and written comments and any translations thereof received during all public meetings for onward transmission to the Authority.

### **6.1.2 World Bank Group (WBG) Environmental Assessment Policy (OP 4.01)**

The World Bank Group's Environmental Assessment Policy (OP 4.01, January 1999) requires that project-affected groups and local non-governmental organizations (NGOs) be consulted during the impact assessments process about the project's potential environmental and social impacts.

The purpose of this consultation is to take local views into account in designing the environmental and social management plans as well as in project design. For complex projects where the environmental impacts and risks are high, the policy requires public consultation at least twice: first, shortly after Environmental Screening and before the terms of reference for the ESIA are finalized and secondly, once a draft ESIA Report is prepared. Consultation during project execution is also required. Section 5 summarizes the consultation programme for the ESIA, and confirms that the project meets and indeed exceeds these requirements.

### **6.2 Approach to Public Participation and Consultations**

In case of the proposed drilling of borehole at the fire station located in industrial area, Umoja area and Nairobi CBD area public participation and consultations followed these steps:

#### **6.2.1 Identification of Stakeholders**

Like in all civil works projects, the core stakeholders comprise people to be directly served by the borehole which included the locals residing close to the proposed borehole and fire station employees.

This study also identified a second category of stakeholders comprised of county officers and institutions in charge of diverse sectors), which are likely to be impacted by the proposed projects. This category was also consulted as key informants on sectoral policy and to advise this ESIA study on mitigation measures to be put in place so as to minimize adverse impacts in respective sectors. Each category of stakeholders called for a different approach to consultation.

### **6.3 Modalities for stakeholder consultation**

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

#### **➤ Site checklists**

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

#### **➤ Scheduled interviews**

This involved face-to face interaction between the consultants/experts and the stakeholders of the project like Nairobi County government. An interview guide was used to solicit information from various government offices and relevant players on the area of study.

#### **➤ Photography and direct observation**

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Photography was particularly useful as it captured the real situation on the ground that was relevant to the study. Direct observation involved site viewing of the proposed project location to see the extent of development on it. In addition photographs were taken during the public participation meetings as shown on the plates below

Proposed site/description	Public participation photographs	Proposed site
Industrial area fire fighting station		
Umoja area fire fighting station		
Nairobi CBD area fire fighting station		

#### **6.4 Consultation and public participation (CPP) Methodology**

In each of the proposed project site Interviews were carried out in the project areas by the use of questionnaires, to find out all the views from the neighbours' and other stakeholders on the proposed project. The ESIA team took the respondents through the questions ensuring they understood all the questions and there after respondents were given time to fill in the questionnaire. The main objective was to find out if the stakeholders support the project and have no objection to it. The questionnaire was to initially give introduction and make the residents aware of the proposed project. Afterwards, the ESIA team enquired on the acceptance of the project and whether the project would cause any negative impacts on the following;

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

#### **6.5 Stakeholder Analysis**

A sample of the questionnaires from those that attended the meeting including the attendance sheet is part of this report.

#### **6.6 Public Disclosure of ESIA and Annual Monitoring Reports**

In accordance with NEMA and World Bank/IFC guidelines on environmental and social safeguards, the Project Proponent in this case State Department for Housing and Urban Development (SDH&UD) will ensure that the Results of public Consultations including ESIA, and annual Monitoring Reports are published on the Ministry website for wider circulation and review.

The Reports will also be made available at Chiefs' Offices and Member of County Assembly for Umoja area, Industrial area and Nairobi CBD area sub counties. This disclosure will be done early before commencement of Project Works, approximately 60 days before Contractor's mobilization on site. In addition, (SDH&UD) will ensure that the ESIA Report is available throughout the project construction phase.

The ESIA report and information will be disclosed at the ESIA Stage by NEMA and during Project Implementation Stage by (SDH&UD). NEMA will require (SDH&UD) to undertake a closeout audit after completion of the Project and also undertake and initial Environment Audit (EA) immediately after commissioning of the project in the 1<sup>st</sup> year, these audits are essential in determining the performance of the project in addressing issues related to environment and social safeguards, gaps identified are corrected through implementation of recommendation of the Environment and Social Audit Action Plan (ESAAP).

### 6.7 Construction, Operation and Decommissioning Phase Consultations

Stakeholder groups that may be affected by and/or interested in the implementation of the Project, as well as proposed communication methods and media for each group, have been identified and are presented in **Table 2** below.

