ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

REPORT

FOR

THE PROPOSED BIOSAFETY LEVEL II LABORATORY (BSL2) AND AN INCINERATOR FACILITY PROJECT

AT MARSABIT COUNTY REFERRAL HOSPITAL LOCATED IN MARSABIT TOWN, MARSABIT COUNTY

Proponent
MINISTRY OF HEALTH
P.O. BOX 30016-00100,
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CERTIFICATION

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### Acronyms and Abbreviations

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>PR</td>
<td>Project Report</td>
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<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<tr>
<td>EMCA</td>
<td>Environmental Management and Coordination Act</td>
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<tr>
<td>NEAP</td>
<td>National Environmental Action Plan</td>
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<tr>
<td>NEMA</td>
<td>National Environment Management Authority</td>
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<tr>
<td>KPLC</td>
<td>Kenya Power and Lighting Company</td>
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<td>KNH</td>
<td>Kenyatta National Hospital</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>LR</td>
<td>Land Registration</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<td>EHS</td>
<td>Environment, Health and Safety</td>
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<td>BS</td>
<td>British Standards</td>
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<td>WBG</td>
<td>World Bank Group</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>CIDP</td>
<td>County Integrated Development Plan</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinylchloride</td>
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<tr>
<td>GoK</td>
<td>Government of Kenya</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>D.P.C</td>
<td>Damp Proof Course</td>
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<td>GRM</td>
<td>Grievance Redress Mechanism</td>
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<tr>
<td>PCR</td>
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EXECUTIVE SUMMARY

Introduction
Environmental and Social Impact Assessment, (ESIA) has been identified as a key process for predicting and assessing the potential environmental and social impacts of a proposed project, evaluating alternatives, designing appropriate mitigation, management, and monitoring measures. Early identification of possible development impacts to the environment and human populations enhances and promotes environmental sustainability as anthropogenic factors are balanced with natural environmental needs.

The World Bank requires an environmental and social assessment (EA) of projects proposed by borrowers for Bank financing to help ensure that they are environmentally and socially sound and sustainable, and thus to improve decision making. The Bank undertakes environmental and social screening of each proposed project to determine the appropriate extent and type of environmental and social assessment. It classifies a proposed project into one of four Environmental and Social Assessment (EA) categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental and social risks and impacts. It is also a requirement by the National Environment Management Authority (NEMA) under the Environmental Management and Coordination Act (EMCA), CAP 387 and the Environmental (Impact Assessment and Audit) Regulations of 2003, Laws of Kenya for projects of such nature to undergo an environmental impact assessment (EIA) process.

The proposed Biosafety Level II Laboratory and Incinerator Project falls under Category B of the World Bank EA categorization. Under this general category, “a proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigating measures can be designed more readily than for Category A projects.

The scope of assessment for a Category B project may vary from project to project, but it is narrower than that of Category A assessment. Like Category A assessment, it examines the project’s potential negative and positive environmental and social impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.”

The proposed project triggers one World Bank safeguard policy that is key in avoiding, preventing and mitigating undue harm to people and their environment in the development process. This is the World Bank’s safeguards operational policies and procedures on Environmental Assessment (OP/BP 4.01). Apart from the above-mentioned WB policy, EMCA CAP 387, and EIA/EA Regulations of 2003, this ESIA was also developed in light of a number of national and international policies, procedures, regulations, laws and statutes, some of which are discussed in detail in Section 3 of this report.

Project alternatives considered included not taking action or choosing a different construction site. However, after an in-depth evaluation of a number of factors the project was proposed to go ahead at the proposed site.

With regard to stakeholder consultation for the proposed projects, the ESIA team interviewed a number of stakeholders from different areas who may be affected by the proposed project. Most of them generally agreed that the project should go on as planned.

Background:
The project proponent is the Ministry of Health who intends to put up a Bio Safety Level II public laboratory and an incinerator at the Marsabit County Referral Hospital, Marsabit Town, Marsabit
County. Marsabit County Referral Hospital is a public hospital owned by the Government of Kenya and it stands on public land. Therefore, the land where the proposed project will be undertaken is public land owned by the Government of Kenya. Consequently, there are no issues on land acquisition on this project.

This is a development being undertaken under the East Africa Public Health Laboratory Networking Project. The Regional Public Health Laboratory Project is a combined initiative of the Governments of Kenya, Rwanda, Uganda, Tanzania, Burundi and World Bank in support of efficient laboratory networking. The member countries have jointly mobilized resources to revamp public health laboratory services delivery. The Project will deliver rehabilitated public health laboratories provided with critical equipment, improved technical and managerial skills for laboratory workers and strengthened institutional governance.

The overall project objective is to strengthen capacities for diagnosis and surveillance of Tuberculosis and other communicable and non-communicable diseases by establishing a network of efficient, high quality and accessible public health laboratories and by promoting innovation and knowledge sharing.

The overall responsibility for project implementation will be with the Ministry of Health (MoH). At the national level, the Director of Medical Services will provide leadership and ensure effective inter-ministerial coordination, all of whom are responsible to their respective Principal Secretaries or duly appointed representatives. A dedicated Project Coordination Unit will support the Head, National Public Health Laboratory in the implementation of the Project.

Marsabit County is one of the 47 counties of the Republic of Kenya created under the constitution 2010. It has an international boundary with Ethiopia to the North, borders Turkana County to the West, Samburu and Isiolo Counties to the South and Wajir County to the East.

The County covers an area of 70,961.2Km² and occupies the extreme part of Northern part of Kenya. It is divided into four constituencies namely; Moyale, North Horr, Saku and Laisamis and 20 electoral units. The county has two towns; Moyale and Marsabit and four urban centers namely; Sololo, North Horr, Loiyangalani and Laisamis.

Marsabit County Referral Hospital is the health facility that serves a county population estimated at 353,258 persons in 2016. Most residents are referred from far-flung areas such as Ileret, which lies 550 kilometers from Marsabit Town. In 2016, Saku sub-county catchment population estimate was 56419 persons. Marsabit County referral hospital bed occupancy is 86. The hospital has an average annual outpatient of 35,000 while average admission is 3750. The hospital’s location in a hard to reach area places a challenge in attracting and retaining health workers.

The project proponent appointed NeoLife Consultants Ltd to carry out an Environmental and Social Impact Assessment of the project for the World Bank and prepare a related Project Report (PR) for the National Environment Management Authority NEMA. This is in line with the World Bank Operational Policies and Bank Procedures on Environmental Assessment, and also refers to the World Bank Group’s Environment, Health and Safety, (EHS) Guidelines as well as the Environmental Management and Coordination Act, CAP 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003 contained in the Kenya gazette supplement No. 56, legislative supplement No. 31 Legal Notice No. 101 of 13thJune, 2003 Laws of Kenya.

The purpose of the ESIA is to identify potential positive and negative environmental and social impacts associated with the proposed project and make recommendations on how to take advantage of the positive impacts on one hand and how to mitigate the negative impacts on the other.

The ESIA team carried out the project’s environmental and social assessment using a combination of methods, which include; ground surveys, a public consultative meeting, questionnaires and interviews with broad spectrum of stakeholders. Also, existing literature on statutory and other
requirements were reviewed. The potential environmental and social impacts identified are classified into the following categories: Impacts on air resources, water resources, ecological resources, biodiversity, and socio-economic issues. The key aspects include; dust generation, noise generation, health and safety issues, waste management issues, and fire and chemical hazards. Since the entire Marsabit town is not served by a public sewer line, Marsabit County Referral Hospital makes use of the septic tank system for wastewater management. Sewage from the proposed facilities will be discharged through the septic tank system on site. The septic tank system at the hospital has enough capacity to handle effluents from the proposed project. The full capacity of the septic tank system is 67,500 Litres.

There are no major environmental liabilities identified at the Marsabit County Referral Hospital.

Presently, the Marsabit County Referral Hospital has a grievance redress mechanism (GRM), but it is not well structured. It involves lodging of complaints by aggrieved stakeholders or submission of comments from hospital staff, patients, neighbours or community members to a suggestion box located in the hospital’s premises. The proponent (MOH) shall establish a GRM specifically for the proposed project to ensure all issues as they pertain to the proposed project are addressed as and when they arise. The contractor shall be required to adopt the GRM by the MOH.

A chance find procedure is a project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered. According to the World Bank’s policy on Physical Cultural Resources (PCR), the MOH shall be responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage. In such cases, the MOH shall develop provisions for managing chance finds through a chance find procedure which shall be applied in the event that cultural heritage is subsequently discovered. The MOH shall not disturb any chance find further until an assessment by competent professionals is made and actions are identified.

Mitigation measures have been developed in respect of the significant negative environmental and social impacts which when adopted, will make the proposed project viable. In addition, The ESIA team has developed an environmental and social management plan (ESMP), which should be adopted in order to ensure that the mitigation process is successful. Table 1: A summary of significant environmental and social impacts, and the contractor shall develop the Contractor’s ESMP before starting the construction activities. The contractor’s ESMP shall form part of his contract.

**Socio-economic Importance of the Proposed Project:**

The proposed project will have the following positive socio-economic impacts:

i. The proposed development will positively impact the health of Kenyans through provision of high quality laboratory testing and specialized care for people with high risk communicable diseases.

ii. Operation of the facilities will create additional long-term technical and non-technical job opportunities for medical professionals and other non-medical professionals.

iii. The proposed project will contribute towards increase in revenue collection by the central and county governments.

iv. The proposed project will be connected to the existing public utilities hence will generate revenue to the water and power companies through payment of connection and service fees.
v. Apart from the direct employment of construction and operation workers, the proposed project will also benefit the following categories of individuals:

**Transporters:** Investors on lorry and trailer transport will benefit greatly from the project. This benefit will extend to vehicle dealers, manufacturers and lorry drivers.

**Sand Harvesters:** Locals involved in sand harvesting in nearby areas are to be major beneficiaries of the project. The benefits will extend to the county government entitled to levy taxes on sand transporters.

**Ballast Quarries:** There will be massive use of ballast. This will ensure that the quarry owners and workers benefit greatly.

**Cement Manufacturers:** The local cement manufacturers, their employees and shareholders are direct beneficiaries of the development. The government will also get some impressive increase in V.A.T. and other taxes levied on cement.

**Manufacturers and dealers of other building materials:** Most of the building materials to be used are locally manufactured. Relevant companies, their workers and shareholders will be direct beneficiaries of the development.
### SUMMARY OF SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS, AND MITIGATION MEASURES.

Table 1: A summary of significant environmental and social impacts

<table>
<thead>
<tr>
<th>Activity</th>
<th>Environmental and Social Aspects</th>
<th>Potential Environmental/Social Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Estimated Cost (Kshs)</th>
<th>Timeframe/Responsibility</th>
</tr>
</thead>
</table>
| **Pre-construction & Construction phase** | Dust generation | • Adverse human health e.g. intensified respiratory health problems.  
• Impaired visibility.  
• Legal non-compliance.  
• Nuisance to neighbours and/or workers.  
• Air pollution and eventual water pollution through settling of dust.  
• Dirt settling on peoples’ properties.  
• Creation of unsafe working conditions through impaired visibility. | • Install signs to limit vehicle speed at the site  
• Provide workers with appropriate Personal Protective Equipment (PPE).  
• Ensure regular maintenance of roads.  
• Apply water spray to roads during construction in the dry season.  
• Train site workers on dust minimization techniques.  
• Truck loads to be kept within designated load limits.  
• Trucks carrying dusty material to be covered with canvas sheet.  
• Limit haul truck traffic only to authorized routes and designated entrance and exit points.  
• Promote the progressive re-vegetation of disturbed areas as much as possible.  
• Cease construction activities which generate excessive dust until effective control measures are implemented.  
• Fence off/barricade the site with iron sheets prior to construction work to minimize spread of dust to the immediate neighbourhood.  
• Securely cover skips containing dusty wastes where possible.  
• Use dust nets at high levels. | • 100,000 | • During construction phase by Main Contractor for civil works |
| **Activity** | Environmental and Social Aspect | Potential Environmental and Social Impact | Proposed Mitigating Measures | Estimated Cost (Kshs) | Timeframe/Responsibility |
| • Internal road paving and construction.  
• Excavation of building foundation and related earth works e.g. concrete mixing.  
• Loading and unloading of materials.  
• Stockpile accumulation and compaction.  
• Movement of vehicles.  
• Handling of soils and broken/crushed concrete. | Noise generation | • Adverse human health such as hearing impairment.  
• Nuisance to neighbours & workers, hospital | • Avoid construction activities during the night.  
• Regular servicing and maintenance of construction equipment. Install silencers to curb excessive noise  
• Use of ear protectors by workers. | • 80,000 | • During construction phase by Main Contractor for civil works |
- Actual construction works e.g. drilling, crushing, batching and mixing of concrete.
- Loading and unloading of materials.
- Stockpiling and compacting
- Handling of soils and broken/crushed concrete

<table>
<thead>
<tr>
<th>Activity</th>
<th>Environmental and Social Aspect</th>
<th>Potential Environmental/Social Impact</th>
<th>Proposed Mitigating Measures</th>
<th>Estimated Cost (Kshs)</th>
<th>Timeframe/Responsibility</th>
</tr>
</thead>
</table>
| Road construction. | Emissions from transporting trucks, bulldozers & stationary equipment including:  
  - Particulates  
  - Carbon dioxide  
  - Carbon monoxide,  
  - SO$_2$ and NO$_x$ | Legal non-compliance  
  Adverse human health  
  Greenhouse effect (global warming)  
  Acid rain.  
  Smog. | Establish an inspection program for equipment.  
  Avoid leaving vehicles and other equipment idling for prolonged periods.  
  Sensitize drivers to avoid unnecessary noise making and hooting. | 20,000 | During construction phase by Main Contractor for civil works |
| Storing fuel on site  
  Road construction.  
  Transportation of workers to and from the construction site.  
  Excavation of building foundation and related earth works.  
  Actual construction related works e.g. drilling, crushing, batching and mixing of concrete.  
  On-site refuelling | Oil (including lubricant and fuel) spills  
  Fire hazard | Adverse human health because of consuming oil contaminated water and food.  
  Contamination of surface water.  
  Contamination of ground water.  
  Contamination of soil resources.  
  Burns to humans and property. | Establish site spill and fire control and management procedures.  
  Constitute and train a spill and fire management team on site  
  Training of workers on spill and fire control/management procedures and emergency preparedness.  
  Spill control kits should be availed at the site.  
  Personnel carrying out refuelling and lubrication of construction equipment should undergo training in spill response and management.  
  Implement fuel delivery and storage procedures and spill prevention and control | 50,000 | During construction phase by Main Contractor for civil works |
| and lubrication | • Transportation of construction workers, staff, materials and equipment. | • Over speeding  
• Overloading  
• Non-compliance with road safety regulations | • Increased number of accidents.  
• Violation of traffic rules and regulations.  
• Loss of time in case of accidents leading to injury or death. | • Enlighten the drivers on the importance of observing traffic rules.  
• Install signs for speed limits along the access road and within the institution.  
• Discourage driving while drunk.  
• Install signs to prohibit obstruction.  
• Discourage overloading.  
• Ensure use of insured and roadworthy vehicles.  
• Discourage use of mobile phones while driving.  
• Enforce use of safety belts even on short distances.  
• Train drivers on road safety.  
• Truck loads to be kept within designated load limits and load covers to be used always.  
• All roads being used by the project should be well maintained and left in a good state as they were found, if not better.  
• Involve the community during road upgrades. | • 100,000 | • During construction by roads/traffic department |
| --- | --- | --- | --- | --- | --- |
| • Influx of labour to construction site | • Workers’ health and safety.  
• Health and safety of hospital staff, students, in- and out-patients.  
• Disruption to social networks and local customs.  
• Traffic safety | • Accidents and death.  
• Transmission of sexually transmitted diseases and HIV/AIDS.  
• Gender-based violence (GBV) and sexual exploitation and abuse (SEA)  
• Conflicts between immigrants and local residents | • Provide employment for locals, which controls influx.  
• Enforce occupational health, safety and hazard control on site.  
• Workers should sign a code of conduct.  
• Issues of occupation, health and safety addressed in tool box meetings and inductions.  
• Inform local communities of major activities in advance.  
• Screen the health of potential workers for communicable diseases as part of the recruitment process.  
• Undertake background checks of potential workers about any past involvement in GBV/SEA related offenses  
• Provide the workforce with access to primary healthcare on site, including prescriptions, prophylactics, condoms and basic testing for TB etc. | • 700,000 | • During construction by the contractor |
### Activity

**Environmental and Social Aspect**

**Potential Environmental/Social Impact**

**Proposed Mitigating Measures**

**Estimated Cost (Kshs)**

<table>
<thead>
<tr>
<th>Operation phase</th>
<th>Activities</th>
<th>Impact</th>
<th>Proposed Measures</th>
<th>Estimated Cost (Kshs)</th>
<th>Timeframe/Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation phase</td>
<td>Operations of the lab such as drawing and testing of blood specimens, stool and urine, etc</td>
<td>• Introduction and spread of disease creating pathogens.&lt;br&gt;• Risk to lab workers, lab cleaners and out-patients</td>
<td>• Abuse/risk of unauthorized entry&lt;br&gt;• Adverse human health through contact with disease spreading pathogens.&lt;br&gt;• Increased risk of disease spread to the neighbours&lt;br&gt;• Increased pricks and cuts when using sharps</td>
<td>• Constitute a lab management committee to include an occupational health and safety officer&lt;br&gt;• Display clear warning signage at vantage points;&lt;br&gt;• The doors to the lab should be under lock and key unless one is allowed in.&lt;br&gt;• Enforce entry/exit rules&lt;br&gt;• Laboratory doors should be self-closing.&lt;br&gt;• Laboratory supervisor must ensure that laboratory personnel receive appropriate training regarding their duties; and the necessary precautions to prevent exposures, and exposure evaluation procedures.&lt;br&gt;• Use and wearing of appropriate PPEs</td>
<td>250,000</td>
</tr>
<tr>
<td>Operation phase</td>
<td>Operations of the lab such as storage and handling of laboratory reagents.</td>
<td>• Fire hazard&lt;br&gt;• Spillage of laboratory reagents (e.g. acids)&lt;br&gt;• Chemical fumes&lt;br&gt;• Leakage of materials.</td>
<td>• Loss of life and/or property.&lt;br&gt;• Adverse human health such as bronchial and skin disorders through inhaling, imbibing contaminated foods and drinks or coming into direct contact with chemical reagents.</td>
<td>• Constitute a lab management committee to include an occupational health and safety officer&lt;br&gt;• Wash hands after working with potentially hazardous materials.&lt;br&gt;• Wash hands before leaving the laboratory.&lt;br&gt;• Provide adequate personal protective equipment to all the workers.&lt;br&gt;• Provide emergency exits in storage areas.&lt;br&gt;• Provide spill containment kits.&lt;br&gt;• Equip storage areas with fire protection</td>
<td>600,000</td>
</tr>
<tr>
<td>Nuisance to staff and neighbours.</td>
<td>Fire hazard</td>
<td>Loss of life and/or property.</td>
<td>Loss of workforce in case of injury or death.</td>
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<td></td>
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</tr>
<tr>
<td>Loss of work time in case of injury or death</td>
<td>Spillage of laboratory reagents (e.g. methylated spirits, ethanol)</td>
<td>Adverse human health.</td>
<td>Provide adequate personal protective equipment to all the workers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features (passive fire-resistant materials).</td>
<td>Chemical fumes</td>
<td>Contamination of surface water</td>
<td>Provide emergency exits in storage areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical pipetting devices must be used instead of mouth pipetting.</td>
<td>Leakage of materials.</td>
<td>Contamination of ground water</td>
<td>Provide spill containment kits.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain proper records of all products stored, used or temporally kept prior to disposal.</td>
<td></td>
<td>Contamination of soil resources</td>
<td>Ensure the storage area is equipped with fire protection features (passive fire resistant materials including doors).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain an adequate number of first aid kits at strategic points within the bio-safety laboratory.</td>
<td></td>
<td>Nuisance to staff and neighbours.</td>
<td>Provide adequate natural and/or artificial lighting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post at strategic places “No smoking” signs.</td>
<td></td>
<td>Loss of workforce in case of injury or death.</td>
<td>Stacking and shelving of medical products should be in a secure and orderly way with clearly visible labels.</td>
<td></td>
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</tr>
<tr>
<td>Install an adequate number of firefighting equipment and systems including portable fire extinguishers and hose reels.</td>
<td></td>
<td></td>
<td>Maintain a record of all products stored.</td>
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<tr>
<td>Provide emergency eye and body showers.</td>
<td></td>
<td></td>
<td>Post “No smoking” signs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide adequate ventilation.</td>
<td></td>
<td></td>
<td>Install adequate protection against fire.</td>
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<tr>
<td>A sign incorporating the universal biohazard symbol must be posted at the entrance to the laboratory when infectious agents are present. The sign may include the name of the agent(s) in use, and the name and phone number of the laboratory supervisor or other responsible personnel.</td>
<td></td>
<td></td>
<td>● Head of Laboratory during operation</td>
<td></td>
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</tr>
<tr>
<td>An effective integrated pest management program is required.</td>
<td></td>
<td></td>
<td>● 300,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Environmental and Social Aspect</td>
<td>Potential Environmental and Social Impact</td>
<td>Proposed Mitigating Measures</td>
<td>Estimated Cost (Kshs)</td>
<td>Timeframe/Responsibility</td>
</tr>
<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Solid waste management.</td>
<td>Hazardous</td>
<td>Adverse human</td>
<td>Provide adequate personal protective</td>
<td>300,000</td>
<td>Proponent</td>
</tr>
</tbody>
</table>

- High cost for treatment of sick or injured personnel.
- Provide emergency eye and body showers at the entrance to the storage areas.
- Provide adequate ventilation.
- Incineration of hazardous waste.
- Atmospheric emissions e.g. hydrocarbons, nitrogen and sulphur oxides
- Contact with hazardous waste including sharps and pathological wastes.
- Disposal of ash residuals
- Consumption of energy.
  - Adverse human health including bronchial infections and skin problems.
  - Soil pollution resulting from deposition of residuals from plant operations.
  - Water pollution resulting from direct deposition, surface runoff or infiltration into groundwater sources.
  - Fire outbreaks leading to loss of life and/or property.
  - Complaints and concerns from the public on health and safety.
  - Conflicts at off-site landfills or dumping areas.
- The kilns/combustion chambers should be designed with provisions for flue gas trapping, smoke interception and stacks fitted with scrubbers (for gases) and filters for removal of particulate matter.
- Seek NEMA’s permit for installation and operation of incinerator
- Conduct annual air quality surveys within the site of the incineration plant and maintain such records on site.
- Fly ash and other incineration residuals should be disposed of in landfills or other NEMA approved dumping sites.
- Holding yards for hazardous waste should be kept moist at all times to prevent dust emission into the atmosphere and the windward side of the site.
- The waste holding and sorting area should be compartmentalized to allow for segregation of various waste categories as classified on source.
- Observe good housekeeping at all times with particular focus on waste management.
- Training and induction of all employees and visitors on site to enhance safety.
- Provide employees with appropriate PPE and enforce their usage within the work area.
- Implement energy saving measures by accumulating hazardous waste first before incineration to reduce frequency of incineration.
- Establish public relation strategies with the stakeholders for enhanced co-existence and tolerance.
- Invest in corporate social responsibility initiatives.