**Table 2: Stakeholder Consultations during Project Construction and Operation Phase**

Stakeholder/s	Type of communication	Responsibility	Timing
<b>External Stakeholders</b>			
Community Members	Public meetings and monthly project progress updates	Contractor &SDH&UD	Throughout project implementation phase
Local administration representatives Chiefs and Ward Representatives	Public meetings and monthly project progress updates	Contractor &SDH&UD)	Throughout project implementation phase
Interested NGOs and other civil societies	Local media ESIA, published on SDH&UD) website.	Contractor &SDH&UD)	Throughout the implementation of the Project
Relevant National Government and County Government Authorities	Official correspondence and meetings, progress reports  Permitting procedures	Contractor &SDH&UD)	During project design, construction and implementation
<b>Internal Stakeholders</b>			
Employees Contractor &SDH&UD)	Notice boards, email, Grievance Redress Mechanism,	Contractor &SDH&UD)	Throughout project implementation phase
Casual workers and temporary staff	Notice boards, email, Grievance Redress Mechanism, meetings	Contractor	Throughout project implementation phase

#### 6.7.1 Community Relations in Construction Phase

This section set outs the proposed objectives, mechanisms and responsibilities for liaison with settlements affected by the project during the construction phase. It identifies the approach to, and frequency of, consultation with affected settlements.

The primary responsibility for liaison will be borne by the construction contractor SDH&UD will therefore require the contractor to develop its own plan and more detailed proposals for community liaison. This will build on the approach outlined in this section. All potential contractors will be required to draw up this plan as part of the tender process.

The objectives of the Community Relations Programme will be to:

- Provide local residents affected by the project with regular information on the progress of work and implications for these settlements.

- Inform the project/contractor of any community related issues that may impact construction.
- Monitor implementation of mitigation measures and the impact of construction via direct monitoring and feedback from settlements.
- Identify any significant new issues that may arise during the construction period; and
- Manage any complaints against the project/contractors and local residents (i.e., provide a grievance mechanism).

#### **6.7.2 Construction Contractor's Role in Community Liaison**

The Construction Contractor will be required to adhere to the requirements of the Environmental and Social Management and Monitoring Plan (ESMMP) that sets out how the contractor will meet and monitor the mitigation measures recommended by the Plan. The role and responsibilities of the Contractor include:

- Provide primary interface between project and affected or interested persons;
- Coordinate and implement required pre-construction activities, namely;
  - produce management plans for community relations, construction camps and transport; train staff with community relations responsibilities; and
  - implement induction training workshops for all construction staff;
- Assist in local recruitment process; and
- Ensure on-going communication with interested persons

#### **6.7.3 Community Relations in Operational Phase**

The objective of the Community Relations Programme in this Phase will be to:

- Maintain constructive relationships between local residents
- Maintain awareness of safety issues among local residents in the project areas;
- Ensure compliance with land use constraints among land owners in the project areas;
- Monitor community attitudes to the fire infrastructure and to the operator, Nairobi City County

#### **6.7.4 Decommissioning**

In the event of decommissioning of the Project, liaison will continue to take place between SDH&UD and Nairobi County Government and with Project Interested Persons prior to decommissioning. This role will complement work carried out by the operating company and social investment team to reduce the negative impact of the project decommissioning.

## **CHAPTER 7: POTENTIAL IMPACTS AND MITIGATION MEASURES**

### **7.1 Introduction**

This Chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability. Appropriate Impact Rating has been presented for the situation without mitigation.

Allocation of responsibilities, time frame and estimated costs for implementation of these measures are presented in the Environmental Management and Monitoring Plan (ESMMP).

### **7.2 Definition and Classification of Environmental Impact**

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect.

Impacts are termed cumulative when they add incrementally to existing impacts. In the case of the Project, potential environmental impacts would arise during the construction and operation phases of the Project and at both stages positive and negative impacts would occur.

### **7.3 Impact Significance**

The purpose of this ESIA Report is to identify the significant impacts related to the Project under consideration and then to determine the appropriate means to avoid or mitigate those which are negative. Significant impacts are defined, not necessarily in order of importance, as being those which:

- Result in Loss of property and of livelihood.
- Relate to protected areas or to historically and culturally important areas;
- Are of public concern and importance.
- Trigger subsequent secondary impacts.
- Elevate the risk to life threatening circumstances.
- Affect sensitive environmental factors and parameters.