- **100,000**
- **Proponent during operation**
<table>
<thead>
<tr>
<th>Waste types</th>
<th>Health impacts</th>
<th>Equipment management measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste including expired drugs. Empty packaging materials. Office waste paper. Biodegradable waste.</td>
<td>Soil contamination. Contamination of surface and ground water bodies. Nuisance to neighbours and staff.</td>
<td>Provide an adequate number of waste receptors showing names of various waste streams at strategic points within the institution. Ensure there is proper waste segregation. Empty containers to be cleaned prior to disposal. Avoid undue accumulation of waste. Provide a central waste collection centres/points. Ensure that hazardous waste is incinerated using either in-house incinerator or through outsourcing. Ensure the collector and transporter is NEMA-licensed. Train workers on waste management. Institute waste reduction/minimization strategies within the institution.</td>
</tr>
</tbody>
</table>

| Equipment to all the workers. Provide an adequate number of waste receptors showing names of various waste streams at strategic points within the institution. Ensure there is proper waste segregation. Empty containers to be cleaned prior to disposal. Avoid undue accumulation of waste. Provide a central waste collection centres/points. Ensure that hazardous waste is incinerated using either in-house incinerator or through outsourcing. Ensure the collector and transporter is NEMA-licensed. Train workers on waste management. Institute waste reduction/minimization strategies within the institution. | during operation |
1.0 INTRODUCTION.

1.1 Background
The project proponent is the Ministry of Health who intends to put up a Bio Safety Level II laboratory and an incinerator plant at Marsabit County Referral Hospital, Marsabit Town, Marsabit County. This is a development being undertaken under the East Africa Public Health Laboratory Networking Project.

The Regional Public Health Laboratory Project is a combined initiative of the Governments of Kenya, Rwanda, Uganda, Tanzania, Burundi and World Bank in support of efficient laboratory networking. The member countries have jointly mobilized resources to revamp public health laboratory services delivery. The Project will deliver rehabilitated public health laboratories provided with critical equipment, improved technical and managerial skills for laboratory workers and strengthened institutional governance.

The overall project objective is to strengthen capacities for diagnosis and surveillance of Tuberculosis and other communicable and non-communicable diseases by establishing a network of efficient, high quality and accessible public health laboratories and by promoting innovation and knowledge sharing.

The overall responsibility for project implementation will be with the Ministry of Health (MoH). At the national level, the Director of Medical Services will provide leadership and ensure effective inter-ministerial coordination, all of whom are responsible to their respective Principal Secretaries or duly appointed representatives. A dedicated Project Coordination Unit will support the Head, National Public Health Laboratory in the implementation of the Project.

Marsabit County is one of the 47 counties of the Republic of Kenya created under the constitution 2010. It has an international boundary with Ethiopia to the North, borders Turkana County to the West, Samburu and Isiolo Counties to the South and Wajir County to the East. The County covers an area of 70,961.2Km² and occupies the extreme part of Northern part of Kenya. It is divided into four constituencies namely; Moyale, North Horr, Saku and Laisamis and 20 electoral Units. The county has two towns; Moyale and Marsabit and four urban centers namely; Sololo, North Horr, Loiyangalani and Laisamis.

Marsabit County Referral Hospital is the health facility that serves a county population estimated at 353,258 persons in 2016. Most residents are referred from far-flung areas such as Illeter, which lies 550 kilometers from Marsabit Town. In 2016, Saku sub-county catchment population estimate was 56419 persons. The Marsabit County referral hospital bed occupancy is 86. The hospital has an average annual outpatient of 35,000 while average admission is 3750. The hospital’s location in a hard to reach area places a challenge in attracting and retaining health workers.

Section 1 of the report includes a brief summary of the project report content. Section 2 provides details on the project objectives, methodology, screening and scoping processes used during the environmental and social impact assessment. Sections 3 provides the terms of reference while section 4 of the report provides details on the policy and legal framework on environmental management in Kenya with highlights on relevance to the proposed project. Section 5 of the report gives descriptive information on the proposed project location and the construction details. The current environmental and social setting (baseline information) has been described in Section 6 of the report while Section 7 has details of public participation where public views were recorded regarding the positive and negative impacts of the proposed project. Section 8 discusses the
potential environmental and social impacts associated with the project with the mitigation measures. Section 9 gives analysis of project alternatives while section 10 gives the environmental and social management plans.

Section 10 and 12 contains conclusion and recommendations, references and appendices.

1.2 OBJECTIVES AND SCOPE OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA).

1.2.1 Screening to determine whether ESIA is required:
The ESIA was done in reference to the requirements of the World Bank Operational Policies and Bank Procedures on Environmental Assessment and World Bank Group’s Environment, Health, and Safety (EHS) Guidelines as well as the principal environmental legislation and specifically the second schedule of EMCA, CAP 387, Laws of Kenya. Issues considered included the physical location and the nature of the anticipated impacts of the proposed project.

The project proponent is the Ministry of Health which intends to put up a bio-safety level II laboratory and an incinerator plant at Marsabit County Referral Hospital.

1.2.2 Scoping:
The scoping process was carried out with a view to identifying key issues and to help focus available resources on the issues.

The first step was to identify all interested parties relevant to the project. The second step was to develop information on the resource to be affected, potential concerns and project alternatives. The scoping process involved:

- Discussions with the Proponent and consultation with relevant officials in the regulatory Authorities,
- Verbal interviews with key project beneficiaries and key stakeholders.
- Physical investigation of the site and the surrounding areas using a checklist with a view to identifying potential environmental, social and safety issues that pertain to the project.
- Documentary review of the nature of the proposed activities, relevant legal and regulatory framework

1.2.3 Category of project:
The proposed project falls under Category B of the World Bank Environmental Assessment categorization. Under this general category, “a proposed project is classified as Category B if its potential adverse environmental and social 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, mitigating measures can be designed more readily than for Category A projects. The scope of assessment for a Category B project may vary from project to project, but it is narrower than that of Category A assessment. Like Category A assessment, it examines the project’s potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.”

The proposed bio-safety laboratory and incinerator subprojects fall under the category B as its assessment shall examine the potential negative and positive environmental and social impacts and mitigating measures shall be proposed for the significant negative impacts. Their mitigating measures can also be designed more readily than for category A projects.
According to EMCA, CAP 387 and the EIA/EA Regulations, 2003, Laws of Kenya, NEMA categorizes the proposed project as a low risk project. Low risk projects are expected to submit EIA project reports to NEMA. Low risk projects are those that:
- Are likely to have minimal adverse environmental impacts,
- Projects impacts that are easily mitigated,
- Projects designed for positive environmental and social uplifting projects.

The proposed bio-safety laboratory and incinerator are classified as low risk because they are rehabilitation, maintenance, and modernization (small scale) projects within an existing hospital. They are also projects designed for positive environmental and social uplifting within the hospital. Subject to the above-mentioned provisions, the project proponent has contracted Neolife Consultants Ltd to conduct an ESIA for submission, review and clearance to the World Bank.

### 1.2.4 ESIA Criteria
The ESIA was conducted in accordance with the World Bank Operational Policies and Bank Procedures on Environmental Assessment and the World Bank Group’s Environment, Health and Safety, (EHS) Guidelines.

It is in line with the Environmental Management and Coordination Act, Cap 387, the Environmental (Impact Assessment and Audit) Regulations, 2003 contained in the Kenya gazette supplement No. 56, legislative supplement No. 31 Legal notice No. 101 of 13th June, 2003 and the best practice guidelines on safety and health contained in the Occupational Safety and Health Act, 2007, Laws of Kenya.

### 1.2.5 Scope of the ESIA
The Environmental and Social Impact Assessment (ESIA) was carried out to cover risks and impacts and these could be mitigated within the project boundaries.

The ESIA team carried out the project’s environmental and social impact assessment using a combination of methods which includes: ground surveys, development and use of questionnaires and interviews with a broad spectrum of stakeholders including residents living close to the Marsabit County Hospital and from far, healthcare workers and government agencies and review of existing literature on statutory and other requirements.

The ESIA process entailed a description of the project, the baseline information (environmental and socio-economic setting), identification of the potential positive and negative impacts, development of mitigation measures and an environmental and social management plan that includes budget for implementing mitigation actions and indicators for monitoring.

### 1.2.6 The objectives of the project:
The overall project objective is to strengthen capacities for diagnosis and surveillance of Tuberculosis and other communicable and non-communicable diseases by establishing a network of efficient, high quality and accessible public health laboratories and by promoting innovation and knowledge sharing. The incinerator will also ensure effective management of solid waste at the hospital.

### 1.2.7 Project Justification:
The ESIA report in Chapter 8.0 ANALYSIS OF PROJECT ALTERNATIVES has given the alternatives to the incinerator. Open uncontrolled non-engineered dumpsites, sanitary landfill, crude burning, microwaving, autoclaves, and plasma pyrolysis have been analysed as alternatives to incineration. Though autoclaves are considered more efficient and environmental friendly, they are too expensive, they require technical persons in maintenance, and are not common. Incinerators accept the greatest variety of waste, significant volume is reduced, trained personnel are readily available and
they are cheaper to maintain. The decision to go for incinerator was therefore guided by a through environmental, economic and financial considerations.

The overall project objective is to strengthen capacities for diagnosis and surveillance of Tuberculosis and other communicable and non-communicable diseases. The facility to be constructed under the proposed project will include an efficient, high quality and accessible public health laboratory that will promote innovation and knowledge sharing and an incinerator for healthcare waste management.

1.2.8 Methodology Outline:
The following general steps were followed during the assessment to ensure comprehensiveness and completeness of the report: -

- Environment and social screening in which the project was identified as among those requiring environmental and social impact assessment study under the World Bank Operational Policies and Bank Procedures on Environmental Assessment and the World Bank Group’s Environment, Health and Safety, (EHS) Guidelines. It is in line with the Environmental Management and Coordination Act, Cap 387, Laws of Kenya.

- Environmental and social scooping that provided the key environmental issues.
- Physical inspection of the site and its environs.
- Stakeholder engagement and discussions.
- Desktop studies, literature reviews, consultations, questionnaires and interviews with the proponent and his consultants among others.
- Reporting.
2.0 TERMS OF REFERENCE (TOR)

2.1 Activities by the Consultant:
The Consultant shall carry out an environmental and social impact assessment of the proposed
development and prepare a project report, which shall incorporate the following details:

- The proposed location of the project.
- A concise description of the national and international environmental legislative and
regulatory framework, baseline information and any other relevant information related to the
project.
- The objective of the project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The products, by-products and waste generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the
direct, indirect, cumulative, irreversible, short term and long term effects anticipated.
- Alternative technologies and processes available and reasons for preferring the chosen
technology and processes.
- Stakeholder analysis and consultations.
- Analysis of alternatives including project site, design and technologies and the reasons for
preferring the proposed site design and technologies.
- An environmental and social management plan proposing the measures for eliminating,
minimizing or mitigating adverse impacts on the environment and human populations,
including the cost, time frame and responsibility to implement the measures.
- Public consultation and stakeholder engagement.
- Provision of an action plan for the prevention and management of foreseeable accidents and
hazardous activities in the course of carrying out activities or major industrial and other
development projects.
- The measures to prevent health hazards and to ensure security in the working environment
for the employees and for the management of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in
compiling the information.
- An economic and social analysis of the project.
- An indication of whether the environment of any other state is likely to be affected and the
available alternatives and mitigating measures, and
- Such other matters as the authority may require.

2.2 Expected Outputs
An Environmental and Social Impact Assessment Project report acceptable by the World Bank.

2.3 Responsibility of the Client

- Provide the necessary assistance required by the consultants.
- Pay consultancy fees for preparing the project report.
3.0 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

3.1 General View
Under the World Bank Group’s Environment, Health and Safety, (EHS) Guidelines and the World Bank Operational Policies and Bank Procedures on Environmental Assessment (OP/BP 4.01), it is a requirement that project proponents perform environmental assessments on projects before bank financing.

In addition, Kenya has a policy, legal and administrative framework for environmental management. Under the framework, the National Environment Management Authority (NEMA) is responsible for ensuring that environmental and social impact assessments (ESIAs) are carried out for new projects and environmental audits on existing facilities as per the Environmental Management and Coordination Act, CAP 387, Laws of Kenya.

ESIAs are carried out in order to identify potential positive and negative impacts associated with the proposed project with a view to taking advantage of the positive impacts and developing mitigation measures for the negative impacts.

The proposed project triggers one safeguard policy developed by the World Bank that is key in prevention and mitigating undue harm to people and their environment in the development process. This is the World Bank’s operation policy and procedure on Environmental Assessment (OP/BP 4.01).

According to World Bank Operational Policies and Bank Procedures on Environmental Assessment, proponents of projects requiring financing from the World Bank shall be responsible for carrying out environmental and social impact assessments on all activities that are likely to have a significant adverse effect on the bio-physical and socio-economic environment.

Environmental auditing (EA) is a tool for environmental conservation and has been identified as a key requirement for existing facilities to ensure sustainable operations with respect to environmental resources and socio-economic activities in the neighbourhood of the facilities.

The Government of Kenya has established regulations to facilitate the process on ESIAs and environmental audits. The regulations are contained in the Kenya Gazette Supplement No. 56, Legislative Supplement No. 31, and Legal Notice No. 101 of 13th June 2003.

**The Proponent will be required to observe the provisions of the various statutes that are aimed at maintaining a clean, healthy and sustainable environment.**

Some of the policy and legal provisions are briefly presented in the following sub-Sections;

3.2 Policy Framework

3.2.1 The Constitution of Kenya, 2010

Article 42 of the Bill of Rights of the Kenyan Constitution provides that ‘every Kenyan has the 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 legislative and other measures’. Under Chapter 5 (Land and Environment), Part 1 is devoted to land. It requires that land be used and managed in ‘a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles:

(i) Equitable access to land;
(ii) Security of land rights;
(iii) Sustainable and productive management of land resources;
(iv) Transparent and cost effective administration of land; and
(v) Sound conservation and protection of ecologically sensitive areas.

Part 2 of Chapter 5 of the Constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall;

(i) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
(ii) Work to achieve and maintain tree cover of at least ten per cent of the land area of Kenya;
(iii) Encourage public participation in the management of, protection and conservation of the environment;
(iv) Protect genetic resources and biological diversity;
(v) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
(vi) Eliminate processes and activities that are likely to endanger the environment; and
(vii) Utilize the environment and natural resources for the benefit of the people of Kenya.

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress.

_The proposed project should ensure the sustainability of livelihoods and biological resources within the project areas are protected. Any development proposals should also be cognizant of the increased powers under the Constitution given to communities and individuals to enforce their rights through legal redress._

### 3.2.2 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 for Wealth and Employment Creation which saw the country’s economy back on the path to rapid growth since 2002. GDP growth rose from 0.6% to 7% in 2007, but dropped to between 1.7% and 1.8% in 2008 and 2009 respectively. The objective of the Kenya Vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of 10% by the year 2030”. The 2030 goal for urban areas is to achieve “a well-housed population living in an environmentally-secure urban environment.” This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030.

_This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives is critical._

### 3.2.3 Health Care Waste Management Strategic Plan 2015-2020 (2015)

The Health Care Waste Management Strategic Plan 2015-2010 developed in 2015 by the Ministry of Health in Kenya is a document intended for use by health managers and program officers across the health sector (including those in the private health sector). The purpose of developing this plan was
This plan describes the situation of health care waste management on the basis of a survey which was conducted in order to document the situation of waste management in Kenya. A holistic approach has been recommended to include, clear delineation of responsibilities, occupational health and safety programs, waste minimization and segregation.

This document is designed to provide viable options to address the challenges encountered in planning for health care waste management in Kenya.

3.2.4 National Environmental Action Plan (NEAP), 2009-2013 (2009)
The NEAP provides a framework for the implementation of the Environment Policy and realization of the National Millennium Development Goals and Vision 2030. The plan outlines measures to combat climate change including mitigation and adaptation, improving inter-sectoral coordination, mainstreaming sustainable land management into national planning, policy and legal frameworks and undertake research on impact of climate change on environmental, social and economic sector. The plan also aims to increase the country’s forest cover and adopt economic incentives for management of forest products.

Under the NEAP process, Environmental and Social Impact Assessments were introduced targeting the industrialists, business community and local authorities.

3.2.5 National Policy on Water Resources Management and Development, 1999
While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country’s socio-economic progress, it also recognizes the by-products of this process as wastewater. It, therefore, calls for development of appropriate sanitation systems to protect people’s health and water resources from institutional pollution.

Industrial and business development activities, therefore, should be accompanied by corresponding waste management systems to handle the wastewater and other waste emanating there from. The same policy requires that such projects should also undergo comprehensive ESIs that will provide suitable measures to be taken to ensure environmental resources and people’s health in the immediate neighbourhood and further downstream is not negatively impacted by the emissions. As a follow-up to this, EMCA, CAP 387, Laws of Kenya requires annual environmental audits to be conducted in order to ensure that mitigation measures and other improvements identified during the ESIA process are implemented.

In addition, the policy provides for charging levies on wastewater on the basis of quantity and quality. The “polluter-pays-principle” applies in which case parties contaminating water are required to meet the appropriate cost of remediation. The policy provides for establishment of standards to protect water bodies receiving wastewater, a process that is on-going.

3.2.6 Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999).
The key objectives of the policy include:

- To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,
- To ensure that an independent environmental and social impact assessment (ESIA) report is prepared for any industrial venture or other development before implementation,
- To come up with effluent treatment standards that will conform to acceptable health guidelines.
Under this paper, broad categories of development issues have been covered that require a “sustainable development” approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

3.2.7 The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategies Paper (PRSP)

The objective of the NPEP is to reduce the incidence of poverty in both urban and rural areas by 50% by the year 2015 as well as strengthening the capabilities of the poor and the vulnerable groups to earn income. Also, it aims to narrow gender and geographical disparities and create a healthy, better educated and more productive population. The plan has been prepared in line with the goals and commitment of The World Summit for Social Development (WSSD) of 1995 and focuses on the four WSSD themes of poverty eradication, reduction of unemployment, social integration of the disadvantaged people and creation of enabling economic, political, and cultural environment. This plan is to be implemented by the Poverty Eradication Commission (PEC) formed in collaboration with government ministries; community based organizations, the private sector, non-governmental organizations, and bilateral and multilateral donors.

The NPEP emphasizes the empowerment of poor people and their communities to better manage their resources for collective advancement. The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya’s commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without participation of the poor themselves. Any development project that incorporates these strategies in its plans is most welcome in Kenya.

3.3 Environmental Management Statutes.

The key national laws that govern the management of environmental resources in the country have been briefly discussed in the following paragraphs. Note that wherever any of the laws contradict each other, the Environmental Management and Coordination Act, Cap 387 prevails.

3.3.1 The Environment Management and Coordination Act, Cap 387

Part II Section 3(l) of the Environment Management & Coordination Act, Cap 387 states that “every person in Kenya is entitled to a clean and healthy environment in accordance with the constitution and relevant laws and has the duty to safeguard and enhance the environment.” According to Section 58 of the Act, an Environmental Impact Assessment study needs to be carried out on projects specified in the second schedule of the Act that are likely to have a significant impact on the environment. This project is considered to fall under the second schedule of the Act.

*It is in line with this provision that the Proponent has appointed Neolife Consultants Ltd to carry out an ESIA and prepare a project report in respect of the proposed development.*

Part VII, Section 68 of the same Act requires operators of projects or undertakings to carry out environmental audits in order to determine level of conformance with statements made during the ESIA. The environmental audit shall be carried out by the Authority or its designated agents.
The Project Proponent will need to prepare and submit an environmental audit report in the first year of operation to confirm the efficacy and adequacy of the Environmental and Social Management Plan.

Part VIII Section 72(1) of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive waste or any other pollutants into the aquatic environment. Section 73 requires that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 demands that all effluent generated from point sources are discharged only into the existing sewerage system upon issuance of prescribed permit from the relevant entity. Section 87 sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while Section 88 provides information on acquisition of a license for generation, transporting or operating a waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the Authority for a license.

3.3.2 Environmental (Impact Assessment and Audit) Regulations, 2003 (Legal Notice No.101)

Part V Section 31 states that an Environmental audit is expected to be undertaken on the development activities likely to have adverse environmental impacts. The audit exercise is expected to be conducted by a qualified environmental inspector registered in accordance with regulation 14. Section 31(3) the environmental Audit study is prepared based on the baseline information provided in the Environmental impact assessment report study which will be used as baseline information upon which subsequent environmental control audit studies shall be undertaken.

According to section 31(7) information required to be included in the audit report is mentioned; past and present impacts of the project, responsibility and proficiency of the operators of the project, existing internal control mechanisms to identify and mitigate activities with negative environmental impacts, existing internal control mechanisms to ensure workers health and safety, existence of environmental awareness and sensitization measures including environmental standards and regulations, law and policy for managerial and operational personnel.

Compliance Aspects

Provides a guide to the environmental inspectors and auditors on the requirements during the audit process. NEMA ESIA License is obtained before project commencement.

3.3.3 The Environmental Management and Coordination (Air Quality) Regulations, 2014

According to the Act,
5. (1) No person shall-
(a) act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or
(b) emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the First Schedule.
6. No person shall cause or allow emission of the priority air pollutants prescribed in the Second Schedule to cause the ambient air quality limits prescribed in the First Schedule to be exceeded.
7. No person shall cause the ambient air quality levels specified in the First Schedule of these Regulations to be exceeded.
8. (1) No person shall cause or allow particulate emissions into the atmosphere from any facility listed under the Fourth Schedule in excess of those limits stipulated under the Third Schedule.
Where “suspended particulate matter” means all particulate material which persists in the atmosphere or in flue gas stream for lengthy periods because the Particles are too small in size to have appreciable falling velocity;

9. A person, being an owner of premises, who causes or allows the generation, from any source, of any odour which unreasonably interferes, or is likely to unreasonably interfere, with any other person’s lawful use or enjoyment of his property shall ensure that the odour emission limits comply with the ambient quality limits set out under the First Schedule of these regulations.

This regulation was formulated to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The proposed project has potential to impact on air quality. In the light of the above, these Regulations prohibit the Proponent from:

- Acting in a way that directly or indirectly cause or may cause air pollution to exceed levels set out in the second Schedule to the Regulations.
- Allowing particulates emissions into the atmosphere from any source not listed in the six schedules of the Regulations.
- Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed those stipulated under second Schedule.

Compliance Aspect

The proponent shall be required to apply for the following licenses:

1. Emission License and
2. License to own/operate an incinerator plant
3. Air quality monitoring shall be done regularly.


These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No. 36, Legal Notice No. 120 of 29th September 2006. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells and other water sources).

It is an offence under Regulation No. 4 (2), for any person to 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.

Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

Compliance Aspect

The Proposn will have to ensure that appropriate measures to prevent pollution of underground and surface water sources are implemented throughout the project cycle.

These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September 2006. The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- domestic waste
- industrial waste,
- hazardous and toxic waste
- biomedical wastes and
- radioactive waste

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

i. Improvement of production process through-
   - Conserving raw materials and energy
   - Eliminating the use of toxic raw materials and wastes
   - Reducing toxic emissions and wastes

ii. Monitoring the product cycle from beginning to end by-
   - Identifying and eliminating potential negative impacts of the product
   - Enabling the recovery and re-use of the product where possible, and
   - Reclamation and recycling and

iii. Incorporating environmental concerns in the design and disposal of a product

Compliance Aspect

*The Proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project.*

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal.

Regulation 14 (1) requires every trade or industrial undertaking to install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA. Regulation 18 requires all generators of hazardous waste to ensure that every container or package for storing such waste is fixed with a label containing the following information:

- The identity of the hazardous waste
- The name and address of the generator of waste
- The net contents
- The normal storage stability and methods of storage
- The name and percentage of weight of active ingredients and names and percentages of weights of other ingredients or half-life of radioactive material
- Warning or caution statements which may include any of the following as appropriate-
  - the words “WARNING” or “CAUTION”
  - the word “POISON”, marked indelibly in red on a contrasting background; and
  - the words “DANGER! KEEP AWAY” or “NO ENTRY FOR UNAUTHORIZED PERSONS” and
Regulation 19 (1) requires every person who generates toxic or hazardous waste to treat or cause to be treated such hazardous waste.

Compliance Aspect

During the construction phase of the project, the proponent shall ensure that the main contractor implements the above-mentioned measures as necessary to enhance sound environmental management of waste.

3.3.6 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009

These regulations were published as Legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, Cap 387. The regulations provide information on the following:

(i) Prohibition of excessive noise and vibration.
(ii) Provisions relating to noise from certain sources.
(iii) Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and;
(iv) Noise and excessive vibrations mapping.

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

<table>
<thead>
<tr>
<th>Table 2: First Schedule - Maximum Permissible Noise Levels</th>
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<tbody>
<tr>
<td>Zone</td>
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<tr>
<td></td>
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<tr>
<td>A.</td>
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<td>B.</td>
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<tr>
<td>C.</td>
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<td></td>
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<tr>
<td>D.</td>
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<tr>
<td>E.</td>
</tr>
</tbody>
</table>

**Time Frame:**

**Day:** 6:01 a.m. - 8:00 p.m. (Leq, 14h)

**Night:** 8:01 p.m. – 6:00 a.m. (Leq, 10 h)

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- (a) produces any loud and unusual sound; and (b) exceeds 84 dBA when accelerating. According to sub regulation2 of this regulation, no person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident.

Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam
shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Maximum Noise Level Permitted [Leq] in dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>i. Health facilities, educational institutions, homes for disabled etc.</td>
<td>60</td>
</tr>
<tr>
<td>ii. Residential</td>
<td>60</td>
</tr>
<tr>
<td>iii. Areas other than those prescribed in (i) and (ii)</td>
<td>75</td>
</tr>
</tbody>
</table>

**Table 3: Second Schedule-Maximum Permissible Noise Levels for Construction Sites (Measurement taken within the facility)**

**Time Frame:**
**Day:** 6.01 a.m. – 6.00 p.m. (Leq, 14 h)
**Night:** 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

Regulation 16 (1) stipulates that where a sound source is planned, installed or intended to be installed or modified by any person in such a manner that such source shall create or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a license to the Authority. According to regulation 18 (6) this license shall be valid for a period not exceeding seven (7) days.

Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub regulation 4, such permit shall be valid for a period not exceeding three months.

**Compliance Aspect**
The main contractor will be required to comply with the above-mentioned regulations throughout the construction phase of the project in order to promote a healthy and safe working environment.

### 3.4 Institutional Framework

#### 3.4.1 The National Environment Management Authority (NEMA)

The responsibility of the National Environment Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be principle instrument of government in the implementation of policies relating to the environment. In addition to NEMA, EMCA, CAP 387, Laws of Kenya provides for the establishment and enforcement of environmental quality standards to be set by the technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC).

The Authority has registered environmental assessment experts who conduct environmental assessment of proposed projects on its behalf to assess potential negative and positive impacts and develop mitigation measures. Therefore, it shall be the responsibility of the Authority to ensure that an ESIA for the proposed project is conducted and that a license is issued before the project can commence.

The Authority shall ensure that under the ESIA report, the ESIA experts give feedback on public consultation of affected stakeholders in the form of questionnaires to take into account their views in the decision-making.
3.4.2 The National Environment Tribunal
This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. If disputes to this project arise, they are supposed to be presented here for hearing and legal direction.

3.4.3 The County Government
The County Government of Marsabit has powers to control or prohibit all businesses, factories and other activities including the proposed project which by reason of smoke, fumes, gases, dust, noise or other cause, maybe or become a source of danger, discomfort or annoyance to the neighbourhood and to prescribe conditions subject to which such businesses, factories etc. shall be carried.
The Constitution of Kenya, 2010 grants county governments the powers to grant or renew businesses licenses or refuse the same. The county government is empowered to make by laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and well-being of the inhabitants of the area. This includes construction and maintenance of water supply, sewage and solid waste management systems.

3.4.4 The Directorate of Occupational Safety and Health Services (DOSHS)
The construction site is a workplace and the health, safety and welfare of all persons must be taken into account. The occupier (MOH) shall acquire a certificate of registration of the workplace before occupation. However, the proposed project being within a hospital setting has a hospital occupation certificate. All workers within the construction site shall also be required to use appropriate PPEs.

3.4.5 The National Construction Authority (NCA)
The NCA is responsible for issuing permits to construction sites and advising the government of Kenya on construction. The proposed project shall acquire a permit from NCA and ensure the contractor is registered by the NCA board.

3.4.6 Ministry of Health
The proposed project is under the Ministry of Health and it shall be the primary role of the Ministry to monitor and measure the progress of implementation of the social and environmental safeguards. During project implementation, it shall undertake inspections to verify compliance by NEMA and the Ministry of Lands with the safeguards and measure progress toward the expected outcomes.
The Ministry, through the hospital management shall then prepare periodic reports, which shall be submitted to the World Bank for review.

3.5 Other Local Laws that Apply to this Project
3.5.1 The Water Act, 2016
Part III section 21 (1) of this Act provides for national monitoring and geo-referenced information systems on water resources to be effected by the Water Resources Management Authority. Following on this, sub-section 2 allows the Authority to demand from any person or institution, within a reasonable time or on a regular basis, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a site operator and the information thereof furnished to the authority.
Part IV Section 63 states that “every person in Kenya has a right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution”
Section 110 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 107 and sub-section 1 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 such land for preventing pollution of water sources within his/her jurisdiction.

Section 108 subsections 2 and 3 state that a person shall not discharge any trade effluent from any trade premises into the sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the trade effluent, maximum quantity of effluent to be discharged on any one day, highest rate of discharge and any other information deemed necessary. The consent shall be issued on conditions including payment of rates for the discharge as may be provided under section 109 of the same Act.

Section 143 subsections 1 (b) of the Act makes it an offence to throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such a manner as to cause, or be likely to cause, pollution of the water resource.

Compliance Aspect

The project proponent will be required to ensure that all construction waste is collected and dumped at approved sites to prevent potential for contaminating surface and underground water sources. The Act applies anytime throughout the project cycle when there is discharge of effluent to the environment.

3.5.2 The Public Health Act Cap. 242, Revised 2012

Part IX, Section 115 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 reasonably 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 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 a 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 are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

Compliance Aspect

This applies for all projects with direct and indirect implication to the health of workers and neighbouring communities to the project area. The Proponent will be required to abide by these provisions throughout the project cycle.

On the responsibility of local authorities, Part XI Section 129 of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purpose.”

Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in Section 129. This provision is supplemented by Section 126A that requires local authorities to develop by-laws for controlling and regulating among others private sewers, communication between drains and sewers and between sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter.
Compliance Aspect
The Proponent will be required to contract a licensed solid waste transporter to transport all solid waste from the site for dumping at approved sites by the NEMA and Marsabit County Government. Sewage from the site will be discharged through the septic tank system on site.

3.5.3 The Physical Planning Act, Cap 286 (Revised 2012)
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 controls the 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 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 County Government.

Compliance Aspect
The Proponent will be required to obtain development permission from the Marsabit County Government by seeking approval of the architectural plans in respect of the proposed project.

Finally, Section 36 states that if in connection with a development application, local authority is of the opinion that the proposed development activity will have injurious impact on the environment; the applicant shall be required to submit together with the application an environmental and social impact assessment (ESIA) report. EMCA, Cap 387 echoes the same by requiring that such an ESIA is approved by the National Environmental Management Authority (NEMA) and should be followed by annual environmental audits.

Compliance Aspect
The Proponent has complied with this provision by appointing Neolife Consultants Ltd to prepare and submit this Environmental and Social Impact Assessment Project Report to the Authority.

3.5.4 The Building Code 2000.
Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers. The code also prohibits construction of structures or buildings on sewer lines.

Compliance Aspect
The project proponent will be required to connect to the septic tank system serving the hospital.

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. The Act was published on 26th October, 2007.
The salient features addressed by the Act include the following:
(i) Obligations of employers
(ii) Right to compensation
(iii) Reporting of accidents
(iv) Compensation
(v) Occupational diseases
(vi) Medical aid and
(vii) Appeals
According to section 7 (1) of the Act, every employer is required to obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under the Act to any of his employees. In addition, every employer carrying on business in Kenya shall within the prescribed period and in the prescribed manner register with the Director - section 8 (1). Pursuant to section 10 (2) of the Act, it is the duty of every employee to ensure his/her safety at the place of work and hence where an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee, such an employee is not entitled to compensation. However, according to section 12 if an employee is injured in an occupational accident or contracts an occupational disease while the employee, with the consent of the employer, is engaged in any organized first aid, ambulance or rescue work, fire-fighting or other emergency service, the accident or disease is for the purposes of this Act, deemed to have arisen out of and in the course of the employee’s employment. In a circumstance where an accident occurs in the course of employment, section 21 makes it a requirement for a written or verbal notice of such an accident to be given by or on behalf of the employee concerned to the employer who shall send a copy of the notice to the Director within twenty-four hours of its occurrence in the case of a fatal accident. In line with section 22 (1), an accident that has occurred should be reported to the Director by the employer in the prescribed manner within seven days from the date of receiving a notice of the accident or having learned that an employee has been injured in an accident. Similarly, it is the responsibility of the employee to report to his/her employer the occurrence of an accident not later than 12 months from the date of such an accident or else the right to benefits, in accordance with section 27 (1), shall lapse if the accident is not reported within such a period of time (12 months). According to section 46 (1), the employer shall be responsible for availing necessary means of transport where an employee is injured in an accident, which necessitates his conveyance to a hospital medical facility and from a hospital or medical facility to his residence.

Compliance Aspect
Under the above Act, the main contractor is required to:
- Maintain an insurance policy cover for all staff.
- Report any accident that has occurred to the Directorate of Occupational Health and Safety Service within 7 days from the date of occurrence or receiving notice.
- Maintain a record of accidents on site.
- Sensitize staff and create awareness on health and safety measures.

3.5.6 The Occupational Safety and Health Act, 2007.
This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act was published in the Kenya Gazette Supplement No. 111 (Acts No.15). It received presidential assent on 22nd October 2007 and became operational on 26th October 2007.

The key areas addressed by the Act include:

i) General duties including duties of occupiers, self-employed persons and employees

ii) Enforcement of the act including powers of an occupational safety and health officer

iii) Registration of workplaces

iv) Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences

v) Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver

vi) Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas
vii) Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials

viii) Welfare general provisions including supply of drinking water, washing facilities, and first aid

ix) Offences, penalties and legal proceedings

Under section 6 of this Act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7). He is also required to establish a safety and health committee at the workplace in a situation where the number of employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health advisor (Section 11). In addition, any accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace needs to be reported to the occupational safety and health officer of the respective area by an employer or self-employed person (section 21).

According to section 44, potential occupiers or users of any premises as work places are required to apply for registration to the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (section 47).

To ensure machinery safety, every hoist or lift – section 63 and/or all chains, ropes and lifting tackles – section 64 (1d), shall be thoroughly examined at least once in every period of six months by a person approved by the Director of Occupational Health and Safety Services. In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are manufactured, used, handled or stored-section 78 (5). In addition, necessary precautions for dealing with fire incidents should be implemented including provision of means for extinguishing fire and means for escape, in case of fire, for the persons employed in any workplace or workroom – section 81. As far as disaster preparedness and emergency response program is concerned, section 82 (1) makes it a mandatory requirement for every occupier of a workplace to design evacuation procedures to be used during any emergency situation and to have them tested at regular intervals.

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees.

The employers’ positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water - section 91 and a first aid box or cupboard of the prescribed standard – section 95 at suitable point(s) conveniently accessible to all employees.

Other precautionary measures include: issuance of a permit to work to any employee, likely to be exposed to hazardous work processes or hazardous working environment, including such work processes as the maintenance and repair of boilers, dock work, confined spaces, and the maintenance of machinery and equipment, electrical energy installations, indicating the necessary precautions to be taken – section 96 (1); provision and maintenance for the use of employees, adequate, effective and suitable protective clothing including suitable gloves, footwear, goggle and
head coverings in any workplace where employees are likely to be exposed to wet, injurious or offensive substance – section 101 (1).

**Compliance Aspect**
The Proponent will be required to ensure that the ESMP forms part of the contract document and the main contractor prepares a contractor specific Environment and social management plan and includes adequate measures to promote safety and health of workers and community during the construction phase of the proposed project. The contractor is expected to handle issues of occupational health and safety and community health and safety especially during construction phase of the project.

**3.5.7 The Standards Act, Cap 496 (Revised 2013)**
This Act promotes the standardization of the specification of commodities and provides for the standardization of commodities and codes of practice to ensure public health and safety. It establishes the Kenya Bureau of Standards (KBS) and defines its functions as related to:

- Promotion of standardization in industry and commerce; and
- Making arrangements or provision of facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their degree of accuracy by comparison with standards approved by the Minister on the recommendation of the Council and for the issue of certificates in regard thereto.

**Compliance Aspect**
The Proponent has to ensure all materials and equipment in use during construction as well as operation of the facilities adhere to the highest standards and do not pose any human health and/or safety risk.

**3.5.8 Safety and Health Committees Rules, 2004.**
These rules state that any employer/proponent/occupier who employs more than twenty persons must establish a committee to address the health, safety and welfare of workers. The employer must also cause to be carried out a health and safety audit of all his operations on an annual basis by a registered health and safety advisor who should forward such a report to the Director of Occupational Health and Safety Services.

**Compliance Aspect**
The proponent shall ensure a workplace safety and health committee is formed and regularly trained during the construction and operation phase of the project.

**3.5.9 First Aid Rules, 1977**
These have details on first aid requirements in terms of facilities and capacity building among non-medical workers.

**Compliance Aspect**
The contractor should avail at the site an adequate number of well-stocked first aid kits during the construction phase of the project.

**3.6 Relevant International Guidelines.**

**3.6.1 World Bank Operational Policy on Environmental Assessment (EA) (OP/BP 4.01)**
The Bank 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. EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project’s potential environmental risks and impacts in its area of influence; examines project alternatives; identifies
ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. OP/BP 4.01 on Environment Assessment was triggered mainly due to planned construction of laboratories as well as the generation of the health care waste from the lab.

The provisions of these guidelines describe a series of steps that need to be followed in order to dispose waste and or expired pharmaceuticals. The steps required include identification of pharmaceutical waste, sorting of pharmaceutical waste by category, filling the relevant forms to seek authority from the authorities in charge of disposing such waste. Upon obtaining all the relevant approvals, the disposal of the pharmaceutical waste shall be effected under the supervision of the local pharmaceutical waste disposal team or the Waste Management Team.

The recommended methods for disposing of unwanted pharmaceuticals include:
- The use of either medium temperatures incineration at a minimum of 850 degrees Celsius or high temperature incineration exceeding 1200 degrees Celsius with two chamber incinerator for solids, semi-solids and powders for controlled substances e.g. antineoplastic.
- Engineered sanitary landfill to be used for disposal of expired or unwanted pharmaceuticals.
- Sewer disposal for diluted liquids, syrups, intravenous fluids, small quantities of diluted disinfectants and antiseptics.

These guidelines are relevant in informing the generator of pharmaceutical wastes on safe disposal methods. The proponent shall however contract a licensed waste handler who disposes the pharmaceutical wastes in the manner provided by the Kenya legal framework and the best international practice and guidelines.

The Environment, Health and Safety (EHS) Guidelines contain performance levels and measures for development of industrial projects that are considered to be achievable in new facilities at reasonable costs by existing technology.

Under these guidelines, the World Bank has several guidelines many of which are applicable to various components of the proposed project namely:
- EHS Guidelines-Air Emissions and Ambient Air Quality
- EHS Guidelines-Waste Management.
- EHS Guidelines-Health Care Facilities.
- EHS Guidelines-Hazardous Materials Management
- EHS Guidelines-Construction and Decommissioning.

3.6.4 WBG EHS Guidelines: Air Emissions and Ambient Air Quality
These guidelines are meant for all types of projects with "significant" emissions, sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards. They require the application of national legislated standard, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognised sources. Kenya currently has Environmental Management and Coordination (Air Quality) Regulations, 2014 applicable to this project.
In this project, there will be fugitive air emissions, which are expected during construction and operation phases of the project. These guidelines are useful as they give control and monitoring measures.

3.6.5 WBG EHS Guidelines: Waste Management
The guidelines apply to the management of non-hazardous and hazardous waste. This project will be a major generator of both hazardous and non-hazardous waste. These guidelines provide categories of various wastes and a summary of treatment and disposal options. These guidelines provide good guidance on waste on-site handling, collection, treatment and disposal for both the proponent and the contractors during construction and operation phases respectively. This report greatly adopts the guidance while formulating the environmental and social management plan.

3.6.6 WBG EHS Guidelines: Noise
This section addresses impacts of noise beyond the property boundary of the facilities. These guidelines are applicable during construction phase whereby construction equipment and activities are expected to emit noise. Our local regulation, EMCA (Noise and Excessive Vibration) Pollution Control Regulations, 2009 give permissible levels during construction works. The proponent therefore has adequate guidance to ensure noise levels are maintained as low as reasonably practicable.

3.6.7 WBG EHS Guidelines: Occupational Safety and Health
These guidelines guide employers and supervisors in fulfilling their obligation to implement all reasonable precautions to protect the health and safety of workers. The guidelines provide guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities. The guidelines also describe how facility operation workplace design should be undertaken to prevent occupational health and safety risks and hazards. The guidelines also give examples of internationally published exposure guidelines which may be used to measure occupational health and safety performance examples, to include the Threshold Limit Value, Occupational Exposure Guidelines and Biological Exposure Indices published by American Conference of Governmental Industrial Hygienists, the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety, Permissible Exposure Limits published by the Occupational Safety and Health Administration of the United States, Indicative Occupational Exposure Limit Values.

3.6.8 WBG EHS Guidelines: Construction and Decommissioning
These provide additional and specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

3.6.9 WHO: Safety in Healthcare Laboratories, 1997
This is a manual intended for healthcare laboratories workers and those responsible for laboratory administration and planning. It provides key guidelines for health and safety in the laboratory activities. It offers a pragmatic approach to problems encountered in routine practice. These guidelines will be useful during operation phase of the project.

3.7 Alignment of WB and GoK Polices relevant to this ESIA
Both the World Bank safeguards and GoK laws are generally aligned in principle and objective:
(i) Both require Environmental Assessment before project design and implementation (which also includes an assessment of social impacts),
(ii) Both require public disclosure of EIA reports and stakeholder consultation during preparation,
(iii) While OP 4.01 of World Bank stipulates different scales of EIA for different category of projects, EMCA requires EIA for all sizes of projects, which require to be scoped as applicable,
(iv) EMCA recognizes other sectoral laws while WB has safeguards for specific interests;
(v) The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project which is equivalent to the EMCA requirements,
(vi) Additionally, statutory annual environmental audits are required by EMCA.

In Kenya, it is a mandatory requirement under EMCA, CAP 387 for all development projects (Schedule Two) to be preceded by an EIA study. Thus, under the Laws of Kenya, environmental assessment is fully mainstreamed in all development process consistent with World Bank policies. However, since EMCA provides no minimum size threshold, all projects will be screened at identification stage so as to determine level of environmental assessment required under EMCA. Further, in order to fully insure against triggers to WB safeguard policies, individual investments will be screened against each policy as part of the EIA Study.
4.0 PROJECT DESCRIPTION

4.1 The Proposed Location of the Project.
The proposed project is located in Marsabit County. The piece of land is registered under the name of the proponent, Ministry of Health. The site, Marsabit County Referral Hospital is a public hospital owned by the Government of Kenya. Consequently, there are no issues related to land acquisition on the proposed project. Currently, the piece of land contains a few scattered trees, mounds of soil and stones and grass. The hospital is located near Marsabit Prisons, Administration Police (AP), Kenya Forest Service (KFS) and Kenya Wildlife Service (KWS) in Marsabit County. The vegetation at the site comprises of gravillea, acacia species and various grass species. All wastes arising from construction activities will be transported by NEMA accredited waste handlers who will transport them to NEMA/Marsabit County Government designated dumpsites.

The neighbourhood of the proposed project is in an isolated area within the hospital. To the immediate east of the hospital is administration police block whereas Kenya Forest Service (KFS) is located to the immediate west of the site. The Marsabit Prisons is located to the immediate South while residential houses are located to the immediate North. The neighbourhoods are located within a radius of 1km since the hospital land is large.

The GPS Coordinates of the proposed new lab are Latitude 2.3237835 and Longitude 37.990443.
Figure 1: Shows a satellite view of Marsabit County Referral Hospital

Figure 2: Shows the site for the proposed project from the eastern and southern side respectively
4.2 Project Design Considerations

4.2.1 Environmental and Sustainable Development Considerations
The ESIA takes into account activities during the construction, operation and decommissioning phases of the project. Environmental and sustainable development considerations have been taken into account. This is in accordance with the World Bank Operational Policies on Safeguards and the WBG’s EHS guidelines. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In sustainable development, the objective is to strike a balance between equity, economy and ecology.

The following are the Environmental, Safety, Health and Sustainability considerations that have been included in the proposed development:

1. The construction of the lab and incinerator requires an Environmental and Social Impact Assessment (ESIA) Project Report, which must be approved by NEMA prior to the commencement of any civil work.
2. The proposed development is subject to approval by the Marsabit county government and hence drawings to be submitted as required.
3. Sewage and foul water from the facilities will be discharged into the septic tank system serving the hospital.
4. Foul water from the laboratory will be discharged into the sewers through dilution traps.
5. The facility will be connected to water supply from Marsabit Water and Sanitation Company.
6. The development will include an incinerator for hazardous waste such as biomedical waste.