### **7.4 Impact Scoring and Rating Criteria**

The potential impacts associated with the proposed development have been assessed as presented in the matrix below. Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e. where there is uncertainty or insufficient information, the Environmentalist erred on the side of caution.

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**Table 3** below summarizes the Impact Rating Criteria adopted in the Study.

**Table 3: Environment Impact Scoring and Rating Criteria**

<b>Severity of Impact</b>	<b>Rating</b>	<b>Scoring</b>
Insignificant / non harmful/less beneficial	-1/+1	Very Low
Small/ Potentially harmful / Potentially beneficial	-2/+2	Low
Significant / slightly harmful / significantly beneficial	-3/+3	Medium
Great/ harmful / beneficial	-4/+4	High
Disastrous/ extremely harmful / extremely beneficial	-5/+5	Very high
<b>Spatial Scope of the Impact</b>	<b>Rating</b>	<b>Scoring</b>
Activity specific	-1/+1	Very Low
Right of way specific	-2/+2	Low
Within Project area 5km radius	-3/+3	Medium
Regional / County	-4/+4	High
National	-5/+5	Very high
<b>Duration of Impact</b>	<b>Rating</b>	<b>Scoring</b>
one day to one month	-1/+1	Very Low
one month to one years	-2/+2	Low
Within Project construction period	-3/+3	Medium
within the Project life	-4/+4	High
at decommissioning	-5/+5	Very high

**Example of Cumulative Impact Scoring**

1. +3,+2,+5,+4, +4,+1=+4 (the weight that occurs more becomes the overall rating)
2. +2,+2,+5,+4, +4,+1=+3 (if two scores or more tie, then an average of the scores shall be adopted)

## **7.5 Positive impacts during construction Phase**

### **7.5.1 Creation of Employment and Business Opportunities**

During the construction period, new employment opportunities will be created in the form of skilled and unskilled labour. The majority of unskilled labour will be sourced from estates around the project sites. Business and Employment Opportunities will also be created for Suppliers, Sub-Contractors and other small businesses such as food kiosks that may be set-up near the contractor's camps

Based on the Scope of Works for the drilling of borehole and construction of elevated tanks in the Nairobi CBD area, Umoja Area and Industrial area, it is estimated that the following employment opportunities will be created during the Construction Phase:

**Table 4: Estimate of Jobs Created by the Project**

Casual Labourers	20
Skilled Staff	5
Plant Operators / Drivers	3
Managerial Staff	1

Job creation will help reduce the problem of unemployment with attendant improvement in income for the workers' household and revenue.

The Impact Rating for Creation of Employment and Business is given in **Table 5** below.

**Table 5: Impact Rating for Creation of Employment**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+3
<b>Overall score</b>	<b>+3</b>
<b>Impact Rating</b>	<b>Medium - Beneficial</b>

## **7.6 Positive Impacts during Operation Phase**

### **7.6.1 Minimize loss of lives and property associated with fires.**

The boreholes once commissioned will reduce time taken to source for water to fight fire emergency cases in areas surrounding the proposed project areas as well provide this areas with an alternative source of domestic water. The Impact Rating for reduced number of casualties and loss of property in the in the Project Area is as shown in **Table 6** below.

**Table 6: Reduced number of casualties and loss of Property**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+4</b>
<b>Impact Rating</b>	<b>High – Beneficial</b>

### 7.6.2 Water Pumps on Site within the Station

The proposed project involve equipping the boreholes with high head water pumps, these water pumps are necessary and are required during drawing of water from the boreholes

The Impact Rating for Importance of Water Pumps at the stations is as shown in **Table 7** below.

**Table 7: Importance of Water Pumps**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+4</b>
<b>Impact Rating</b>	<b>High – Beneficial</b>

### 7.6.3 On site Borehole and Elevated Tanks

The stations rely on water from Nairobi City Water and Sewerage Company (NCWSC) network which is unreliable due to rampant water shortage experience. Once the proposed boreholes and elevated tanks are constructed they will provide water to the fire stations and also to the neighboring community living Industrial area and Umoja area.

The Impact Rating for a borehole drilled at the stations is as shown in **Table 8** below.