Currently there are no environmental liabilities identified at the Marsabit County Referral Hospital. The project design will take into account the Guidelines of the American Institute of Architects (AIA) and the Facility Guidelines Institute (FGI), the American Society for Healthcare Engineering (ASHE) of the American Hospital Association (AHA), and the Green Guide for Health Care (www.gghc.org). These guidelines should be used to verify the adequacy of planning for new facilities.

4.3 Project components.
The project components include a Bio Safety Level II Laboratory. An incinerator will be constructed for the treatment/management of the health care waste from the laboratory.

4.3.1 Bio-safety Level 2 Laboratory Requirements.
General design requirements for the Bio Safety Level II laboratory at Marsabit County Referral Hospital.

i. Design of the building must provide universal access to persons with disability (PWD) and the aged as determined by the Constitution of Kenya.
ii. Staff entrance area should have changing rooms for both genders. These changing rooms should have washrooms with both toilets and shower rooms.
iii. The lab should have at least one staff room.
iv. Signage should be provided to direct people unfamiliar with the facility to entrances and parking areas. Corridors, doors and stairs/ramps should have signage for direction or warning.
v. Each unit size and layout shall be determined by projected workload for the next 15 years.
vi. The ceiling finish should be concrete on ground floor and on upper floor gypsum board finish. All ceilings should have a washable paint and the minimum room height of 3.0 meters.
vii. The floor must be a one piece slip resistant, non-pervious and with skirting along the wall. Preferably heat welded vinyl flooring or epoxy coated concrete slab. The floor should also be wear resistant and easy to clean.

viii. Wall finishes should be washable, moisture-resistant and smooth; wall finish treatments should not create ledges or crevices that can harbor dust and dirt.

The surface area of the Bio-Safety Level 2 Laboratory is given in the table below:

<table>
<thead>
<tr>
<th></th>
<th>GROUND FLOOR</th>
<th>FIRST FLOOR</th>
<th>TOTAL AREA (M²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARSABIT LAB</td>
<td>496</td>
<td>496</td>
<td>992</td>
</tr>
</tbody>
</table>

**General Scope of Work for the Biosafety Level II Laboratory at Marsabit County Referral Hospital**

i. Construction of a new laboratory within the hospital compound

ii. Electrical and mechanical works

iii. Installation of water storage tanks (underground and overhead)

iv. Installation of firefighting equipment.

v. Provision of water distillation unit.

*Figure 3: Shows an out-patient block under construction to the north of the proposed site and the current burning chamber behind the wards respectively*
Layouts:

Figure 4: Shows the laboratory layout
4.4 Construction specifications:
The construction specifications for the proposed development are as follows:

4.4.1 Bio safety level 2 Laboratory

Floor slab: “Marmoran’ stone finish with glaze coat on render backing by an approved specialist to architects approval. Preferably heat welded vinyl flooring or epoxy coated concrete slab.

Roof: 10mm thick laminated glass skylight of 5mm thick stained toughened glass in approved powder coated aluminium framing to detail.

Windows: Circular windows on powder coated aluminium casement to schedule.

Masonry wall Natural stone with key finish to external wall only parapet wall finish by an approved specialist.
4.4.2 General construction specification
- All slabs at ground level to be poured over 1000 gauge polythene sheeting on 50mm thick murram binding on hard-core.
- All soils under slabs and around external foundation to be poisoned for termite control.
- All soils or cut embankments to be stabilized and the slope not to exceed natural angle of response.
- All black cotton soil to be removed from below all buildings and paved surfaces.
- All walls less than 150mm thick to be reinforced with hoop irons at every alternate course.
- All adjacent reinforced concrete work and masonry wall to be tied with strip iron at every course.

4.5 Design of the incinerator
The incinerator is a modern waste disposal unit, designed to burn medical waste in a clean and environmentally efficient manner. The prescribed incinerator unit for the Marsabit County Hospital has a worldwide application and employs a temperature based logic control system to provide optimum control of the operating conditions.
To ensure the unit’s effective destruction of the combustion products, the unit will incorporate a high capacity thermal oxidizing secondary chamber.

4.5.1 Design Parameters
a) Waste
The unit should be able to handle medical and general waste Groups A, B, C, D and E and general waste generally comprising of groups 0, 1, 2, and 3 (See table 4 and 5 below for explanation of these groups and types).

| Table 4: Clinical Waste Groups |
|-----------------------------|----------------------------------|
| **Waste Group**             | **Type of Clinical Waste**       |
| Group A                     | Identifiable human tissue, blood, tissue from hospitals or laboratories. Soiled surgical dressings, swabs and other similar soiled waste. Infectious disease cases, excluding any in Groups B-E. |
| Group B                     | Discarded syringe needles, cartridges, broken glass and any other contaminated disposable sharp instruments or items. |
| Group C                     | Microbiological cultures and potentially infected waste from pathology departments and other clinical or research laboratories. |
| Group D                     | Drugs or other pharmaceutical products |
| Group E                     | Items used to dispose of urine, faeces and other bodily secretions or excretions which i.e. bed pans or bed pan liners, incontinence pads, stoma bags and urine containers. |

<table>
<thead>
<tr>
<th>Table 5: Types of solid wastes (non-clinical solid waste)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>
**Throughput:** 75kg/hour at a nominal calorific value of 4,000 kcal/kg and an average bulk density of 120kg/M³

**Ash:** The waste will be reduced by 90~95% to leave 5% ash W/W

**Environmental Standards**
- WBG EHS Guidelines: Air emissions and ambient air quality
- The Environmental Management and Coordination (Air Quality) Regulations, 2014
- EMCA, CAP 387

**Operating Period**
- Anticipated daily operating period 8 hours
- Maximum operating period 12 hours

**4.5.2 Siting**
The location of the incinerator can significantly affect dispersion of the plume from the chimney, which in turn affects ambient concentrations, deposition and exposures to hospital staff, in – and – out – patient.

In addition to addressing the physical factors affecting dispersion, siting must also address issues of permissions/ownership, access, convenience, etc. Best practices siting has the goal of finding a location for the incinerator that minimizes potential risks to public health and the environment.

This can be achieved by:
- Minimizing ambient air concentrations and deposition of pollutants to soils, foods, and other surfaces, e.g.,
  - Open fields or hilltops without trees or tall vegetation are preferable. Siting within forested areas is not advisable as dispersion will be significantly impaired.
  - Valleys, areas near ridges, wooded areas should be avoided as these tend to channel winds and/or plumes tend to impinge on elevated surfaces or downwash under some conditions.
- Minimizing the number of people potentially exposed, e.g.,
  - Areas near the incinerator should not be populated e.g., containing housing, athletic fields, markets or other areas where people congregate.
  - Areas near the incinerators should not be used for agriculture purposes, e.g., leafy crops, grasses or grains for animals

The siting of the incinerator shall be in an open field adjacent to the bio safety laboratory. The proposed site is an open field with a few trees, which will be cut down before construction. The area near the incinerator is also not populated nor used for agricultural purposes hence it was best suited for the incineration plant.

**4.6 MODEL I8-200 DETAILS:**
The I8-200 is a proven and unique design, which is currently operating in many different applications throughout the world. They have a high build quality that ensures durability and ease of installation, operation and servicing.

They are suitable for many purposes including medical waste, animal waste, industrial waste, camp waste and general waste applications.

**Advantages:**
- Ease of use
  - Fully automatic control of burners with temperature monitoring display
  - 90% factory pre-installed for easy and simple on-site installation.
Fuel efficiency
- 29 litres per hour (dependent on application)
- Thick monolith refractory lining rated to 1600°C in main chamber retains heat, increasing efficiency.
- Thermostatic control of burners.
- Quality built to last
  - Heat resistant 5mm steel.
  - Stainless steel stack.
  - 12cm of refractory lining – steel reinforced.

4.7 Site (Project) Activities during the Construction Phase:
The activities during the construction phase include:
  i) Establishment of a site office with site staff amenities,
  ii) Establishment of a store for materials storage and handling,
  iii) Site clearance and fencing,
  iv) Excavation of foundations,
  v) Construction of access roads,
  vi) Construction of spoil and stockpile areas.

4.7.1 Material Storage and Handling
The contractors shall construct temporary site offices to run and manage all activities at different phases. This will also include connection of the utility services such as water, electricity which will be crucial for the construction activities.
All materials to be used shall conform to the Kenya Bureau of Standards’ requirements for quality or equal and approved.

4.7.2 Non-Hazardous Materials
The store for non-hazardous materials will be accommodated within the site office. Materials to be stored in this store shall include samples for review/testing by consultants and inspectors.

4.7.3 Hazardous Materials
Hazardous materials likely to be stored at the site shall include paints, oil, grease and fuel. The store for these materials shall have iron sheet walling, roof, and a waterproof concrete floor to contain spills. Storage and handling of all hazardous chemicals shall be in accordance with manufacturer’s instructions as outlined on the material safety data sheets.

4.7.4 Material Sources and Management
The bulk materials likely to be stored on site include: sand, ballast, stones, cement, quarry chips and timber. All construction materials will be sourced from NEMA licensed sources. Sand will be sourced from nearby centres, ballast and quarry chips from adjacent areas and timber and cement from the hardware stores within the town centre. However, to avoid material accumulation with potential for impeding site activities, inducing safety hazards and creating a nuisance in the neighbourhood, the main contractor intends to have materials delivered to the site in small quantities.

Timber procured from legal sources will be used mainly for roofing, formwork, ceiling, joinery and other carpentry needs. Most joinery works will be fixed at a workshop located outside the site before being delivered ready for installation. Formwork timber will be fixed at the site. Consideration will be given to the working area and material storage requirements to ensure there is no conflict with the movement of the workers.
• **Ballast and Quarry Chips**
The contractor must identify appropriate and suitable ballast and quarry chips materials from NEMA approved areas within Marsabit County. The materials will be sourced from these areas after careful due diligence.

• **Water**
Since the proposed project is within an already existing hospital, water for construction will be sourced from the existing supply within the hospital with an approval from the water company supplying the hospital.

• **Sand**
Sand will be sourced from nearby licensed centres within Marsabit County.

• **Timber and cement**
These will be sourced from the licensed hardware stores within Marsabit Town.

**4.8 Project Cost:**
The estimated cost of the proposed project is Kenya shillings Eighty-seven million, two hundred and twenty-two thousand, eight hundred and sixteen only (Kshs 87, 222, 816.00)
5.0 ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING OF THE PROJECT AREA

This section describes the existing physical, biological, and socio-economic environment at the proposed site and its neighbourhood. The description provides the baseline information upon which potential impacts of the proposed project were determined.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Topography

Most of the county constitutes an extensive plain lying between 300m and 900m above the sea level, sloping gently towards the southeast. The plain is bordered to the west and north by hills and mountain ranges and is broken by volcanic cones and calderas. The most notable topographical features of the county are: Ol Donyo Ranges (2066m above sea level) in the South West, Mt. Marsabit (1865m above sea level) in the Central part of the county, Hurri Hills (1685m above sea level) in the NorthEastern part of the county Mt. Kulal (2235m above sea level) in North West and the mountains around Sololo Moyale escarpment (up to 1400m above sea level) in the North East. Specifically, the topography of the proposed site is plain.

5.1.2 Climate

Most parts of the county are arid, with the exception of high potential areas around Mt. Marsabit such as Kulal, Hurri Hills and the MoyaleSololo escarpment. The county experiences extreme temperatures ranging from a minimum of 10.10°C to a maximum of 30.2°C, with an annual average of 20.10°C. Rainfall ranges between 200mm and 1,000mm per annum and its duration, amount and reliability increases with increase in altitude. North Horr (550m) has a mean annual rainfall of 150mm; Mt. Marsabit and Mt. Kulal 800mm while Moyale receives a mean annual rainfall of 700mm.

<table>
<thead>
<tr>
<th>Table 6: Marsabit climate table/historical weather data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Month</strong></td>
</tr>
<tr>
<td><strong>Avg. Temperature (°C)</strong></td>
</tr>
<tr>
<td><strong>Min. Temperature (°C)</strong></td>
</tr>
<tr>
<td><strong>Max. Temperature (°C)</strong></td>
</tr>
<tr>
<td><strong>Avg. Temperature (°F)</strong></td>
</tr>
<tr>
<td><strong>Min. Temperature (°F)</strong></td>
</tr>
<tr>
<td><strong>Max. Temperature (°F)</strong></td>
</tr>
<tr>
<td><strong>Precipitation Rainfall (mm)</strong></td>
</tr>
</tbody>
</table>

The difference in precipitation between the driest month and the wettest month is 222 mm. throughout the year; temperatures vary by 3.0°C.

5.1.3 Geology and Soils

Most predominant geological formation in the county is volcanic rocks. They extend both westward and eastward from the eastern part of the Rift Valley to Ethiopia border. These volcanic rocks are interrupted in a few areas by pockets of quaternary sediments and Mozambique belt. Other geological formations are associated with the old lake beds of Lake Turkana and Lake Chalbi. The south western and north-eastern parts of the county are underlain by old, metamorphic rock of
pre-Cambrian origin. These are covered by tertiary and Pleistocene sheets and cones of volcanic centres of Mt. Kulal, Hurri Hills and Mt. Marsabit. The south-western plains are covered by quaternary sediments washed out from the higher areas in more recent geological times. Between the hills of Mt. Marsabit, Mt. Kulal, Hurri Hills, the bed of the seasonal lake Chalbi is also covered by recent sediments. The rest of the county is covered by rocky, stony and rugged lava plains with poor soil development. Some of these soils in the western part of the district have acidic moisture and are saline as in Chalbi.

Quaternary volcanic peaks are close to Marsasbit, Kulal and Hurri Hills. The chains of mountains are comprised of the mathes Range, the Ndotos and Nyiru consist of old crystalline Precambrian basement of durable gneisses and granites. Their soils contrast with the soils of plains which consist of vertisols, regosols, lithosols and cambiosols. The mountainous soils humicacrisols overlying Precambrian basement rocks and deep humericandosols in the volcanic areas. According to the Range Management Handbook of Kenya, (1991), there are 36 different soil categories across Marsabit District with only 30% described as having high productivity level, with moderate productivity and 31% with poor productivity. Only 11% of the district is resilient to erosion. 31% slightly-moderately sensitive to erosion, 47% moderate-severely sensitive to erosion and 11% rated highly sensitive to erosion.

**5.2 BIOLOGICAL ENVIRONMENT**

This report endeavours to describe key biological elements, including the identification and distribution of dominant, rare and unique plant and animal species within the region of concern (proposed project site and other potentially affected areas). Three categories are recognized as follows: Wildlife and Forests, community and habitat characterization and ecologically significant features.

**5.2.1 Flora**

Marsabit forest has distinctive vegetation cover varying from thick tropical forest, woodland, perennial grassland, evergreen to semi-deciduous bush land, deciduous bush land, shrub land, dwarf shrub to grassland. The tropical forest is formed by trees of over 40 meters high, with closed canopy (KFWG, 2001). In Marsabit forest, the highest number of woody species was recorded in Old camp (Joseph Edebeet, 2014)

Currently Marsabit forest is dominated by young trees, regeneration shrubs and grasses; hence increased encroachment for grazing land for livestock. Other than encroachment for grazing land, the reserve is facing other challenges such as land use conversion for agricultural land, degradation for fuel wood, and poor demarcation and protection. The forest is also a source of water for the greater Marsabit area.
From a survey carried out by the KWS team, Mt. Marsabit Park supports four to five different identifiable land cover types, which are:

- **a. Cloud forest**: cloud forest found mainly above 1200 meters above sea level, dominated by woody forest trees such as Croton and Olea
- **b. Dry forest**: located in the frost-free regions with annual precipitation between 500-2000mm and a pronounced dry season of 4-7 months with less than 50mm of precipitation.
- **c. Shrub land**: low lying areas around 100 mm above sea level. Characteristics of these vegetation are they normally are not more than 6ft height, and often also include grasses, herbs and geophytes.
- **d. Wetland**: dominated by graminoids of the families Cyperaceae and Poaceae (Graminae). Areas of marsh, fen, peat-land or water. The most common composition of life forms in Mt. Marsabit is woody vegetation covering over 50% of the land cover, followed by herbs.

*The table below shows flora of Mt. Marsabit. These composition of species are moderated by pastoralism and subsistence wood harvesting by Borana, Rendile and peri-urban neighbouring communities (Joseph Edebe et al., 2014).*

The most common species of large trees on Mt. Marsabit include Juniperus procera, Cassipourea molasana, Diosyros abyssinica, Teclea norbilis, Olea capensis, Olea africana, Teclea simplicifolia, Apodytes dimidiata, Croton megalocarpus, Strombosia schefflei, Ekebargia capensis and Premma maxima (KFWG, 2001)

<table>
<thead>
<tr>
<th>Transect</th>
<th>Woody plants (%)</th>
<th>Herbs (%)</th>
<th>Graminioids (%)</th>
<th>Seedlings (%)</th>
<th>Climbers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakuli springs</td>
<td>67.61</td>
<td>26.76</td>
<td>0.70</td>
<td>2.11</td>
<td>0.70</td>
</tr>
<tr>
<td>Lake Paradise</td>
<td>84.45</td>
<td>5.04</td>
<td>1.26</td>
<td>6.30</td>
<td>0.42</td>
</tr>
<tr>
<td>Cloud forest</td>
<td>89.27</td>
<td>4.29</td>
<td>2.15</td>
<td>4.29</td>
<td>0.00</td>
</tr>
<tr>
<td>Parakishon road</td>
<td>77.78</td>
<td>18.75</td>
<td>0.00</td>
<td>4.17</td>
<td>0.69</td>
</tr>
<tr>
<td>Parakishon ² spring</td>
<td>78.79</td>
<td>7.58</td>
<td>18.18</td>
<td>1.52</td>
<td>1.52</td>
</tr>
<tr>
<td>El ngoros spring</td>
<td>85.94</td>
<td>10.42</td>
<td>0.52</td>
<td>1.04</td>
<td>1.56</td>
</tr>
<tr>
<td>Bongole</td>
<td>57.35</td>
<td>5.88</td>
<td>4.41</td>
<td>0.00</td>
<td>1.47</td>
</tr>
<tr>
<td>Ahmed</td>
<td>76.26</td>
<td>8.63</td>
<td>2.52</td>
<td>1.08</td>
<td>1.08</td>
</tr>
<tr>
<td>Old camp</td>
<td>74.27</td>
<td>16.37</td>
<td>2.34</td>
<td>4.68</td>
<td>2.34</td>
</tr>
<tr>
<td>Hula hula</td>
<td>82.28</td>
<td>11.39</td>
<td>0.42</td>
<td>4.22</td>
<td>1.69</td>
</tr>
<tr>
<td>Songo</td>
<td>80.49</td>
<td>10.98</td>
<td>1.22</td>
<td>4.88</td>
<td>2.44</td>
</tr>
<tr>
<td>Ilpus</td>
<td>56.92</td>
<td>24.62</td>
<td>3.08</td>
<td>7.69</td>
<td>7.69</td>
</tr>
</tbody>
</table>

**5.2.2 Fauna**

The forest is also a home of the most unusual species of herbivores including the greater Kudu (*Tragelaphus strepsiceros*), gravy zebra, buffalo (*Synceruscaffer*), Grant’s gazelle (*Nangergranti*), Desert warthog (*Pantheraparudus*), Geunther’s dikdik (*Madoquaguentheri*), bush buck (*Tregelaphus scriptus*) and dry land elephant, other mammals depends on the forest for habitat include genet cat, lions (*Panthera leo*), Cheetah (*Acinoxyx jubatus*), Leopard (*Pantheraparudus*), stripped hyenas (*Hyena hyena*), spotted hyena (*Crocuta crocuta*), Olive Baboons (*Papio anubis*) monkeys/baboons, hyena among others.
5.3 WASTE MANAGEMENT AND POLLUTION PREVENTION

To ensure a clean and healthy environment, waste should be managed properly. Proper waste management enhances improved sanitary conditions that are associated with a reduction of disease incidences. The existing waste management practices in the neighbourhood of the proposed project site and within the Marsabit County in general include:

5.3.1 Wastewater Management

Marsabit town is not served by a public sewer line for effluent management. The Marsabit County Government requires all sewage discharges to be connected to alternative sewer networks including septic/conservancy tanks and soak pit systems and bio-digester tanks. Wastewater and trade effluent are a potential source of heavy metals and other inorganic and organic wastes. The presence of these wastes in an aquatic ecosystem adversely affects its biological, physical and chemical characteristics and thus the capacity to support aquatic life. For this reason, such wastes should be treated as required prior to release into the sewage system.

Marsabit County Hospital discharges its effluents into a septic tank system serving the hospital. The hospital discharges effluents of approximately 200 litres per day. The full capacity of the septic tank system is 67,500 Litres. The proposed project will connect to the existing septic tank system at the hospital. The septic tank system serving Marsabit County Referral Hospital has enough capacity for the additional effluent from the proposed facilities.

5.3.2 Solid Waste Management

Solid and liquid wastes should not be mixed together. In addition, solid wastes should be sorted out (depending on their nature e.g. biodegradable from non-biodegradable, reusable from recyclable, metallic from plastic, clinical and non-clinical, and toxic from non-toxic) prior to disposal.

NEMA, in line with the Environmental Management and Coordination (Waste Management) Regulations, 2006 requires all solid waste (unless the generator opts to recycle) to be dumped at approved landfill sites. The neighbourhood of the proposed site relies on private garbage collectors to dispose of solid waste. Currently, non-hazardous solid waste from the hospital is collected by a licensed waste transporter and dumped at approved dumpsites by NEMA. Marsabit County Referral Hospital produces 30-50 Kg per day of solid waste which are currently being dumped in a central place before being transported to Marsabit County dumpsites. The proposed incinerator will be used in treatment of the hazardous waste and final disposal of the ash will be at the approved dumpsites by NEMA.

5.4 SOCIO-ECONOMIC ENVIRONMENT

The attributes of socio-economic environment include land use; population and housing; economic activity (including employment and income), community; transportation and health and safety.

5.4.1 Land Availability and Use.

Most parts of the county are arid, with the expectation of high potential areas around Mt. Marsabit, Kulal. Hurri Hills and the Moyale-Sololo escarpment, most of the land in the county is owned communally, less than 1% in the county is registered in the county in the areas of Mt. Marsabit, Marsabit Township and Dakabaricha (Marsabit CIDP 2003-2017).

5.4.2 Demographic Features

5.4.2.1 Population Size and Composition

According to the 2009 National Population and Housing Census, the Marsabit County’s projected population was 316,206 people in 2012. This comprised 164,105 males and 152,101 females. The projections are based on annual growth rate of 2.75 per cent.
The county has a sex ratio of 100:93. Currently, 67.8 per cent of the population in the county is between 0 - 24 years. This is an indicator of a growing population and the county therefore expects greater pressure on resources in future if the trend continues.
5.4.2.2 Urban Population

There are two major towns and many urban centres in the county. The towns are Moyale and Marsabit while the major urban centres are Sololo, Loiyangalani and Laisamis with a total projected population of 70,868 as at 2012 (Urban Areas and Cities Act No. 13 2011). This represents 22.4 per cent of the county population. The urban population is expected to increase to 77,078 and 83,833 in 2015 and 2017 respectively, as shown in Table 12.

Table 10: Population projections by urban center including Marsabit Town

<table>
<thead>
<tr>
<th>Urban Centre</th>
<th>2009 (Census)</th>
<th>2012 (Projections)</th>
<th>2015 (Projections)</th>
<th>2017 (Projections)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>Moyale</td>
<td>18,916</td>
<td>18,471</td>
<td>37,387</td>
<td>20,574</td>
</tr>
<tr>
<td>Marsabit</td>
<td>7,525</td>
<td>7,382</td>
<td>14,907</td>
<td>8,184</td>
</tr>
<tr>
<td>Sololo</td>
<td>2,543</td>
<td>2,561</td>
<td>5,104</td>
<td>2,766</td>
</tr>
<tr>
<td>Loiyangalani</td>
<td>2,272</td>
<td>2,845</td>
<td>5,117</td>
<td>2,471</td>
</tr>
<tr>
<td>Laisamis</td>
<td>1,370</td>
<td>1,273</td>
<td>2,643</td>
<td>1,490</td>
</tr>
<tr>
<td>Total</td>
<td>32,626</td>
<td>32,532</td>
<td>65,158</td>
<td>35,485</td>
</tr>
</tbody>
</table>


5.4.2.3 Population Density and Distribution

The vastness of the county makes population density relatively small. The county had an average population density of four persons per sq km in 2012 as shown in Table 13.

Table 11: Population distribution and density by constituency

<table>
<thead>
<tr>
<th>Constituency</th>
<th>2009 ( Census)</th>
<th>2012 (Projections)</th>
<th>2015 (Projections)</th>
<th>2017 (Projections)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Density (Per sq km)</td>
<td>Population</td>
<td>Density (Per sq km)</td>
</tr>
<tr>
<td>North Horr</td>
<td>75,196</td>
<td>2</td>
<td>81,663</td>
<td>2</td>
</tr>
<tr>
<td>Laisamis</td>
<td>65,669</td>
<td>3</td>
<td>71,317</td>
<td>4</td>
</tr>
<tr>
<td>Moyale</td>
<td>103,779</td>
<td>11</td>
<td>112,726</td>
<td>12</td>
</tr>
<tr>
<td>Saku</td>
<td>46,502</td>
<td>23</td>
<td>50,501</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>291,166</td>
<td>4</td>
<td>316,206</td>
<td>4</td>
</tr>
</tbody>
</table>

Saku Constituency has the highest population density at 25 people per sq km. This is expected to increase to 27 and 29 people per sq km in 2015 and 2017 respectively. North Horr is the least densely populated constituency in the county with a population density of two persons per sq km, which is expected to remain the same by 2015 and 2017. The most populous constituency is Moyale with a population of 112,726 in 2012. This represents 35.6 per cent of the county population while Saku Constituency has the lowest population of 50,501, representing 16 per cent of the total population.

5.4.2.4 Population and housing:
The implementation of the proposed project will generate employment, but it will not lead to migration of workers to the project site during the construction phase of the project. However, the project should explore possibilities of employing the locals and more so the vulnerable groups so that they also benefit.

- The Local population are among the poorest and most socially excluded populations in Kenya.
- The Local population are inextricably linked to the land on which they live and natural resources on which they depend.
- Dispossession of land or restriction of access to natural resources generate loss of identity and threatens their cultural survival.

Considerations:
- Ensure that the development process fully respects the dignity, human rights, economies, and cultures of neighboring communities.
- Avoid potentially adverse effects on the neighboring communities. When avoidance is not feasible, minimize, mitigate or compensate such effects.

5.4.3 Poverty, Gender and Vulnerable Groups
Marsabit County is mainly inhabited by the Cushitic-speaking Borana, Burji, Gabbra and Rendille. There are also some Nilotic Turkana and Bantu Ameru residents. Additionally, there are a few Somali traders.

The communities in Marsabit County in most cases do not benefit from the livelihood investments on land and other activities but rather face-off emergencies situations and little has been done to enhance and improve pastoral livelihood and their resilience to drought menace, for example issues related to water development, livestock trade and marketing and livestock diseases to improve productivity of the livestock sub sector the bedrock of their livelihoods. Consequently, these communities are rife with acute starvation, malnutrition among the small children, expectant mothers, the sick and the elderly. Disease incidences and mortality rates are also relatively high. Some of these minority groups are often subjected to marginalization in decision-making and policy formulation by project developers and other authorities within the County. However, with the promulgation of the Kenyan 2010 constitution, which provides for public participation in policy-making and formulation, the concerns of these groups have and continue to be addressed through their involvement in public meetings and barazas.

The proposed project should seek to involve all groups within the project area, including marginalized communities, poor people and women in different phases of the project including; hiring of labourers from marginalised communities during the construction phase, hiring women and the poor and consulting elders or representatives of these vulnerable groups in decision-making processes.
5.4.4 Project Staff:
Project development phase office staff will stay in rental or own houses within Marsabit and neighbouring project site towns.

![Figure 7: Shows the proposed site's neighborhood within the hospital](image)

5.4.6 Economic Activities:

5.4.6.1 Agriculture
There is some agriculture and agro-pastoralism on the foot of the mountains Marsabit, Kulal and Ol Donyo Mara Range which have moderate rainfall and productive agricultural soils. These areas receive moderate rainfall of about 700mm annually. Marsabit county areas below 700mm have low agricultural potential and cover 75% of the land surface and suitable only for wildlife and livestock rearing. The remaining 25% of the county land surface is made of highland which has reasonable rainfall and agriculturally favourable soils.

The Mt. Marsabit Falls under agro ecological zone III and is characterized by dense forest which is being degraded, high rainfall and low evaporation rates. Below these forests lies a belt of vegetation characterised by deciduous thorn tree (5-15m high) and tall perennial grasses. This zone is suitable for agriculture and various horticultural crops including maize, beans, pawpaw, tomatoes, bananas and coffee are grown. Ecological zone IV covers the low parts of Mt. Marsabit and the surrounding hills. It is suitable for livestock grazing mainly cows, sheep and goats and sedentary cultivation of maize, millet, fruits and vegetables is also practiced.
5.4.6.2 Livestock Farming
Livestock rearing is the main economic activity and is practiced by 80% of the inhabitants in the county. Livestock kept include; cattle which area approximately 424,003, camel 203,320, sheep 900, 004, goats 1,143,480, donkeys 63,861 and poultry 50,690 which are kept for their products such as beef, animal meat, milk, mutton and skin/hides and donkeys used mostly for transport. There are 2,091 beehives/ apiaries in the entire county (Marsabit CIDP 2013-2017).

5.4.6.3 Crop Farming
Despite Marsabit County receiving low rainfall, 2% of the county population practise subsistence agriculture in regions around Mt. Marsasbit and Moyale where farming does well during rainy season. Main cash crops grown include vegetables and fruits such as mangoes, avocados and oranges. Whereas food crops include; maize, wheat, teff, beans and millet. (Marsabit CIDP 2013-2017).
The agricultural practices has increased pollution of water bodies from pesticide and fertilizer inputs; soil erosion which has occurred due to bare land; poor farming methods; over grazing among others. All these have led to sedimentation of rivers.
The total area of land under food and cash crop production is 5,060 Ha. However the county has a great potential of crop production with area of 1,582,750 Ha being arable, much of the area is underutilized due to erratic climatic condition (Marsabit CIDP 2013-2017).

5.4.6.4 Commerce and Trade
About 7% of Marsabit County populations are involved in commerce and trade within Marsabit town and other major towns in the county such as Moyale town and Loiyangalani town (which is a major tourist destination in Northern Kenya). The remaining 3% are salaried employees mainly working with National or county governments and non-government (NGOs) such as World Vision, Kenya Red Cross, Action Aid, World Food Programme among other NGOs. The socio-economic survey undertaken took an analysis of other sources of livelihood and incomes other than the crops, livestock and forest products.

5.4.7 Socio-economic Importance of the Proposed Project
The proposed project will have the following positive socio-economic impacts:

i. The proposed project will indirectly contribute towards enhancement of security in the neighbourhood.

ii. The proposed project will discharge into the septic tank system on site and will connect to the water supply network hence will generate revenue to the Marsabit County Government through payment of connection and service fee.

iii. The proposed project will improve the health standards of the area through provision of modern laboratory testing and waste incineration.

iv. Apart from the direct employment of construction workers, the proposed project will also benefit the following categories of individuals:

- **Transporters.** Investors on lorry and trailer transport will benefit greatly from the project. This benefit will extend to vehicle dealers and manufacturers, lorry drivers.

- **Sand Harvesters.** Locals involved in sand harvesting are to be major beneficiaries of the project. The benefit will extend to the local authority entitled to levy taxes on sand transporters.

- **Ballast Quarries.** There will be massive use of ballast. These will ensure that the Quarry owners and workers benefits greatly.

- **Cement Manufacturers.** The local cement manufacturers and their employees and shareholders are direct beneficiaries of the development. The government will also get some impressive increase in V.A.T. and other taxes levied on cement.
5.4.8 Community Services
In general, Community services include water supply, sewage disposal, storm water drainage, flood control, solid waste management, power supply, education, healthcare, police and fire protection, churches and libraries. The Kenya power and lighting company is responsible for the supply of electricity through the National Grid whereas the Marsabit Water and Sewerage Company is responsible for water supply. The Government of Kenya and some private organizations are responsible for running of facilities like schools, colleges, hospitals and healthcare centres.

5.4.8.1 Infrastructure and Access
The total road network in the county is approximately 5,000km. This consists of 312km tarmacked, 580km gravel surface and 4,108km earth surface. Most of the roads are however impassable during rainy seasons. The construction of the Merille - Moyale road is complete. The upgrading of sections of the Isiolo – Moyale road to bitumen standard has greatly improved the transportation of goods and services in the county. Once completed, this will greatly boost cross-border trade between Kenya and Ethiopia.

The county has eighteen airstrips located in all sub-counties within Marsabit. The Marsabit airstrip is undergoing renovation but the others are in good condition and in use. There is no railway line, port or jetty in the county. However, railway transport is expected to develop once the Lamu Port - South Sudan - Ethiopia Transport Corridor (LAPSSET) project is completed. The county has already benefited from the project through the tarmacking of the Isiolo - Moyale highway.

The transportation system provides access to movement and trade. The systems that offer access to movement and trade in Marsabit town are road networks. The proposed project site will make use of the existing road network. The site can be accessed from Marsabit town along co-operative bank of Kenya. Construction materials will be transported to the site by road hence investors on lorry and trailer transport will benefit greatly from the project.

5.4.8.2 Financial Institutions
There are four major banks in the county and three micro finance institutions (MFIs). The banks are based in Marsabit and Moyale towns. These are Kenya Commercial Bank (KCB), Equity Bank, Cooperative Bank of Kenya and First Community Bank. The MFIs are Kenya Women Finance Trust, Equatorial Debit Solutions Ltd and Liqui Solve. Post Bank is also set to open a branch in Marsabit soon.

Equity Bank has led the way in opening satellite agency points in main urban centres like North Horr, Maikona, Laisamis, Loiyangalani, Dukana and Sololo. Kenya Commercial Bank is also expected to roll out its agency networks within the county. The county has seven active savings and credit cooperative societies (SACCOs) situated in Marsabit and Moyale serving a huge clientele base. Three of these are newly registered matatu (commuter minibuses) SACCOs, namely, MAISMO, MMOST and TRIPPLE M for matatus plying the Isiolo - Moyale highway.

5.4.8.3 Education Institutions
There are 340 Early Childhood Development Education (ECDE) centres in the county of which 335 are public and 5 private. In addition, a number of public primary schools in the county have, with the help of the county government, integrated a pre-primary unit in their systems.

Separately, the county government, through the Department of Education, Youth, Sports and Skill Development, has managed to build 90 Early Childhood Development (ECD) centres and is planning to build 33 more by the end of the third financial year. There are 216 primary schools of which 166
are public and 50 private. The primary school age population is estimated at 46,178. Therefore, there is a strain on existing facilities with some public primary schools and their respective pre-primary units sharing some facilities. With the population projected to grow to 61,300 in 2017, the county must set aside adequate resources to expand school infrastructure to meet present and future demand. The county has 32 secondary schools with the number of students standing at about 5,000. Mixed schools make up 44 per cent of these, boys’ schools 31 per cent and girls schools 25 per cent. The number of secondary schools is inadequate hence the low primary to secondary transition rate.

The county has four youth polytechnics, no colleges and no universities. This means that majority of youths cannot acquire technical skills within the county. There is thus need for the establishment of more polytechnics, tertiary colleges and universities. With respect to post-secondary education, the county has built four youth polytechnics in each sub county and still plans to build the same in each ward. There are three constituent colleges in the county - Kenyatta University, University of Nairobi and Maasai Mara in Saku Sub-county – which offer diploma courses.

5.4.9 Social Impact Assessment
During the public participation, 53 people were consulted on the proposed project to get their input before the proposed project officially commences. Those interviewed were drawn from far and near, the nearest being an immediate neighbour while the farthest being around 15km away. The table below gives a summary of those interviewed between 4th and 6th June 2018.

Table 12: Shows a summary of the respondents and data tabulation

<table>
<thead>
<tr>
<th>S/N</th>
<th>NAME OF RESPONDENT</th>
<th>AGE BRACKET</th>
<th>DISTANCE FROM PROJECT SITE</th>
<th>HIGHEST EDUCATION LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>under 35 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Salahadin Shariff</td>
<td>?</td>
<td>5Km</td>
<td>Primary</td>
</tr>
<tr>
<td>2</td>
<td>Bokayo Halake</td>
<td>?</td>
<td>50m</td>
<td>Secondary</td>
</tr>
<tr>
<td>3</td>
<td>Patrick Leadismo</td>
<td>?</td>
<td>2Km</td>
<td>Primary</td>
</tr>
<tr>
<td>4</td>
<td>Abdulfatah Ali</td>
<td>?</td>
<td>2Km</td>
<td>Primary</td>
</tr>
<tr>
<td>5</td>
<td>Ali Fernandes (Assistant Chief)</td>
<td>?</td>
<td>800m</td>
<td>College</td>
</tr>
<tr>
<td>6</td>
<td>Abdikadir Kirija</td>
<td>?</td>
<td>1.5Km</td>
<td>College</td>
</tr>
<tr>
<td>7</td>
<td>Daniel Dida</td>
<td>?</td>
<td>1.5Km</td>
<td>College</td>
</tr>
<tr>
<td>8</td>
<td>Abdulsalman Hussein</td>
<td>?</td>
<td>1.5Km</td>
<td>Primary</td>
</tr>
<tr>
<td>9</td>
<td>Ahmed Sheikh</td>
<td>?</td>
<td>60m</td>
<td>Primary</td>
</tr>
<tr>
<td>10</td>
<td>Tayba Abass</td>
<td>?</td>
<td>1.5Km</td>
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<tr>
<td>11</td>
<td>Mohammed Abdullahi</td>
<td>?</td>
<td>3Km</td>
<td>University Student</td>
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<td>Mohamed Dima</td>
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<td>13</td>
<td>James Gethiba</td>
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<tr>
<td>14</td>
<td>John Githinji</td>
<td>?</td>
<td>15Km</td>
<td>Secondary</td>
</tr>
<tr>
<td>15</td>
<td>Mohamed Jamal</td>
<td>?</td>
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</tr>
<tr>
<td>16</td>
<td>Abdalla Nunu</td>
<td>?</td>
<td>1.5Km</td>
<td>Primary</td>
</tr>
<tr>
<td>17</td>
<td>Huqman Hussein</td>
<td>?</td>
<td>2.5Km</td>
<td>Primary</td>
</tr>
<tr>
<td>18</td>
<td>Robe Mark Kanchora</td>
<td>?</td>
<td>1.5Km</td>
<td>Primary</td>
</tr>
<tr>
<td>19</td>
<td>Katu Jarso Yattani</td>
<td>?</td>
<td>3Km</td>
<td>Primary</td>
</tr>
<tr>
<td>20</td>
<td>Ali Elema Galgallo</td>
<td>?</td>
<td>3Km</td>
<td>Primary</td>
</tr>
<tr>
<td>21</td>
<td>Esao Alex</td>
<td>?</td>
<td>5Km</td>
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<tr>
<td>22</td>
<td>Diko Boru Ele</td>
<td>?</td>
<td>1Km</td>
<td>Primary</td>
</tr>
<tr>
<td>23</td>
<td>Hadija Ali Kambapo</td>
<td>?</td>
<td></td>
<td>Primary</td>
</tr>
<tr>
<td>24</td>
<td>Dhabaru Wario</td>
<td>?</td>
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<td>N/A</td>
</tr>
<tr>
<td>25</td>
<td>Kula Salesa Guyo</td>
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<td></td>
<td>N/A</td>
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<td>26</td>
<td>Abdullahi AliDida</td>
<td>?</td>
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<td>Primary</td>
</tr>
<tr>
<td>27</td>
<td>Halima Wario</td>
<td>?</td>
<td></td>
<td>Primary</td>
</tr>
<tr>
<td>28</td>
<td>Madina Wari Guyo</td>
<td>?</td>
<td></td>
<td>N/A</td>
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<tr>
<td>29</td>
<td>Fatuma Hassan</td>
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<td>Primary</td>
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</table>
## Data Tabulation

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Address</th>
<th>Distance</th>
<th>Status</th>
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<tr>
<td>32</td>
<td>Bothu Eche Badha</td>
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<td>33</td>
<td>Osman Wario</td>
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<td>9Km</td>
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</tr>
<tr>
<td>34</td>
<td>Muslim Adan</td>
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<td>50m</td>
<td></td>
</tr>
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<td>Nasibo Ali Hussein</td>
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<td></td>
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<td>Alinoor Golicha</td>
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<td>Moi Girls’ Sec. School</td>
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<td>Missionaries of Charity</td>
<td>Children’s Home</td>
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<td>St. Teresa’s Girls’ Boarding</td>
<td>School</td>
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<td>N/A</td>
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<tr>
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<td>Joseph Ortoya Mobile</td>
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</tr>
<tr>
<td>41</td>
<td>James L. Lekaras</td>
<td>Mobile no: 0704346806</td>
<td>50m</td>
<td></td>
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<tr>
<td>42</td>
<td>Guyo J. Gaya</td>
<td>Mobile no: 0726159690</td>
<td>50m</td>
<td></td>
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<tr>
<td>43</td>
<td>Yusuf Wario</td>
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<td>50m</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Amos W. Guyo</td>
<td>Mobile no: 0717261834</td>
<td>Immediate neighbour</td>
<td></td>
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<tr>
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<td>Hassan Ali</td>
<td></td>
<td>Immediate neighbour</td>
<td></td>
</tr>
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<td>Diba Molu Sora</td>
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<td>300m</td>
<td></td>
</tr>
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<td>Wamo James Jillo</td>
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<td>2Km</td>
<td></td>
</tr>
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<td>500m</td>
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</tr>
<tr>
<td>52</td>
<td>Gumatho Rudere</td>
<td></td>
<td>7Km</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Kabale Galgallo</td>
<td></td>
<td>50m</td>
<td></td>
</tr>
</tbody>
</table>

### Total no. of respondents: 53
- Disabled: 02
- Youth (<35 years): 25
- Middle aged (35-50 years): 15
- Aged (>50 years): 10
- Institutions: 03
- Total men: 38
- Total women: 12
6.0 PUBLIC CONSULTATION

6.1 Overview
The World Bank Safeguards Operational Policy/Bank Procedures (OP/BP 4.01 Environmental Safeguard) requires that public consultations including disclosure of impacts and proposed measures be undertaken. Similarly, the Environment Management & Coordination Act (EMCA) CAP 387 and Environmental (Impact Assessment and Audit) Regulations, 2003 Laws of Kenya provides that the project proponent shall in consultation with NEMA, seek the views of persons who may be affected by the proposed project. Stakeholder engagement helps to provide feedback on the project design by the affected persons. Local communities and stakeholders give their views, inputs and opinions and any significant issue is addressed at the initiation stage.

On the basis of the above requirements, beneficiaries and members of the public affected by the proposed project are consulted to seek their views and opinions regarding the projects before they are implemented. Consultative public participation is therefore an important process in ESIA studies.

Through this process, stakeholders have an opportunity to internalize and contribute to the overall project design by making recommendations and raising concerns. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation of the project. The participants included neighbouring communities, business persons, patients, and government officials. Table 12 above summarizes levels of participation by different categories.

Participants in the consultative meetings and interviews indicated that they could perform various roles and responsibilities in the proposed project implementation which would include among others:

(i) Supporting the project positively by providing constructing ideas concerning it.
(ii) Providing manpower required especially casual labour.
(iii) Ensuring safe interwork with the contractor and cooperating with him.
(iv) Providing food stuffs and beverages to workers.

6.2 Public Meeting
One public consultative meeting was undertaken at the project site on 4th June, 2018 between 11:30AM and 12:30PM. There were 24 participants in the meeting including the area Assistant Chief. The forum was a major avenue for resident communities within Marsabit Town to propose and thereby contribute to improvement of the public hospital. During the meeting, the attendees were provided with information required before the commencement of the proposed project. The minutes were taken and any issues recorded so as to provide appropriate mitigation measures.