**Table 8: Importance of Borehole Drilled on Site.**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+4</b>
<b>Impact Rating</b>	<b>High - Beneficial</b>

### 7.6.4 Employment opportunities creation

The boreholes once commissioned will create employment for boreholes manager’s personnel. This will reduce the number of unemployed youth within the area. The Impact

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Rating for creation of employment in the Project area is as shown in **9** below.

**Table 9: Creation of Employment**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+4</b>
<b>Impact Rating</b>	<b>High - Beneficial</b>

**7.6.5 Spark economic growth.**

More investors will be attracted to the area without fire of property destruction caused by fire outbreaks which take long to be put out. This will lead to increased investment rate that will in turn spark economic growth.

The Impact Rating for a spark in economic growth rate in the Project area is as shown in **Table 10** below.

**Table 10: Spark in economic growth**

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+4</b>
<b>Impact Rating</b>	<b>High - Beneficial</b>

**7.6.6 Reduced poverty level**

Generally in the event of a fire outbreak, property for example houses and business premises are burnt down leading to massive destructions which impoverish owners. Drilling of boreholes and construction of elevated tanks for water storage will ensure timely response to fire outbreaks which will lead to significant reduction in property destruction hence reduction poverty levels.

The Impact Rating for Reduced poverty level is as shown in **Table 11** below.

**Table 11: Impact Rating for Reduced poverty level**

Severity of Impact	+3
Spatial Scope of the Impact	+3
Duration of Impact	+4
<b>Overall score</b>	<b>+3</b>
<b>Impact Rating</b>	<b>Medium - Beneficial</b>

## **7.7 Negative Impacts to the Biophysical Environment and Mitigation Measures**

### **7.7.1 Destruction of Vegetation on the proposed boreholes Sites**

Assessment of the Project target area identified that the Project area is a settled area; human activities have completely resulted to the areas being cleared of vegetation to provide land for development of structures. Therefore less significant impact of the project to vegetation is anticipated.

The Impact Rating for Destruction of Vegetation Cover is as shown in **Table 12** below.

**Table 12: Impact Scoring for Destruction of Vegetation Cover**

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Low Negative</b>

### **Mitigation Measures**

- Site Clearance and Construction activities will be limited to the area set out for construction.
- Reinstatement of the project sites to their original state to be carried out once construction works are completed to allow growth of vegetation.

### **7.7.2 Contamination of Surface Water Sources by Effluents from Construction Plant and Equipment**

The assessment identified that no water resource is located within close proximity to the proposed Project areas; therefore chances of pollution of water resources are less significant.

However, effluents from Construction Plant and Equipment (oils, grease, hydro-carbonates) are potential point pollutants. This can occur during cleaning, repair of the equipment as well as through leakages during normal operation of the equipment. These effluents can further contaminate the surface water channels within the project areas and eventually pollute adjacent water resources. The Impact Rating is as shown in **Table 13** below.

**Table 13: Impact Rating for Surface Water Pollution**

Severity of Impact	-2
Spatial Scope of the Impact	-1
Duration of Impact	-3
<b>Overall score</b>	<b>-2</b>
<b>Impact Rating</b>	<b>Low – Negative</b>

## **Mitigation**

The risk of surface water pollution by discharges from Construction Equipment is low and will be further minimized by ensuring Construction Equipment is well maintained and serviced according to manufacturers' specifications to prevent oil leaks, Cleaning / repair of Construction Plant and Equipment to be carried out at designated yards and the Contractor to have designated storage areas for oils, fuels etc. that is protected from rain water and away from nearby surface water courses

### **7.7.3 Soil Erosion Resulting to Loss of Top Soil**

Site clearance, excavation and ground levelling activities during construction can cause the top soil to be loose and susceptible to agents of erosion which include wind and water. This impact applies only to the public land that was targeted under this assessment. The Impact Rating for Soil Erosion is as shown in **Table 14** below.

**Table 14: Impact Rating for Soil Erosion**

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-2</b>
<b>Impact Rating</b>	<b>Low – Negative</b>

## **Mitigation**

- Minimize the areas to be cleared and leave as much vegetation as possible to filter runoff water from the site
- Avoid stock piling topsoil, sand and other building materials on foot path, roads and drainage channels.

### **7.7.4 Solid Wastes Generation from Construction Activities**

The major solid waste will be the drilled cuttings. There will be some solid containers such as cement, bentonite and gravel bags and other packets with materials and equipment to be used during implementation of the project. Other solid waste will be generated from the composite housing of the drilling crew.

The Impact Rating for Pollution by Solid Wastes is as shown in **Table 15** below.

**Table 15: Impact Scoring for Solid Waste Generation**

Severity of Impact	-3
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Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium – Negative</b>

### **Mitigation Measures**

- The proponent in collaboration with the local administration should organize for disposal of waste to a NEMA licensed dump site before commissioning the project.
- Some of the drilled materials will be used in the borehole construction by back-filling the annular space. All excavated material from the draining channel will be used to refill it.
- Drilling crew to be encouraged to dump their personal wastes in designated covered dustbins
- Do not secure a solid waste disposal site within a radius of 50M of the proposed borehole site.

#### **7.7.5 Air Pollution and Dust Generation**

Air Pollution can be caused by emissions from Construction Plant and Equipment and Vehicles. Dust can be generated by vehicles travelling on unpaved roads and tracks, and dust from exposed, non-vegetated surfaces. Some dust will also be generated during excavation works, by blowing from dump truck loads. This impact applies to the public land under this assessment.

The Impact Rating for Air Pollution and Dust Generation is as shown in **Table 16** below.

**Table 16: Impact Scoring for Air Pollution and Dust Generation**

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

### **Mitigation Measures**

- The contractor shall comply to the provisions of EMCA 1999 (Air Quality Regulations 2014)
- Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications

- The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible
- The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds
- Vehicles delivering construction materials and vehicles hauling excavated materials shall be covered to reduce spills and windblown dust
- Water sprays shall be used on all earthworks areas within 200 metres of human settlement especially during the dry season.

### **7.7.6 Hazardous wastes**

Accidental oil and diesel spills would be caused by leaking of drums holding the diesel and oil that are stored on the site. The machines being used at the site could also cause oil spill especially if they are not well maintained or during regular maintenance. However, the occurrence of these wastes is expected to be minimal. Seepage of hydrocarbon products such as oils, grease and fuel if not carefully handled will result into contamination of water thus rendering it not good for domestic use. During the dry season spilled fuel, oils and lubricants could result into fire risks. The Impact Rating for hazardous wastes is as shown in **Table 17** below

**Table 17 Impact scoring for hazardous waste**

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium – Negative</b>

### **Mitigation measure**

The following mitigation measures should be adopted to limit the impact of hazardous substances on-site;

- i. Ensure that the drilling crew is aware of the procedures to be followed for dealing with spills and leaks;
- ii. Ensure that spills are immediately removed along with all contaminated material and disposed of at an approved hazardous landfill site;
- iii. Ensure that all contaminated material is stored in a banded area before being disposed of;
- iv. Ensure that a suitable spill kit is available on site, to be applied to all contaminated areas that will absorb / breakdown the spills. The quantity of such materials shall be able to handle the total volume of the hydrocarbon stored on site; and

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- v. Ensure that all diesel and oil drums are stored in a banded area with the respective tags like “Danger” or its pictorial representation.
- vi. Caution to be observed when transporting diesel and oil to, from and within the site. It is recommended that if possible, this be done using qualified oil transporters
- vii. Repairing and maintenance and greasing of vehicles and construction plants must be carried out off the site (petrol station or garage) to avoid fuels and lubricants spills at the project site and contamination of the water

## **7.8 Negative Impacts to the Socio-Economic Environment and Mitigation Measures**

### **7.8.1 Increased Influx of Workers**

The Project will attract new people to the Project area seeking employment during the construction period. In the event that the construction contract is awarded to an international Contractor, the contractor will mobilize technical personnel from foreign country as well. Labour influx to the Project area could result to various social vices which include, discrimination, sexual abuse, drug and alcoholism, child labour among others

The Impact Rating for influx of workers is as shown in **Table 18** below.

**Table 18: Impact Rating for Increased influx of workers**

Severity of Impact	-2
Spatial Scope of the Impact	-3
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

### **Mitigation Measures**

The contractor and the supervising engineer should ensure that the personal on site are protected as provided for under the Worker Injures and Benefits Act (WIBA 2007) and the International Finance Cooperation IFC Performance Standard 2: on Labour and Working Conditions. The standard aims to ensure:

- To promote the fair treatment, non discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as avoidance of discrimination and harassment of minors

### **7.8.2 Increased Transmission of HIV/AIDS**

During construction, the project is likely to bring in a significant population of new people in the project area. With this, chances are high that social delinquency and STI rates will increase.