6.3 Results of Public Consultation
The consultations were done by use of the consultative meeting, questionnaires, and by visiting various places including schools, children’s homes, and various rural homes. Those consulted were majorly drawn from the far and near, the nearest being an immediate neighbour while the farthest was 15km away. The table shown below provides a summary of comments received from the public as per the copies of questionnaires attached separately for reference. The consultations captured the following groups:-

1. Local residents/elders
2. Local administration
3. The neighbouring community including various vulnerable and marginalized groups (the physically challenged, women, the old, and the youth).
### 6.4 Summary of Public Comments as Per the Questionnaires

**Table 13: Summary of Public Comments as Per the Questionnaires**

<table>
<thead>
<tr>
<th>NAME OF RESPONDENT</th>
<th>COMMENT(S) GIVEN</th>
<th>MITIGATION MEASURES/REMARKS</th>
</tr>
</thead>
</table>
| Missionaries of Charity Mobile no: 0797969981 | • Will lead to job creation.  
• Easy access of health services by the community. | • Priority to be given to local residents for casual jobs.                                 |
| St. Teresa’s Girls’ Boarding Mobile no: 0725560910 | • Will lead to improved health care/laboratory services.  
• Mismanagement of the facilities. | • Proper training of personnel.                                                          |
| Moi Girls’ Sec. Sch. Mobile no: 0722143575 | • Employment for the locals.  
• Enhanced cleanliness of the environment. | • Avoid cutting down trees.  
• Provide PPEs for workers.  
• Educate the community. | |
| Salahadin Shariff | • During construction, job opportunities will be created to the local residents.  
• Will lead to improved healthcare/laboratory services | • The respondent did not identify any negative impact/ no mitigation measures required |
| Bokayo Halake | • Will lead to job creation.  
• Improved service delivery and efficient disease diagnosis.  
• If the drainage system is improperly installed will lead to soil/land contamination.  
• Displacement of soil micro-organisms during construction | • The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site.  
• The contractor will be required to ensure regular inspection of storm water drains to avoid flooding of the site.  
• It's only designated areas for construction that will be excavated. This will ensure minimal soil disturbance |
| Patrick Leadismo | • Improved service delivery and efficient disease diagnosis  
• Destruction of soil structure during construction | • It’s only designated areas for construction that will be excavated. This will ensure minimal soil disturbance. |
| Abdulrataf Ali | • Will improve medical diagnosis to the community.  
• Jobs will be created to the local residents during construction.  
• Waste generation during construction and operation of the laboratory. | • Solid wastes from the laboratory will be segregated and then later transported by NEMA licensed solid collectors for proper disposal during construction and operation phase. |
| Ali Fernandes (Assistant Chief) Mobile No: 0728 861 701 | • Employment creation.  
• Social interaction.  
• Tourist attraction.  
• Economic growth.  
• Health facility improvement. | • Use authorized contractor.  
• Use qualified engineers.  
• Avoid corruption. | |
| Abdikadir Kirja | • Job creation/ employment opportunities  
• Improved health service delivery  
• Land contamination if drainage systems improperly constructed | • The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site |
<p>| Daniel Dida | • Improved service delivery | • The respondent did not identify any negative impact/ no mitigation measures required |
| Abdulsalman Hussein | • Efficient service delivery to the community | • The respondent did not identify any negative impact/ no mitigation measures required |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Recommendations</th>
<th>Negative Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tayba Abass</td>
<td>• Easy accessibility of laboratory services to the community/ locals residing near Marsabit County Hospital</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required</td>
</tr>
<tr>
<td>Mohamad Abdullahi</td>
<td>• Efficient service delivery to the community</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required</td>
</tr>
<tr>
<td>Mohamed Dima</td>
<td>• More business opportunities.</td>
<td>• Put up proper waste disposal measures.</td>
</tr>
<tr>
<td>James Gethiba</td>
<td>• Employment creation.</td>
<td>• Use qualified engineers and avoidance of corruption.</td>
</tr>
<tr>
<td>John Githinji</td>
<td>• Employment creation.</td>
<td>• Use authorized contractor.</td>
</tr>
<tr>
<td>Mohamed Jamal</td>
<td>• Trade expansion.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Abdalla Nanu</td>
<td>• Employment creation.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Huqman Hussein</td>
<td>• Job creation.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Robe Mark Kanchora</td>
<td>• Job creation.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Katu Jarso Yattani</td>
<td>• Town expansion.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Ali Elema Galgallo</td>
<td>• Employment creation.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Esao Alex</td>
<td>• Employment creation.</td>
<td>• Avoid corruption.</td>
</tr>
<tr>
<td>Diko Boru Ele</td>
<td>• More business opportunities.</td>
<td>• Use authorized contractor.</td>
</tr>
<tr>
<td>Hadija Ali Kambapo</td>
<td>• Employment creation.</td>
<td>• Use qualified engineers and avoidance of corruption.</td>
</tr>
<tr>
<td>Dhahabu Wario</td>
<td>• Employment creation.</td>
<td>• Use authorized contractor.</td>
</tr>
</tbody>
</table>

Measures required:
- Use qualified engineers.
- Avoid corruption.
- Use authorized contractor.
<table>
<thead>
<tr>
<th>Name</th>
<th>Mobile No</th>
<th>Economic Development</th>
<th>Social Interaction</th>
<th>Urban Development</th>
<th>Health Facility Improvement</th>
<th>Employment Creation</th>
<th>Trade Expansion</th>
<th>Avoid Corruption</th>
<th>Use Qualified Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kula Salesa Guyo</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Abdullahi AliDida</td>
<td>0711 399 630</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Corruption</td>
<td>Use Qualified Contractors</td>
</tr>
<tr>
<td>Halima Wario</td>
<td>0727 965 346</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Corruption</td>
<td>Skilful people to run the project</td>
</tr>
<tr>
<td>Madina Wari Guyo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proper Training of Personnel</td>
<td></td>
</tr>
<tr>
<td>Fatuma Hassan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Cutting Down Trees</td>
<td>Provide PPEs for Workers</td>
</tr>
<tr>
<td>Hussein Halkano</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Educate the Community</td>
<td></td>
</tr>
<tr>
<td>Halima Jarso Wario</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The Contractor did not identify any negative impact/ no mitigation measures required</td>
<td></td>
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<tr>
<td>Bothu Eche Badha</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>It's only designated areas for construction that will be excavated. This will ensure minimal soil disturbance</td>
<td></td>
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<tr>
<td>Osman Wario</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Corruption</td>
<td>Use Durable Construction Materials</td>
</tr>
<tr>
<td>Muslim Adan</td>
<td>0718 120 881</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Corruption</td>
<td>Use Durable Construction Materials</td>
</tr>
<tr>
<td>Nasibio Ali Hussein</td>
<td>0702 652 604</td>
<td></td>
<td></td>
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<td>Avoid Corruption</td>
<td>Use Durable Construction Materials</td>
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<tr>
<td>Alineor Golicha</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Avoid Corruption</td>
<td>Use Durable Construction Materials</td>
</tr>
</tbody>
</table>

- Social interaction.
- Tourist attraction.
- Economic growth.
- Health facility improvement.

- Use qualified engineers.
- Avoid corruption.

- Avoid corruption.
- Use qualified contractors.

- Avoid corruption.
- Use qualified contractors.

- Avoid corruption.
- Skilful people to run the project.

- Proper training of personnel.

- Avoid cutting down trees.
- Provide PPEs for workers.
- Educate the community.

- The respondent did not identify any negative impact/ no mitigation measures required

- It's only designated areas for construction that will be excavated. This will ensure minimal soil disturbance

- Avoid corruption.
- Use durable construction materials.

- Avoid corruption.
- Use durable construction materials.

- Avoid corruption.
- Use durable construction materials.
<table>
<thead>
<tr>
<th>Name</th>
<th>Mobile no.</th>
<th>Will lead to improved health care/laboratory services.</th>
<th>Will lead to job creation</th>
<th>Adhere to permissible noise levels provided under the second schedule of the Environmental Management and Coordination (Noise and excessive Vibration Pollution control) regulation, 2009.</th>
<th>The respondent did not identify any negative impact/ no mitigation measures required.</th>
<th>The respondent did not identify any negative impact/ no mitigation measures required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph Ortoya</td>
<td>0741606462</td>
<td>• Easy access of health services by the community.</td>
<td>• May lead to noise pollution during construction of the laboratory</td>
<td>• During the operation of the laboratory, harmful solid and liquid wastes will be disposed to the environment thus leading to environmental /land pollution.</td>
<td>• Will lead to job creation</td>
<td>• Will lead to job creation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• May lead to noise pollution during construction of the laboratory</td>
<td>• • During the operation of the laboratory, harmful solid and liquid wastes will be disposed to the environment thus leading to environmental /land pollution.</td>
<td>• Adhere to permissible noise levels provided under the second schedule of the Environmental Management and Coordination (Noise and excessive Vibration Pollution control) regulation, 2009.</td>
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<td>• Adhere to permissible noise levels provided under the second schedule of the Environmental Management and Coordination (Noise and excessive Vibration Pollution control) regulation, 2009.</td>
</tr>
<tr>
<td>James L. Lekaras</td>
<td>0704346806</td>
<td>• Will lead to improved health care/laboratory services.</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• Will lead to improved health care/laboratory services</td>
<td>• Will lead to improved health care/laboratory services</td>
</tr>
<tr>
<td>Guyo J. Gaya</td>
<td>0726159690</td>
<td>• During construction, job opportunities will be created to the local residents</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• During construction, job opportunities will be created to the local residents</td>
<td>• During construction, job opportunities will be created to the local residents</td>
</tr>
<tr>
<td>Yusuf Wario</td>
<td>0707762474</td>
<td>• During construction, job opportunities will be created to the local residents</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• The respondent did not identify any negative impact/ no mitigation measures required.</td>
<td>• Will lead to improved health care/laboratory services</td>
<td>• Will lead to improved health care/laboratory services</td>
</tr>
<tr>
<td>Amos W. Guyo</td>
<td>0717261834</td>
<td>• Will lead to job creation</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
<td>• Displacement of soil micro-organisms during construction</td>
<td>• Displacement of soil micro-organisms during construction</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
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<tr>
<td></td>
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<td>• Displacement of soil micro-organisms during construction</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
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<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
</tr>
<tr>
<td>Hassan Ali</td>
<td></td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• It’s only designated areas for construction that will be excavated. This will ensure minimal soil disturbance</td>
<td>• It’s only designated areas for construction that will be excavated. This will ensure minimal soil disturbance</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
<td>• Improved service delivery and efficient disease diagnosis</td>
</tr>
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<td>• Displacement of soil micro-organisms during construction</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• It’s only designated areas for construction that will be excavated. This will ensure minimal soil disturbance</td>
<td>• It’s only designated areas for construction that will be excavated. This will ensure minimal soil disturbance</td>
</tr>
<tr>
<td>Diba Molu Sora</td>
<td></td>
<td>• will improve medical diagnosis to the community</td>
<td>• Solid wastes from the laboratory will be segregated and then later transported by NEMA licensed solid collectors for proper disposal during construction and operation phase.</td>
<td>• Solid wastes from the laboratory will be segregated and then later transported by NEMA licensed solid collectors for proper disposal during construction and operation phase.</td>
<td>• Jobs will be created to the local residents during construction</td>
<td>• Jobs will be created to the local residents during construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Jobs will be created to the local residents during construction</td>
<td>• Waste generation during construction and operation of the laboratory.</td>
<td>• Waste generation during construction and operation of the laboratory.</td>
<td>• Waste generation during construction and operation of the laboratory.</td>
<td>• Waste generation during construction and operation of the laboratory.</td>
</tr>
<tr>
<td>Wamo James Jillo</td>
<td></td>
<td>• will improve medical diagnosis to the community</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
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<td>• If the drainage system is improperly installed will lead to soil/land contamination</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
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<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
</tr>
<tr>
<td>Francis Huka</td>
<td></td>
<td>• Job creation/ employment opportunities</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• Improved health service delivery</td>
<td>• Improved health service delivery</td>
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<tr>
<td></td>
<td></td>
<td>• Improved health service delivery</td>
<td>• Land contamination if drainage systems</td>
<td>• Land contamination if drainage systems</td>
<td>• Land contamination if drainage systems</td>
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<td></td>
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<td>• Land contamination if drainage systems</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
<td>• The contractor should ensure that the drainage systems are properly constructed to reduce flooding on the site</td>
</tr>
<tr>
<td>Name</td>
<td>Improperly constructed issues</td>
<td>Site</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fugicha Guyo</td>
<td>- Improved service delivery</td>
<td>- The respondent did not identify any negative impact/ no mitigation measures required</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BekoAiliaBeko</td>
<td>- Efficient service delivery to the community</td>
<td>- The respondent did not identify any negative impact/ no mitigation measures required</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hussein Boru</td>
<td>- Easy accessibility of laboratory services to the community/ locals residing near Marsabit County Hospital</td>
<td>- The respondent did not identify any negative impact/ no mitigation measures required</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gumatho Rudere</td>
<td>- Easy accessibility of laboratory services to the community/ locals residing near Marsabit County Hospital, Job creation/ employment opportunities to the local residents</td>
<td>- The respondent did not identify any negative impact/ no mitigation measures required</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Kabale Galgallo</td>
<td>- Efficient service delivery to the community</td>
<td>- The respondent did not identify any negative impact/ no mitigation measures required</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**6.5 Conclusion**

In summary, a few issues raised by the respondents include:
- Noise pollution during construction,
- Environmental pollution due to poor liquid waste management from the laboratory during operation phase,
- Increased waste generation.

These and other issues raised in Table 13: Summary of Public Comments as Per the Questionnaires including those raised by the ESIA team are adequately addressed in chapter 7.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES.
7.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

7.1 INTRODUCTION
The proposed project will be handling hazardous wastes through incineration. It is therefore expected that there are potential emission of various gases and particulate matter into the atmosphere, depositions of particulate matter onto land and vegetation in the surrounding and discharge of effluent and contaminated runoff into open drains around the premises. This scenario implies potential linkages with the surrounding environment and ecological setting that require to be addressed during the construction and upon commissioning. The following sections outline these linkages as well as proposed corrective measures.

7.2 POSITIVE IMPACTS
The proposed project has an overall positive implication to the hospital and the country at large. The benefits include:

i. The lab will help in detecting or diagnosing of diseases to ensure timely treatment and prevention.

ii. The incinerator will be used in mopping up of hazardous and toxic materials that may be generated in the hospital and not exposing them to the external environment.

iii. The incinerator will also ensure proper handling and disposal of all hazardous waste generated within the hospital, which could be dumped into public garbage disposal sites, or water bodies and end up having greater negative implications on human health.

iv. The facility will provide a multiple of direct and indirect employment opportunities within the area.

v. The facility is a blueprint of Kenya’s vision 2030 aimed at having a clean and healthy environment for all.

vi. There will be incremental facilities at the hospital.

The proposed project will also have the following positive socio-economic impacts:

i. The proposed development will positively impact the health of Kenyans through provision of high quality laboratory testing and specialized care for people with high risk communicable diseases.

ii. Operation of the facilities will create additional long-term technical and non-technical job opportunities for medical professionals and other non-medical professionals.

iii. The proposed project will contribute towards increase in revenue collection by the central and county governments.

iv. The proposed project will be connected to the existing public utilities hence will generate revenue to the water and power companies through payment of connection and service fees.

v. Apart from the direct employment of construction and operation workers, the proposed project will also benefit the following categories of individuals:

 Transporters: Investors on lorry and trailer transport will benefit greatly from the project. This benefit will extend to vehicle dealers, manufacturers and lorry drivers.

Sand Harvesters: Locals involved in sand harvesting in nearby areas are to be major beneficiaries of the project. The benefits will extend to the county government entitled to levy taxes on sand transporters.
**Ballast Quarries:** There will be massive use of ballast. This will ensure that the quarry owners and workers benefit greatly.

**Cement Manufacturers:** The local cement manufacturers, their employees and shareholders are direct beneficiaries of the development. The government will also get some impressive increase in V.A.T. and other taxes levied on cement.

**Manufacturers and dealers of other building materials:** Most of the building materials to be used are locally manufactured. Relevant companies, their workers and shareholders will be direct beneficiaries of the development.

### 7.3 ANTICIPATED NEGATIVE IMPACTS AND MITIGATION MEASURES

#### 7.3.1 Construction phase

**7.3.1.1 Air Quality**

There will be minimal production of particulate matter during the project execution. This is because; the proposed construction and installation will be within an already operational hospital. The construction of the hospital was commenced after appropriate approvals were obtained from the Government of Kenya.

The main impacts of the dusty conditions are:

i. Aesthetic and visual problems, though there are no notable settlements within the vicinity of the site,

ii. Potential risks of health (mainly bronchial infections) though there are no notable inhabitants in the immediate neighborhood,

iii. Deposition of dust on vegetation hampering development of the same,

iv. Air pollution aspects including contribution towards climate change.

**7.3.1.2 Noise**

✓ Potential disturbance to premises around the project site,

✓ Noise and vibrations caused by heavy construction machinery could potentially cause noise to buildings around the site,

✓ Non-compliance with the elevated noise and vibrations regulations is a likely health risk to the neighborhood.

✓ Non-observance with the occupational health and safety to the construction workers e.g. use of noise prevention PPEs.

**7.3.1.3 Land Degradation and Soil Loss**

✓ Removal of top soils at material sites (normally rich in nutrients and organic matter) and vegetation cover to give way to appropriate project foundation.

✓ Exposing of land to erosion agents (mainly runoff).

✓ Land degradation at construction material sites (sand, quarry chips, stone quarries) and construction camps from pollutant deposition and top soil disruption.

**7.3.1.4 Health and Safety**

The main concern in this regard is the occupational welfare of the construction workers from the effects of dust and emissions coming from the machineries. There are also potential physical risks from moving machinery, falling from high places especially during installations on heights like
chimneys as well as personal injuries from objects around the construction site. There will also be potential impacts as a result of working at heights, working on electricity circuits, and traffic accidents. Other health and safety concerns include:

- Potential health risks from sanitation and hygiene at the construction site,
- Potential increase on cases of other communicable diseases (STIs, TB, etc.),
- Public health problems associated with dust emissions (eye problems, bronchitis, etc.),
- Generation of dust and gaseous emissions from machinery could have potential implications to public health.
- Possible health risks from elevated noise levels.
- Potential risks to safety from existing trucks transporting construction materials to the site.
- Leaving un-rehabilitated material sites (borrow pits, and quarry sites) hence creation of accident prone areas and breeding sites for waterborne organisms.

7.3.1.5 Topography and Physiology

- Aesthetic changes to areas in immediate neighborhood of materials sites (sand and stone quarry sites),

7.3.1.6 Social Impacts

Anticipated social impacts would be related to gaseous emissions and generation of dust and noise from the construction site. Labor influx to the construction site will lead to increased demand and prices over social services and rental houses. This will also lead to increased demand on local resources especially water leading to social conflicts. It will also lead to social related infections associated with interactions including HIV/AIDS and other communicable diseases. It should be noted that the proposed projects will be located within Marsabit County Referral Hospital which is a public health facility. The hospital is located on public land. Therefore, issues associated with land acquisition do not apply to this project. Others include:

- Potential risks to safety of the intruders on project site.
- Dust emissions with potential effects to public health during transportation of building materials to site.
- Potential conflicts on employment opportunities may arise between the contractor and the local community.
- Accidents and death.
- Transmission of sexually transmitted diseases and HIV/AIDS.
- Gender-based violence (GBV) and sexual exploitation and abuse (SEA).
- Conflicts between immigrants and local residents.

7.3.1.7 Construction Materials

Various construction materials are required for execution of the various respective activities. There is a possibility of sourcing for construction materials of poor quality. The source of building materials including stones and quarry chips would create quarry sites and borrow pits. Sources of sand mainly outside the project area have potential risks to damage the sources.

7.3.1.8 Environmental Liabilities

Any identified environmental liabilities within Marsabit County Referral Hospital is likely to cause safety issues. The MOH can take advantage of the proposed project to mitigate against it.
7.3.1.9 Chance Finds Procedure
A chance find procedure is a project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered. In situations where chance find procedure is not analyzed, the proponent is at risk of losing cultural heritage.

7.3.1.10 Grievance Redress Mechanism (GRM)
During the construction phase, different people may be aggrieved on issues pertaining to undertaking of the proposed project. If such issues are not addressed properly, they may hinder the development of the proposed project.

7.3.2 Construction Phase Mitigation Measures
✓ 7.3.2.1 Air Quality
Ensure constant watering of construction sections and dry materials piles to keep dust low throughout the project areas,
✓ Similar measures will be necessary at the material sites as well as the access road for the delivery trucks,
✓ Maintain construction machinery and vehicles at reasonable state of service to minimize unnecessary exhaust emission into the atmosphere.

7.3.2.2 Noise
✓ Inform the neighboring communities including those within the hospital of any un-usual construction activities with extraordinary noise levels such as to include timing, expected duration and any safety precautions required,
✓ Utilize low noise machinery for the construction to the extent possible (Noise levels to be below 35dBA to the nearest receptors by day).
✓ Provide all construction workers with relevant safety gear including ear corks at all times while at work and enforce application.

7.3.2.3 Social Impacts
i) The foreign labor to embrace local culture.
ii) Minimum resource requirements for the local communities to be maintained.
iii) Ensure at least 60% of the casual employment is drawn from the local communities,
iv) Consult with neighborhoods on activities affecting them and collaborate mitigation;
v) Ensure effective signage and information to road users when transporting materials;
vi) The contractor to establish and manage initiatives on social mitigation measures.
vi) Incorporate HIV/AIDS and communicable diseases control program as part of the construction deliverables.
viii) Enforce occupational health, safety and hazard control on site
ix) Inform local communities of major activities in advance
x) Screen the health of potential workers for communicable diseases as part of the recruitment process.
xii) Undertake background checks of potential workers about any past involvement in any offenses.
xii) Provide the workforce with access to primary healthcare on site, including prescriptions, prophylactics, condoms and basic testing for TB etc.
xiii) Provide awareness training to the workforce, in particular regarding the transmission of STDs, and traffic safety awareness,
xiv) Develop and enforce a strict code of conduct for workers to regulate behavior in the local communities,
xv) Prepare local communities for any large influx of workers by developing community-policing systems.

xvi) Establish a functional grievance redress mechanism (GRM) on site as shown below:

7.3.2.4 Grievance Redress Mechanism

The Grievance Redress Committee (GRC)

The GRC is an institution by which queries or clarifications about the project will be responded to, problems with implementation, resolved and, complaints and grievances addressed efficiently and effectively. The GRC will address various issues ranging from any or combination of the following forms: compensation if any, political, commercial, employment, health, social and space availability. The GRC is composed of representatives from the following:

(i) National government
(ii) County government
(iii) Ministry of Health
(vi) Contractor
(vii) Supervising Engineer

The roles of the GRC are as follows:

(i) Enhance stakeholder participation during the project implementation;
(ii) Solicit inquiries and suggestions that can be used to improve operational performance;
(iii) To enhance the project’s legitimacy among stakeholders;
(iv) Mitigate project risks;
(v) Promote transparency and accountability;
(vi) Screen and refer the complaints where necessary;
(vii) Maintain grievance-related documents, reports, and attendance registers;
(viii) Undertake field inspections and;
(ix) Provide feedback to affected persons and agencies involved in grievances.

7.3.2.5 Health and Safety

i) Incorporate HIV/AIDS control program as part of the construction deliverables

ii) Provide acceptable sanitation facilities in all work areas,

iii) Ensure driving discipline among the drivers and other construction workers with respect to the public safety.

iv) Ensure Occupational Health and Safety (OHS) requirements are observed at all times during the construction.

v) Provision of fire extinguishers to fuel storage areas.

7.3.2.6 Construction Materials

Construction materials should be of the appropriate quality, specifications and standards. This can be ensured through:

i) Should be sourced from licensed dealers and suppliers who are compliant especially with environmental requirements. Quality should be thoroughly controlled through regular tests.

ii) Procurement of the materials should follow specifications by the structural engineers and architects.

iii) All construction materials’ waste must be removed from the site and disposed of as per local regulations.
iv) All construction materials/equipment should be removed from the site.

v) Construction camps and materials sites be restored back to their original conditions upon project completion. Any borrow pits/quarries created as a result of the proposed project should be restored as per NEMA regulations. An ESIA for decommissioning of project site and quarries and borrow pits created should be done and submitted to NEMA for approval.

vi) The contractor should review the site management plan such as to cover the operations and restoration (site decommissioning) upon project completion.

vii) Landscaping of project site and introducing vegetation that match with the buildings.

viii) Ensure compliance with established sand harvesting regulations.

ix) If sand is obtained through independent suppliers, the contractor to ensure due diligence on abstraction and haulage.