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This is due to the fact that the workers and traders will have money to spend and some may use it to attract women from the project area in a bid to solicit for sex, thereby creating avenues for spread of HIV/AIDS and STIs.

This impact applies to the settlements under this assessment. The Impact Rating for Increased Transmission of HIV/AIDS is as shown in **Table 19** below.

**Table 19: Impact Rating for Increased Transmission of HIV/AIDS**

Severity of Impact	-2
Spatial Scope of the Impact	-3
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

**Mitigation measure**

- ✓ Include a specific and independent task in the supervision contract concerning H&S supervision and compliance, together with the staff resources to carry this out;
- ✓ Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats;
- ✓ Implement the specified H&S programme throughout the construction period;
- ✓ The contractor should establish an emergency response procedure and display on all work areas during construction activities;
- ✓ Construction sites should be adequately barricaded from the general public and conspicuous warnings posted in national
- ✓ The contractor should ensure compliance with all standards and legally required health and safety procedures in line with OSHA, 2007, Mining safety rules, explosives act and their associated rules and regulations.

**7.8.3 Increased Crime and Insecurity**

Influx of persons to the project area may lead to increased insecurity and incidences of crime. The Impact Rating for Increased Insecurity is as shown in **Table 20** below.

**Table 20: Impact Scoring for Insecurity**

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-3

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<b>Overall score</b>	<b>-2</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

**Mitigation Measures**

- Contractor and Supervision Team to liaise regularly with the Local Administration and Police Service to address any security and crime arising during project implementation.
- Contractor to provide 24 hours security to Workforce Camps, Yards, Stores and to the Supervising Team’s Offices

**7.9 Negative Impacts on Occupational Health and Safety and Mitigation Measures**

**7.9.1 Noise and Excessive Vibrations**

Noise and Excessive Vibrations are caused by operation of construction plant and equipment and activities such as drilling and rock breaking. This impact poses a health and safety risk to both the communities living in the project area and construction workers.

The Impact Rating for Noise and Excessive Vibrations is as shown in **Table 21** below.

**Table 21: Impact Rating for Noise and Excessive Vibrations**

Severity of Impact	-3
Spatial Scope of the Impact	-1
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

**Mitigation Measures**

- Contractor will comply with provisions of EMCA 2015 (Noise and Excessive Vibrations Regulations of 2009)
- The Contractor shall keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas
- Hospitals and other noise sensitive areas such as schools shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity
- Any complaints received by the Contractor regarding noise will be recorded and communicated to the Supervising Engineer for appropriate action

### 7.9.2 Risk of Accidents at Work Sites

Accidents during construction activities may occur due to failure to use Personal Protective Equipment (PPE) by workers on site and members of the public illegally accessing the work sites. Accidents may result in injuries or even death of workers or members of the public. This impact applies to all settlements under this assessment

The Impact Rating for Risk of Accidents at Work Sites is as shown in **Table 22** below.

**Table 22: Impact Rating for Risk of Accidents at Work Sites**

Severity of Impact	-4
Spatial Scope of the Impact	-3
Duration of Impact	-3
<b>Overall score</b>	<b>-3</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

### Mitigation Measures

- Construction Workers and the Supervising Team to be provided with Personal Protective Equipment including gloves, gum boots, overalls and helmets. Use of PPE to be enforced by the Supervising Engineer.
- Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles
- Adequate Ablution Facilities to be provided at the Camps and Work Sites and cleanliness maintained
- Isolate the site for access by the local communities during the construction for their safety and health
- Contractor to provide a Healthy and Safety Plan prior to the commencement of works to be approved by the Supervising Engineer.
- Camps and Work Sites to be fenced off and Security Guards provided to restrict access to members of the public.

### 7.10 Potential Negative Impacts and Mitigation Measures during the Operation Phase

#### 7.10.1 Groundwater pollution

Water, especially for domestic use should be of high quality and wholesome. Poor water quality could be of great concern to human and animal health. The water that seeps into the ground may be contaminated to some degree and eventually affects the quality of the groundwater and

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indeed, borehole water. Percolation of water from sanitary systems I.e. toilets and refuse disposal sites poses a serious threat to the preservation of groundwater quality.

Protection of groundwater quality depends on the well design and the methods and materials used to construct the borehole.

**Mitigation measure**

- ✓ Groundwater quality must be safeguarded by a correct territorial planning and protection of surface waters since these are strictly linked to ground water resources.
- ✓ Ensure that all potential sources of pollution are eliminated for example by ensuring that the sewage disposal system are well protected and does not leak even during exhaustion
- ✓ The proponent will adhere to the regulations and permits set by WRMA,

**Table 23: Impact rating for ground water pollution**

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-2</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

**7.10.2 Groundwater depletion**

This may result from excessive abstraction of the water from the borehole i.e. beyond the permitted limit.

**Mitigation measure**

On completion of the drilling and other related works;

- d) The borehole should be installed with a Master Meter and an Airline/Piezometer to monitor ground water abstraction and to facilitate regular measurements of the static water level in the borehole, respectively
- e) The maximum ground water abstraction permitted from the borehole is limited to the authorized volume per day for the domestic/industrial use only subject to availability from 60% of the tested yield for a maximum abstraction period not exceeding ten (10) hours per day
- f) Install auto-shut water taps to reduce water wastage

**Table 24: Impact Rating for ground water depletion**

Severity of Impact	-2
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**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED  
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STREET FIRE FIGHTING STATIONS IN NAIROBI COUNTY.**

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Spatial Scope of the Impact	-2
Duration of Impact	-3
<b>Overall score</b>	<b>-2</b>
<b>Impact Rating</b>	<b>Medium - Negative</b>

## **CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN**

### **8.1 Purpose and Objectives of ESMMP**

The specific objectives of the ESMMP are to:

- Serve as a commitment and reference for the contractor to implement the ESMMP including conditions of approval from NEMA.
- Serve as a guiding document for the environmental and social monitoring activities for the supervising consultant, contractor and the client management including requisite progress reports.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment.
- Provide instructions to relevant Project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the Project goal of minimal or zero incidents.
- Document environmental concerns and appropriate protection measures; while ensuring that corrective actions are completed in a timely manner.

### **8.2 Auditing of ESMMP**

The contractor shall conduct regular audits to the ESMMP to ensure that the system for implementation of the ESMMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The ESMMP being used is the up to date version;
- Variations to the ESMMP and non-compliance and corrective action are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints) is in place and other documentation related to the ESMMP; and
- Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued

### **8.3 Management Responsibility of ESMMP**

In order to ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations which will be involved in the project. The following entities should be involved in the implementation of this ESMMP:

- NEMA;
- Contractor;
- Consultant ;
- County Government of Nairobi.

### **8.3.1 National Environment Management Authority (NEMA)**

The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government of Kenya in the implementation of all policies relating to the environment.

### **8.3.2 The Contractor**

The persons/firms contracted to put up the proposed fire station infrastructure will be required to comply with the requirements of the ESMMP within this report. To ensure strict compliance environmental specifications of this ESMMP should form part of the contract documents.

### **8.3.3 Consultant**

The sourced consultant will have to ensure that the proposed ESMMP is up to date and is being used by the contractor. Periodic audits of the ESMMP will have to be done to ensure that its performance is as expected.

### **8.3.4 County Government of Nairobi**

The relevant departmental officers in the above County government will be called upon where necessary during Project implementation to provide the necessary permits and advisory services to the Project implementers. The Project once commissioned will be operated by the County Government of Nairobi under the Fire Bridget department.

## **8.4 Emergency procedure during construction and operation phase of the project**

An emergency situation means unforeseen happening resulting in serious or fatal injury to employed persons or the neighboring communities. In the event of an emergency during construction, the workers shall:-

- i. Alert other persons exposed to danger;
- ii. Inform the OSHA coordinator;
- iii. Do a quick assessment on the nature of emergency;
- iv. Call for ambulance.

When emergency is over the OSHA coordinator shall notify the workers by putting a message: "ALL CLEAR".

In the event of such an emergency during operation the workers shall:

- a. Alert other persons exposed to danger;
- b. Ring the nearest police station and ambulance services.

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The proponent has already put measures to respond to emergencies like alarms and a fire assembly point there are also trained staff can assist in case of emergencies