7.3.2.7 Land Degradation and Soil Loss

✓ The project will utilize the existing materials sites to the extent possible and comply with the NEMA conditions issued thereof.
✓ This will also apply to the existing construction camp sites.
✓ Construction wastes (including spoil earth, oils/grease, vegetation and other materials) be disposed of in approved dumping areas by the Marsabit County Government.
✓ Construction camps and materials sites be restored back to their original conditions upon project completion.

7.3.2.8 Topography and Physiology

✓ Material sites should be rehabilitated and restored to near the original status as soon as they are exhausted to restore the micro-topographical outlook,
✓ The cut sections to be done such as not to lose compatibility with the adjoining land areas,
✓ The proposed project to blend with the surroundings to the extent possible (project to engage a landscape/aesthetic architect to minimize visual disruption).

7.3.2.9 Environmental Liabilities

✓ The MOH shall take advantage of the proposed project to clear any environmental liability identified with the hospital.

7.3.2.10 Chance Finds Procedure

✓ According to the World Bank's Performance Standard, the MOH shall be responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage. In such cases, the MOH shall develop provisions for managing chance finds through a chance find procedure which shall be applied in the event that cultural heritage is subsequently discovered.
✓ The MOH shall not disturb any chance find further until an assessment by competent professionals is made and actions are identified.

7.3.3 Operation Phase

It should be noted that the proposed project will be done in an already existing hospital and therefore not much will change as pertains to the operation phase of the proposed project. However, as usual for any proposed project, the following impacts are inevitable:

7.3.3.1 Air Quality

Major potential point sources of particulate matter (chemical residuals and smoke) and gaseous emissions in and around the proposed premises are expected to be as follows;
i. The incineration will involve burning hazardous at very high temperatures (between 800°C – 1,500°C). Particulate matter will comprise of ashes and flue gases from the burning process and smoke as a combustion product. Other emissions from this point is hydrocarbon residuals, carbon dioxide, carbon oxide, nitrogen oxides and Sulphur oxides from fuels and related combustion processes,

ii. Overall, it is estimated that the smoke of opacity within the premises could be slightly more than the 20% opacity level recommended by the European Union, though there are no matching standards in the country.

Impacts associated with the above air pollution would include;

i. Health effects mainly bronchial infections, skin problems, visibility, etc. This is likely to affect the employees and the immediate residents and communities (at the moment there are no inhabitants in the immediate neighborhood),

ii. Soil quality degradation that may result from deposition of pollutants from the plant operations or carried to other areas through surface runoff,

iii. Pollution of water sources through direct deposition, surface runoff and/or infiltration into groundwater aquifers,

iv. Emissions of acetylene gas into the air have a potential to cause fire in the premises with far reaching implications on the neighboring land users.

7.3.3.2 Noise Levels
The proposed project operations are likely to generate some little amounts of noise levels from pumping of waste oil and sludge from the sludge tank to the incinerator. This situation is likely to have occupational health and safety implications as well as effects to the workers. Currently, there are no settlements or other businesses in the immediate neighborhood, but any such future land use may imply that noise levels be maintained at the recommended levels of 45dBA at the residential areas during the night and 45dBA during the day with an occupational noise levels of 75dBA.

7.3.3.3 Environmental Pollution
The key environmental pollution anticipated from the site activities includes the following;

i. Deposition of emitted particulate matter and dust on land affects the soil quality and the effect could also compromise on the integrity of water sources (both the surface and ground aquifers). The area is generally dry and accumulation of pollutants on soil provide heavy pollution loads in storm water and consequently surface water sources,

ii. Deposition of particulate matter as well as the fly ash from the incinerator kilns could be undesirable for disposal onto open land. One reason is because the flash is an atmospheric pollutant and deposition could be an aesthetic nuisance,

iii. Aerial emissions are perhaps the worst feature of an incineration activity. Hydrocarbons, nitrogen oxides, sulphur oxides and flue gas are among contaminants anticipated into the air with significant implications to the residents and commercial activities on the windward direction,

iv. Disposal of inert solid waste from the premises could become an extended environmental problem that would affect physical environmental quality, biodiversity and public health at points of disposal. Such waste including fly ash, drums, scrap metals and kiln tiles are notable potential waste requiring planned disposal strategy.
7.3.3.4 Health and Safety
The health of the workers and clients varies from one section to another as outlined below;

i. Health risks are found in the management of the hazardous waste holding areas, the transfer routes and preparation procedures. The risks including exposing the workers to a wide range of chemical poisoning, toxicity or long-term health complications. The neighborhood could also be affected through wind or surface runoff transferring contaminants from the waste holding areas to the external environment. Waste oil and sludge is pumped into the sludge tank, then will be moved to the incinerator through a pipework connection hence such risks will be minimal.

ii. Combustion areas are the most critical sections in respect of health and safety. The kilns emit fumes and particulate matter originating from the wastes burning exposing the workers directly handling the same as well as others working elsewhere within the same premises. The affected workers are exposed through inhalation, skin and to some extent ingestion. Emissions from the kilns is also likely to reach external recipients through stacks if not well designed and managed.

iii. Heat is also a serious impact to the employees operating the kilns since they are likely to be open. The general ambient heat around the entire premises is also likely to be relatively high extending the risk to more workers.

iv. Personal accidents and risks of getting injured by falling objects to the workers and visitors while moving around the premises cannot be ignored. Heavy, corrosive and hot objects are among potential risks to safety anticipated in the proposed premises.

v. There are risks of fire outbreaks from kilns, oil and fuel storage areas posing potential danger to not only the site, but also the neighboring land users.

7.3.3.5 Pathogen Release
Risk of healthcare-acquired infections (HCAI) is omnipresent in healthcare facilities worldwide, and understanding transmission routes is key to effective control. While the transmission routes for some diseases are well documented, the precise mode of transmission is uncertain for many infections, particularly for those pathogens that cause HCAI. Although it is probable that the majority of transmission occurs via a contact route (Sax et al., 2009), there is increasing recognition that the hospital environment plays an important role.

Evidence suggests that at least 20% of HCAIs potentially could have arisen from an environmental reservoir (Harbarth et al., 2003) and several recent studies have highlighted the importance of surface contamination and indicated a causal link to subsequent patient infection (Bhalla et al., 2004a).

7.3.4 Operational Phase Mitigation Measures
7.3.4.1 Hazardous Wastewater Management
The following are basic aspects for inclusion in the site design and the wastewater handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations Legal Notice No. 120 of September 2006.

Since Marsabit town is not served by a public sewer line, Marsabit County Referral Hospital makes use of the septic tank system for wastewater management. Sewage from the proposed facilities will be discharged through the septic tank system at the hospital. The septic tank system at the hospital has enough capacity to handle the quality and quantity of effluents from the proposed facilities. The full capacity of the septic tank system is 67,500 Litres. Any wastewater containing hazardous chemicals at the hospital e.g. expired reagents is confined, recorded, and incinerated while the non-hazardous wastewater is left to freely move into the septic tank system. Reference shall be made to
Annex 3: Standards for Effluent Discharge into the Environment and Annex 5: Effluent Levels for Health Care Facilities to ensure the effluent discharges from the proposed facilities meet the required limits. Regular monitoring of the wastewater from the proposed facilities shall be done to ensure the quality standards of discharge of effluents into the septic tank system are met.

I. Maintain appropriate records on wastewater quality for compliance evaluation and comparison with the gazetted standards on a continuous basis. Reference shall be made to Annex 3: Standards for Effluent Discharge into the Environment and Annex 5: Effluent Levels for Health Care Facilities to ensure the effluent discharges meet the required limits.

II. Oil storage areas should be provided with slabs with surrounding bunds to contain any spilt oils.

7.3.4.2 Hazardous Solid Waste Management
Handling of solid wastes at the site will require the following components and handled in compliance with the Environmental Management and Coordination (Waste Management) Regulations Legal Notice No. 121 of September 2006;

i. The waste slab should be provided with compartments for segregation of various categories of waste classified on source and physical nature that should also be handled separately,

ii. Provide solid waste holding bins at strategic locations around the premises and install transfer stations and modalities of waste removal to approved dumping grounds. Hazardous materials should be handled through incineration,

iii. Fly ash and other incineration residuals shall be disposed of in landfills or other NEMA approved dumping grounds in conjunction with the County Government of Marsabit.

iv. Oils and grease from moving machine parts and other sources should be handled as hazardous wastes in accordance with the waste regulations,

v. At the Marsabit County Referral Hospital, there is an existing Health Care Waste Management Plan (HCWMP) currently being implemented with an internal Standard Operating Procedures. The HCWMP is geared towards realization of a proper health care waste within Marsabit County Referral Hospital i.e. from waste generation to the final treatment point. Please find attached the HCWMP. This Plan or System takes into account the next components during operation and maintenance: a) Waste Minimization, Reuse, and Recycling; b) Waste Segregation Strategies; c) On-site Handling, Collection, Transport and Storage; d) Transport to External Facilities; and e) Treatment and Disposal Options.

This HCWMP shall be implemented during the operation phase. The HCWMP implementation shall identify the responsible department at the hospital, resources required, and the personnel training required.

7.3.4.3 Aerial Emissions
Gaseous and particulate matter is perhaps the most critical environmental aspect associated with the proposed operations. The following measures should be considered to reduce the elated impacts:

i. Hazardous wastes holding yards require to be kept moist at all times to prevent dust emission into the atmosphere and the windward side of the site during in-house movement or just in storage.

ii. The kilns should be designed with provisions of flue gas trapping, smoke interception and stacks fitted with scrubbers (for gases) and filters for particulate matter removal.

iii. The flue gases shall be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere.

iv. A permanent and regular air quality monitoring is necessary. Reference should be made to Annex 6: Air Emission Levels for Hospital Waste Incineration Facilities.
v. Seek NEMA’s permit for installation and operation of incinerator and an emission license according to the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the Environmental Management and Coordination (Air Quality) Regulations, 2014 Laws of Kenya respectively. This will ensure annual monitoring of the air quality.

vi. The incinerator should be operated and maintained by trained employees to ensure proper combustion temperature, time, and turbulence specifications necessary for adequate combustion of waste.

vii. Pollution prevention and control measures including application of waste segregation and selection including removal of: a) halogenated plastics (PVC), pressurized gas containers, large amounts of active chemical waste, silver salts and photographic / radiographic waste, waste with high heavy metal content (e.g. broken thermometers, batteries), and sealed ampoules or ampoules containing heavy metals.

7.3.4.4 Health and Safety
Attention should also be on the health and safety of the workers, visitors, customers and neighboring community such as to include;

i. All moving machine parts and high temperature areas should be fitted with guardrails and restrict access,

ii. Provide all employees with personal protective gear and enforce application at all times within the place of work,

iii. Workers operating within the high temperature zones (e.g. melting, rolling mills and galvanizing plant should not exceed 2hrs continuous presence or/as may be directed by the Occupational Health and Safety Experts,

iv. Segregate scrap materials on sources basis and devise safe modes of handling each category with particular focus on those likely to be hazardous/toxic.

v. Training and induction of all employees and visitors on site to enhance safety.

7.3.4.5 Pathogen Release
To prevent pathogen release, the following measures are necessary:

- Exposures from pathogen release leading to laboratory-acquired infections and to release outside the community i.e. those leading to community-acquired infections will require the presence of a sophisticated occupational medicine program to assess and manage potential exposures as varied as needle sticks and fomite and aerosol exposures. This may include hospitalization, isolation, and critical care of infected people and quarantine of contacts.

- Surface hygiene in the laboratory should be key.
  Hand hygiene especially use of hand gloves reduces pathogen exposure.
8.0 ANALYSIS OF PROJECT ALTERNATIVES
This section analyses the projects alternatives in terms of site, technology scale and waste management options.

8.1 Alternative site
The proposed project site has been chosen after consideration of a number of factors including water supply, electric connection and proximity to other facilities that undertake similar or related functions within the hospital.
The incinerator and the bio safety laboratory will be located within the same site to enable ease of transportation of healthcare waste from the bio safety lab to the incinerator and to reduce the risk of spread of pathogens from the laboratory to other facilities within the hospital.
Thus, the proposed site was best suited for undertaking the development.

8.2 Analysis of Alternatives to Incineration
8.2.1 Open uncontrolled, non-engineered dump sites
i. Open dumps are probably the most common land disposal method in developing countries, Kenya included.
ii. Untreated waste discharged into an uncontrolled, non-engineered, open dump does not protect the local environment and should not be used. Discharging waste in open dumps either within the healthcare institutions or in the municipal facilities is insufficient solution and leads to environmental pollution.
iii. As a last resort where other methods of disposal are not available the healthcare waste if disposed of on open dump must be covered immediately with inert material such as soil.

This method could not be considered because it does not protect the environment.

8.2.2 Sanitary landfill
i. Properly constructed and operated land fill sites offer a relatively safe disposal route for municipal solid waste including healthcare wastes.
ii. The priority is protection of the water aquifers and each day’s waste is compacted and covered with soil to maintain sanitary conditions.
iii. Treated healthcare waste can be safely disposed of in sanitary landfill site without any problems.

This method could not also be considered because it requires a larger space for compaction of each day’s waste.

8.2.3 Incineration
i. Incineration is a high-temperature dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and result in very significant reduction of waste volume and weight.
ii. This process is usually selected to treat waste that cannot be recycled, reused or disposed of in sanitary landfill.

Medium temperature incineration
i. In many developing countries, Kenya included, there are no high temperature double chamber incinerators designed to handle hazardous waste. Such incinerators meet strict emission control standards such as those set by the European Union.
ii. All types of incinerators if operated properly eliminate pathogens from the waste and reduce waste to ashes.
iii. However certain types of healthcare waste e.g. pharmaceutical waste or chemical waste require higher temperatures for complete destruction. Higher operating temperatures and cleaning of exhaust gases limit the atmospheric pollution and odors produced by the incineration process.

**Advantages of incineration include:**
- Accept the greatest variety of waste,
- Treated waste is unrecognizable as ash,
- Significant volume reduction,
- Energy recovery,
- Waste totally sterilized.
- Trained personnel readily available,
- Existing guidelines in place,
- Cheaper to install and maintain compared to other methods like autoclaves.

**Disadvantages include:**
- Acid gases in air emissions,
- Heavy metals in ash residues,
- Convert biological problem into potential air quality emission problems,
- Major source of dioxin and furan emissions.

Because of the many advantages of incinerators including that they accept the greatest variety of waste, significant volume is reduced, trained personnel are readily available and that they are cheaper to install and maintain, this method is highly considered provided the mitigation measures provided in this ESIA report are considered.

**8.2.4 Crude burning**
i. Burning healthcare waste at low temperatures in the open should be discouraged because this may release toxic pollutants into the air. This method is highly discouraged and the proponent could not even try to consider it.

**8.2.5 Microwaving**
Microwave technology of clinical waste in the healthcare waste sector is considered an alternative technology of the incinerator and is a steam-based process, and electromagnetic waves with frequencies between radio and infrared waves that use wet inside the wastes or by additional steam to sterilize wastes and destroy infectious agents and pathogenic organisms in the waste. So it includes the use of high-intensity radiation to heat the moisture inside the waste. The types of waste generally treated in microwave systems are equal to those treated in autoclaves.

**Advantages of Microwaving include:**
- Technology is easy,
- Reduce volume by 80%,
- Environmentally sound,
- No liquid effluents,
- The emissions are minimal

**Disadvantages include:**
- Cost is very high,
- Not suitable for all types of wastes,
- The shredder used is noisy,
- Offensive odors

The proponent did not consider this technology given that it is not suitable for all types of waste.
8.2.6 Autoclaves
An autoclave consists of a metal chamber sealed by a charging door and surrounded by a steam jacket. Steam is introduced into both the outside jacket and the inside chamber which is designed to withstand elevated pressures. Heating the outside jacket reduces condensation in the inside chamber wall and allows the use of steam at lower temperatures. Because air is an effective insulator, the removal of air from the chamber is essential to ensure penetration of heat into the waste. This is done in two general ways: gravity displacement or pre-vacuuming. A gravity-displacement (or downward-displacement) autoclave takes advantage of the fact that steam is lighter than air; steam is introduced under pressure into the chamber, forcing the air downward into an outlet port or drain line in the lower part of the chamber.

Advantages of Autoclaves:
✓ Steam treatment is a proven technology with a long and successful track record,
✓ The technology is easily understood and readily accepted by hospital staff and communities,
✓ It is approved or accepted as an alternative technology in all states,
✓ The time-temperature parameters needed to achieve high levels of disinfection are well-established,
✓ Autoclaves are available in a wide range of sizes, capable of treating from a few pounds to several tons per hour,
✓ If proper precautions are taken to exclude hazardous materials, the emissions from autoclaves and retorts are minimal.
✓ Capital costs are relatively low compared to other non-incineration technologies,
✓ Many autoclave manufacturers offer many features and options such as programmable computer control, tracks and lifts for carts, permanent recording of treatment parameters, autoclavable carts and cart washers, and shredders.

The disadvantages include the following:
✓ The technology does not render waste unrecognizable and does not reduce the volume of treated waste unless a shredder or grinder is added,
✓ Any large, hard metal object in the waste can damage any shredder or grinder,
✓ Offensive odors can be generated but are minimized by proper air handling equipment,
✓ If hazardous chemicals such as formaldehyde, phenol, cytotoxic agents, or mercury are in the waste, these toxic contaminants are released into the air, wastewater, or remain in the waste to contaminate the landfill,
✓ If the technology does not include a way of drying the waste, the resulting treated waste will be heavier that when it was first put in because of condensed steam,
✓ Barriers to direct steam exposure or heat transfer (such as inefficient air evacuation; excessive waste mass; bulky waste materials with low thermal conductivities; or waste loads with multiple bags, air pockets, sealed heat-resistant containers, etc.) may compromise the effectiveness of the system to decontaminate waste. Examples of waste that may need to be collected separately and treated using another technology include evacuated containers and pleurovac machines.

Though modern, this method was found to be too expensive to install and maintain, they are not common, and that they require trained personnel to implement. This, in addition to the above disadvantages rendered the technology not considerable.

8.2.7 Plasma Pyrolysis
Plasma pyrolysis is a modern technology for safe disposal of healthcare waste. Also, it is an environmentally friendly technology that transforms organic waste into useful products, and it is another type of thermal parsing of carbonaceous materials in oxygen. Plasma pyrolysis technology needs two chambers installed so that the primary chamber takes place at a high temperature of 1,100°C and secondary chamber ignition takes place at 950 to 1,000°C. In addition, due to the
severe heat generated by the plasma, it can dispose of all types of waste, including municipal solid waste, biomedical waste, and hazardous waste in a safe and reliable manner.

**Advantages include:**
- Suitable all types of wastes,
- Consumes less space,
- Environmentally sound,
- Not require chimney,
- Toxic residuals are much below,
- Not require segregation,
- Energy recovery,
- Reduce volume more than 99%

**Disadvantages include:**
- Requires technical persons,
- Cost is very expensive.
- They are not common.
- Large initial investment costs relative to that of alternatives, including landfill and incineration.
- Operational costs are high relative to that of incineration.
- Little or even negative net energy production.
- Wet feed stock results in less syngas production and higher energy consumption.
- Frequent maintenance and limited plant availability.

This technology could not be considered because of the high cost involved including other disadvantages highlighted above.

**8.3 The No Action Alternative**

This alternative describes a situation where the proposed development fails to be implemented. In case this happens, positive impacts associated with the proposed development will not accrue to the stakeholders including sick people, the development consultants, contractors and suppliers of materials. However, from an environmental management perspective, the “No action alternative” will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. The “No Action Alternative” should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis.

The no project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from the extreme environmental perspective as it ensures non-interference with the existing conditions. Under no project alternative, the proponent’s proposal would not receive the necessary approval from NEMA, proposed project would not be constructed/installed and there would be no demand for the proposed project. This option will however, involve several losses both to the hospital and the community as a whole. The proponent will not utilize the land for the purpose it was intended for leaving the property to remain idle. The no project option is the least preferred from the socio-economic and partly environmental perspective due to the following factors;
- Discouragement for hospital investments.
- There will be no incinerator and a bio-safety level II Laboratory installation yet there is acute need for such facility within Marsabit County Referral Hospital.
- Land will remain idle.
No employment opportunities will be created for Kenyans bearing in mind that the proposed project will have employment opportunities both directly or indirectly during construction and operations phases and thus improve lifestyles and livelihoods.

- Local skills would remain under-utilized.
- Development of infrastructural facilities (energy facilities, roads, electrical etc. will not be undertaken).
- Vision 2030 will be far from being achieved/attained bearing in mind that this is one of the sector which need infrastructural improvement to gear the nation towards realization of vision 2030.

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

**8.4 Analyses of Alternative Construction Materials and Technology**

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health safety, security and environmental aesthetic requirements. Equipment that save energy and water will be given first priority without compromising on cost or availability factors. Heavy use of timber during construction is discouraged because of massive destruction of forests. The exotic species would be preferred to indigenous species in the construction where need may arise. However, this will require very little timber. The proponent should consider installing solar panels so that solar energy is also used as an alternative.

**8.5 Wastewater (Effluent) Management Alternatives**

Five locally available technologies are discussed below:

i. **Waste water treatment plant:** This involves the construction of a plant and use of chemicals to treat the effluents to locally accepted environmental standards before it is discharged into the environment. Wastewater discharge will increase because of the proposed project. From the analysis, a wastewater treatment plant can be appropriate for the proposed project.

ii. **Use of stabilization ponds/lagoons:** This refers to the use of a series of ponds/lagoons that allow several biological processes to take place, before the water is released back to the river. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds. This option is not preferable in the area because the required space is not only available, and the surrounding community is not likely to accept the option.

iii. **Use of Constructed/Artificial wetland:** This is one of the powerful tools/methods used in raising the quality of life and health standards of local communities in developing countries. Constructed wetland plants act as filters for toxins. The advantages of the system are the simple technology, low capital and maintenance costs required. However they require space and a longer time to function. Long-term studies on plant species on the site will also be required to avoid weed biological behavioral problems. Hence it is not the best alternative for this kind of project.
iv. Use of septic tanks: This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is expensive to construct and requires regular emptying. Septic tanks if not well constructed and monitored can lead to blockages and leaks to the underground water. Currently, this is the best alternative since the area is not served with a public sewer system which is more efficient for use in effluent management. The proponent intends to use the existing septic tank system in management of effluents from the proposed project. The wastewater from the hospital is handled through a septic tank system which has enough capacity to handle effluent from the proposed project. However, monitoring shall be done regularly to ensure the discharge into the septic tank system meets the required standards. Reference shall be made to Annex 3: Standards for Effluent Discharge into the Environment and Annex 5: Effluent Levels for Health Care Facilities.

v. Connection to the existing sewer system: Connection to a sewer line would solve the effluent management issue at a very minimal cost and in environmentally efficient manner. However, the proposed site is not covered with a sewer line hence connection to sewer line is not an alternative.

8.6 Solid Waste Management
The proposed project will generate considerable amounts of solid wastes both during construction and operational phases. An integrated solid waste management system is recommended. The proponent will give priority to reduction of the materials at source. This option will demand a solid waste management awareness program in to be effected by the management and the entire workforce. In addition to that, recycling, reuse and composting of waste will be an alternative in priority. This issue calls for a source separation program to be put in place-the proponent/hospital management should introduce separate and adequately marked skips/ dustbins for sorting the recyclable wastes, organic matter and the other waste.

The recyclable waste is sold to waste buyers within Marsabit town and surrounding areas, organic matter is sold for use as compost while the rest can be taken to an approved dump-site/ sanitary landfill i.e. ash that will be generated by the incinerator. The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. Finally, sanitary land filling will be the last option for the proponent to consider.

8.7 Comparison of Alternatives
The proposed project is the best alternative since it will provide hazardous waste management facility within the hospital. In addition to this, the facility will lead to revenue for the proponent and the government, improvement in service (hazardous waste) delivery and will create employment opportunities for more people.

According to Maryam, K. G and Rosnah B. M. Y (2015) Advantages and Disadvantages of Healthcare Waste Treatment and Disposal Alternatives, studies on healthcare waste treatment show that among many methods for health care waste treatment, about 59-60% are treated via incineration, 37-20% by steam sterilization, and 4-5% by other treatment technologies. Incineration methods are most used among the technologies for healthcare waste treatment in most countries including Kenya. Therefore, the proponent opted for incineration against the other waste treatment options.
9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS

This environmental and social management plans presents integrated scenarios with the environmental aspects, anticipated impacts during construction and occupation as well as preventive (mitigation) action plans. Other issues covered include the responsibilities, costs implications, timeframes and parameters for monitoring of the trends. The EMP matrix is designed such that it is self-implementing and can be implemented.

9.1 Environmental and Social Management Plan for the Construction and Operation Phases

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Environmental and social Impacts</th>
<th>Mitigation Measures</th>
<th>Estimated cost (Kshs)</th>
<th>Timeframe/Responsibility</th>
<th>Monitoring Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition, construction, and operation phases</td>
<td>• ESMP implementation</td>
<td>• Collaboration between different stakeholders in implementing the ESMP.</td>
<td>5,000,000 annually from demolition to operation.</td>
<td>From demolition to operation by the MOH</td>
<td>The ESMP</td>
</tr>
<tr>
<td>Construction phase</td>
<td>• Fall hazard from high level work</td>
<td>• Provide safety harnesses and scaffolding</td>
<td>100,000</td>
<td>• Before and during construction • Main contractor for civil works</td>
<td>• PPEs' use</td>
</tr>
<tr>
<td>Construction Phase</td>
<td>• Public health, occupational health and safety, and security</td>
<td>• Fence off the site to keep off intruders. • Train staff/workers on occupational health and safety. • Provide full protective gear &amp; workmen's compensation cover in addition to the right tools and operational instructions &amp; manuals during construction. • Ensure use of standard construction materials and to the specifications. Avoid undesirable, substandard, hazardous or unauthorized materials during construction &amp; maintenance. • Sensitize staff on social/health issues such as drugs and HIV/AIDS. • Ensure machinery and equipment servicing and maintenance as per schedules &amp; legal requirements.</td>
<td>700,000</td>
<td>• During construction by the contractor</td>
<td>• Complaints on health, safety, and security aspects • Special focus on material sites and the project site</td>
</tr>
<tr>
<td>Construction Phase</td>
<td>Road safety issues</td>
<td>Enforce speed limits for construction vehicles especially along roads leading to the site even within the hospital.</td>
<td>10,000</td>
<td>During the construction phase by traffic and roads department/transporter s</td>
<td>Speed limits</td>
</tr>
<tr>
<td>Construction phase</td>
<td>Falling objects from high level</td>
<td>Provide helmets</td>
<td>130,000</td>
<td>Before and during construction Main contractor for civil works</td>
<td>PPEs’ use</td>
</tr>
<tr>
<td>Construction phase</td>
<td>Dust</td>
<td>Water the ground before and during excavation</td>
<td>100,000</td>
<td>Before excavation Main contractor for civil works</td>
<td>Construction related dust level within the project; Exhaust fumes from construction machineries.</td>
</tr>
<tr>
<td>Construction phase</td>
<td>Noise</td>
<td>Use of ear protectors (ear plugs/muffs) by workers</td>
<td>80,000</td>
<td>Main contractor to provide the protective</td>
<td>Noise level</td>
</tr>
<tr>
<td>Construction Phase</td>
<td>Mitigation Measures</td>
<td>Estimated cost (Kshs)</td>
<td>Timeframe /Responsibility</td>
<td>Monitoring Parameters</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>---------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
</tbody>
</table>
| Construction phase | • Recondition engine exhaust systems  
• Engine tune-up  
• Establish inspection program for equipment | 120,000 for respirators | • Main contractor to provide the protective gear to the workers  
• Before excavation by main contractor for civil works | • Air quality |
| Construction phase | • Emissions  
• Use of respirators by workers  
• Recondition engine exhaust systems  
• Engine tune-up  
• Establish inspection program for equipment/incinerator | 80,000 | • Main contractor to provide the sanitary facilities to the workers  
• Before excavation by main contractor for civil works | • Particular attention on pollutants from construction site. |
| Construction Phase | • Identified environmental liabilities within the hospital.  
• The proposed project shall be used to clear any environmental liabilities within the hospital. | 100,000 | • During decommissioning after construction phase by the main contractor and the MOH. | • Environmental Liabilities |
| Project Phase | Environmental and social Impact | Mitigation Measures | Estimated cost (Kshs) | Timeframe /Responsibility | Monitoring Parameters |
| Construction phase | • Storage and handling of hazardous materials | • Obtain material safety data sheets for all hazardous materials and products handled at the site  
• Obtain personal protective equipment for the workers responsible for handling hazardous materials  
• Train the workers on safe handling procedures | 140,000 per annum | • Main contractor  
• During construction | • Material Safety Data Sheet |
| Construction phase | • Accumulation of waste oil | • Provide labelled containers for waste oil.  
• Contract licensed firm to collect, transport and dispose of waste oil | 3,000 per drum | • Main contractor  
• During construction | • Particular attention on waste oil |
| Construction phase | • Disposal of waste oil.  
  • Appoint a NEMA licensed contractor to collect waste oil.  
  • 4,000 per month  
  • Main contractor  
  • During construction  
  • Particular attention on waste oil |
| Construction phase | • Spill control  
  • Obtain spill control kits  
  • Train staff on spill control  
  • 70,000 for spill kit and training  
  • During construction  
  • By main contractor  
  • Particular attention on spills |
| Construction and operation phases | • Emergency response  
  • Keep a record of the public emergency service telephone numbers including:  
  ✓ Police  
  ✓ Fire brigade  
  ✓ Ambulance services  
  • Document an emergency response procedure  
  • Train staff on emergency response  
  • 50,000 per group of trainees  
  • During construction and operation of the medical facilities.  
  • Main contractor and proponent  
  • Safety response |
| Construction and operation phases | • Compliance with legal and regulatory requirements  
  • Refer to relevant policy, legal and administrative framework and comply  
  • 20,000  
  • During construction and operation of the medical facilities.  
  • Main contractor and proponent  
  • Legal requirement |
| Construction phase | • Decommissioning after project construction  
  • All waste must be removed from the site and disposed of as per local regulations.  
  • All construction materials/equipment should be removed from the site.  
  • Construction camps and materials sites be restored back to their original conditions upon project completion. Any borrow pits/quarries created as a result of the proposed project should be restored as per NEMA regulations.  
  • Contractor to review the site management plan such as to cover the operations and restoration (site decommissioning) upon project completion.  
  • Landscaping of project site and  
  • 500,000  
  • Immediately after construction and clearing of the medical facilities.  
  • Main contractor and project proponent  
  • Usability of the affected camps’ and material sites.  
  • Sustainability parameters in the rehabilitation plan. |
<table>
<thead>
<tr>
<th>Construction phase</th>
<th>Socio-economic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✓ Labor influx</td>
</tr>
<tr>
<td></td>
<td>✓ Social relationships and contacts during construction;</td>
</tr>
<tr>
<td></td>
<td>✓ Safety issues;</td>
</tr>
<tr>
<td></td>
<td>✓ Social related infections associated with interactions including HIV/AIDS and other communicable diseases</td>
</tr>
</tbody>
</table>

**Sources:**
- Construction machineries;
- Construction campsite;

<table>
<thead>
<tr>
<th>Construction phase</th>
<th>Socio-economic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ensure at least 60% of the casual employment is drawn from the local communities,</td>
</tr>
<tr>
<td></td>
<td>Consult with neighborhoods on activities affecting them and collaborate mitigation;</td>
</tr>
<tr>
<td></td>
<td>Ensure effective signage and information to road users when transporting materials;</td>
</tr>
<tr>
<td></td>
<td>The contractor to establish and manage initiatives on social mitigation measures.</td>
</tr>
<tr>
<td></td>
<td>Incorporate HIV/AIDS and communicable diseases control program as part of the construction deliverables.</td>
</tr>
<tr>
<td></td>
<td>Enforce occupational health, safety and hazard control on site</td>
</tr>
<tr>
<td></td>
<td>Inform local communities of major activities in advance</td>
</tr>
<tr>
<td></td>
<td>Screen the health of potential workers for communicable diseases as part of the recruitment process.</td>
</tr>
<tr>
<td></td>
<td>Undertake background checks of potential workers about any past involvement in any offenses.</td>
</tr>
<tr>
<td></td>
<td>Provide the workforce with access to primary healthcare on site, including prescriptions, prophylactics, condoms and basic testing for TB etc.</td>
</tr>
<tr>
<td></td>
<td>Provide awareness training to the workforce, in particular regarding the transmission of STDs, and traffic safety awareness,</td>
</tr>
<tr>
<td></td>
<td>Develop and enforce a strict code of conduct for workers to regulate behavior in the local communities,</td>
</tr>
<tr>
<td></td>
<td>Prepare local communities for any large influx of workers by</td>
</tr>
</tbody>
</table>

| Sources: | Construction machineries; |
| Sources: | Construction campsite; |

<p>| During construction phase | Trends in socio-economic dynamics. |
| During construction phase | Trends in HIV/AIDS cases in the area. |</p>
<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Environmental and social impact</th>
<th>Mitigation Measures</th>
<th>Estimated cost (Kshs)</th>
<th>Timeframe /Responsibility</th>
<th>Monitoring Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation phase</td>
<td>• Environmental audits</td>
<td>• To be carried out against the environmental and social management plan and the mitigation plan in this report.</td>
<td>120,000 per annum</td>
<td>• Annually.</td>
<td>• Environmental quality trends</td>
</tr>
<tr>
<td>Operation phase</td>
<td>• Emissions from the incinerator</td>
<td>• Conduct annual air quality surveys within the site of the incinerator.</td>
<td>90,000 per survey.</td>
<td>• Annually</td>
<td>• Air quality measurement</td>
</tr>
</tbody>
</table>
| Operation phase | • Management of hazardous waste | • Incinerate all hazardous waste on site.  
• Segregate hazardous waste emanating from various sources.  
• The existing Health Care Waste Management Plan (HCWMP) shall be implemented during the operation phase.  
• The HCWMP implementation shall identify the responsible department at the hospital, resources required, and the personnel training required.  
• Fly ash and other incineration residuals shall be disposed of in landfills or other NEMA approved dumping grounds in conjunction with the County Government of Marsabit.  
• The flue gases shall be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere.  
2,000,000 for the implementation and training activities of the HCWMP for one year. | 2,000,000 for one year. | • Continuous             | • Attention on hazardous waste and the Health Care Waste Management Plan.             |
| Operation phase | • Fire protection              | • Install firefighting equipment  
• Ensure firefighting equipment are inspected semi-annually  
• Conduct fire drills  
• Appoint fire volunteer aiders  
1,500 per fire equipment | 1,500 per fire equipment | • Proponent  
• During operation phase | • Fire safety preparedness |
9.2 Environmental and Social Management Plan for Decommissioning Phase

The environmental and social management plan for potential negative impacts during decommissioning phase is provided below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Environmental/ Social impact</th>
<th>Mitigation Measures</th>
<th>Cost (Kshs)</th>
<th>Responsibility and time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power disconnection.</td>
<td>Electric safety</td>
<td>Disconnection to be done by KPLC.</td>
<td>Nil</td>
<td>Proponent Prior to commencement of demolition</td>
</tr>
<tr>
<td>Traffic jams and accidents around site</td>
<td>Spillage of fuel from trucks and heavy demolition machines</td>
<td>Provide traffic signs at site warning of ‘heavy trucks turning’ Provide appropriate signage to direct flow of traffic within the site.</td>
<td>Nil</td>
<td>Proponent During demolition and transportation process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain a spill response kit outside the building. Adhere to spill response procedures developed.</td>
<td>2,000 for spill response kit</td>
<td>Proponent During demolition and transportation process</td>
</tr>
</tbody>
</table>

The table above outlines the environmental and social management plan for decommissioning, detailing specific activities, their mitigation measures, cost, and the responsible parties and timeframes for their implementation.
| **Demolition and transportation of debris to approved site.** | **Noise** | **Limit idling time of stationery vehicles and other construction equipment**  
- Driver of vehicles to be warned against unnecessary hooting and playing of loud music while at the site using appropriate notices.  
- Use of properly serviced and maintained vehicles and other construction equipment.  
- Limit idling time of stationery and other construction equipment.  
- Driver of vehicles to be warned against unnecessary hooting and playing of loud music while at the site using appropriate notices.  
- Use of properly serviced and maintained vehicles and other construction equipment. |  
| **Gaseous emissions** | **Limit idling time of stationery vehicles and other construction equipment**  
- Use of properly serviced and maintained vehicles and other construction equipment.  
- Limit idling time of stationery and other construction equipment.  
- Driver of vehicles to be warned against unnecessary hooting and playing of loud music while at the site using appropriate notices.  
- Use of properly serviced and maintained vehicles and other construction equipment. |  
| **Fall protection** | **Establishment of criteria for use of 100 per cent fall protection. The fall protection system should be appropriate for the storey building and necessary movements, including ascent, descent, and moving from point to point.**  
- When operating power tools at height, workers should use a second (backup) safety strap. |  
| Demolition | **Dust** | **Provide dust masks to workers**  
- Enclose the site with iron sheets | 5,000 |  
| **Proponent**  
**Throughout** | **Working at elevated heights** | **Proponent**  
**Proponent**  
**During demolition process** | 15,000 |  
| **Proponent**  
**Proponent**  
**During demolition process** | **Indiscriminate disposal of waste** | **Segregate waste into various waste streams**  
- Implement procedures for the management of various categories of waste including temporary storage, transport and final disposal or selling to licensed scrap dealers.  
- Transport waste from the site for appropriate disposal in accordance with Environmental Management and Coordination (Waste Management) Regulations, 2006 | 2,000 |  
| **Proponent** | **Clean-up of the site** |  
| **Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent** | **Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent**  
**Proponent** | 10,000 |  
| **Proponent** |
10.0 INSTITUTIONAL ARRANGEMENTS FOR THE ESMP IMPLEMENTATION

The environmental monitoring for the ESMP shall be implemented to address all activities that have been identified to have potentially significant impacts on the environment during normal operations and upset conditions. The implementation of the project environment and social component will be overseen by different institutional arrangements. The players include the following:

10.1 Internal Monitoring

Ministry of Health (MoH)
The proponent (MoH) will establish a specific project desk to be charged with the responsibility of coordinating all matters pertaining to the implementation of the project. The Project Engineer manning the desk will work with the Environment Manager among others, who will directly interact with the Environment and Social Experts from the Supervision and the Contractor.

Supervision Consultant
Monitoring activities will be the responsibility of the supervision with the Resident Engineer being the Leader. Among other staff, the Resident Engineer will have a qualified Environmental Expert and a Sociologist. Among the immediate and follow-up tasks of the Environmentalist and Social Experts at the Resident Engineers office will include;

(i) Development of a monitoring tool/checklist based on the ESMP and guided by the project physical layout;
(ii) Develop a monitoring program for the works targeting specific project working sites, material sites, sensitive environment and social areas, etc.
(iii) Prepare monthly site meetings to involve the Contractor, Client and Stakeholders.
(iv) Monthly reports in addition to continuous communications to the Contractor, Client, the Authorities and the Stakeholders as situations require,
(v) The Resident Engineer will convene monthly meetings for progress reporting by the Contractor and the Supervision Team. The Client will attend all the meetings.

The Contractor
The Contractor is expected to integrate environmental and social focus in the Project Manager. To ensure effective implementation of the projects impacts mitigation measures, therefore, the contractor will mobilize in-house Environment and Social Expert with the following responsibilities;

(i) Evaluate and review the ESMP developed from the main ESIA process and internalize the provisions for implementation on the basis of the realities of the project;
(ii) Customize the ESMP and generate a Construction Environment Management Plan (C.E.M.P) as a tool to guide the implementation. File a copy with the Resident Engineer.
(iii) Procure necessary equipment for environment measurements or engage an appropriate expert personnel for the activity in specific environment quality aspects including air quality, noise, water and soil quality,
(iv) Monthly reporting throughout the project period.
10.2 External Monitoring
Stakeholders and Environmental Authorities will have a significant role to play in monitoring and ensuring compliance in consultation with MoH at all times. Among the external monitoring parties will include;

**Regulatory**
(i) NEMA for surveillance on the impacts management and compliance of projects. The Authority will also be invited to attend monthly meetings.
(ii) Health and safety department will be involved in the surveillance of public and occupational health aspects of the project such as transportation of construction workers, road safety for the public, fire safety preparedness in the camp sites, sanitation and hygiene in camp sites and work areas,
(iii) Labour authorities to keep watch on the compliance of labour laws for the construction works, especially in regard to child labour and gender equity,
(iv) Marsabit County Government to be involved in handling public concerns and especially where there are social conflicts,

**Independent Audits**
External experts may be called upon to undertake limited monitoring activities for the Contractor and/or the Consultant on pre-agreed terms. The areas requiring this initiative will include environment quality sampling and measurements (water, air, soil and noise) etc. The External Experts will be engaged on need basis through the Contractor or Client but within the project implementation structures.

10.3 Grievance Redress Mechanism (GRM)
Presently, the hospital has a grievance redress mechanism, which is not well structured and well-functioning. This system is expected to be revamped and made functional during the operation phase of the project. The existing GRM involves lodging of complaints by aggrieved stakeholders or submission of comments from hospital staff, patients, neighbours or community members to a suggestion box located in the hospital’s premises.

During the construction phase of the proposed project, the proponent (MOH) and contractor should jointly set up a project specific GRM with a project specific grievance redress team comprising of project workers’ representatives, contractor, site engineer and senior hospital management staff who shall receive and log, and address any disputes, conflicts or concerns arising from stakeholders that may be affected by the project.

The grievance redress team shall liaise with the contractor and proponent in developing the redress actions and communicate with the affected stakeholders any resolutions made. Thereafter, the affected stakeholders shall be involved in monitoring and evaluation of the redress actions to assess their effectiveness.

During the operation phase of the lab, the existing hospital GRM will be used to manage all grievances, including from the lab unit. Lessons and experiences from running the project level GRM would be at hand for improving the structure and operations of the hospital level GRM, if need be. This hospital level GRM will have an accountability mechanism for handling issues, disputes, and complaints. It will be accessible so that individuals, workers, communities, and/or civil society organizations that are being affected by any activities of the hospital can use it.
It should be designed in a way that communities and civil society are engaged in the monitoring of implementation of redress actions on the ground. The hospital administration will ensure that communities and potentially affected people are aware of the proposed redress mechanism.

A quality management team should also be set up in the senior management level, which will monitor the feedback of the patients, workers, communities and other organizations in all the departments within the hospital. There should be a quality manager in each of the departments within the hospital to ensure that the system is properly followed.

Patients visiting the outpatient departments or indoor departments, or their caretakers have to fill up a form where they will give a detailed account of their experience in the hospital. They will have to furnish the details on how long the patients had to wait at the OPD or in indoor departments to consult a doctor. There will be another option where the patients can also mention whether they were satisfied with the overall performance of the doctors and the hospital staff members.

The quality managers based on their observations will then file a report to the Health department officials.
11.0 CONCLUSION AND RECOMMENDATION

From the ESIA report, it is clear that the proposed project is associated with both positive and negative environmental and social impacts during the proposed project cycle. The MOH shall follow the guidelines on environment, health and safety in order to reduce incidences of accidents, health problems and compromise to the environmental well-being. Continuous monitoring of the various indicators shall be followed throughout the project cycle.

The following shall be undertaken:

- All solid waste materials and debris resulting from construction activities shall be disposed of at approved dumpsites and according to local and international regulations. The wastes should be properly segregated and separated to encourage recycling of some useful waste materials; i.e. some excavated stone materials can be used as backfills.
- The proponent (MOH) shall acquire all relevant approvals from relevant authorities before implementation of the proposed project.
- All construction materials and especially sand, gravel, hardcore and wood shall be sourced/procured from legalized dealers. The incinerator shall also be bought from legalized sources.
- Construction activities shall be undertaken only during the day i.e. between 0800 hours to 1700 hours. This will minimize disturbance to the general public within the proximity of the site/project.
- Once earthworks have been done, restoration of the worked areas shall be carried out immediately by backfilling, professional landscaping/leveling and planting of low grass in open areas. This will also include restoration of any quarries and borrow pits.
- Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of rubbing metal bodies.
- The contractor shall develop an ESMP which shall be followed as recommended in the ESIA report.
- The contractor in conjunction with the MOH shall integrate the grievance redress mechanisms (GRM) in the project implementation.
- Aerial emissions shall be controlled through appropriate extraction fans in the operation areas into bag houses, electrostatic precipitators and installed scrubbers in the stacks to ensure no hazardous residuals finds their way back in to the natural environment.
- Safety measures for the workers and the neighboring community shall be integrated in the entire project cycle.
- Compliance with the existing laws and regulations shall be upheld at all times.
- The above environmental and social management plans shall be adopted and applied as the basis for addressing environmental and social aspects throughout the project cycle with necessary amendments as may be found appropriate. In this connection, it will be the guiding tool for future audits and monitoring exercises.

Assessment of Small-Scale Incinerators for Health Care Waste, Completed for: Water, Sanitation and Health Protection of the Human Environment World Health Organization 20 Avenue Appia CH-1211, Geneva 27, Switzerland. By Stuart Batterman Environmental Health Sciences University of Michigan 109 Observatory Drive, Ann Arbor, MI 48109 USA, January 2004


EHS Guidelines www.ifc.org/ehsguidelines


Managing Health Care Waste Disposal: Construct, Use, and Maintain a Waste Disposal Unit, September 2005, Prepared with the assistance of the World Health Organization,
Africa Region, Harare, Zimbabwe; and IT Power India, Pvt. Ltd., Pondicherry, India

Funded

by PATH, Seattle, Washington, USA


APPENDICES

Annex 1: Minutes of the Consultative Public Participation
Annex 2: Approved Architectural Drawings
Annex 3: Standards for Effluent Discharge into the Environment
Annex 4: Standards for Effluent Discharge into Public Sewers
Annex 5: Effluent Levels for Health Care Facilities
Annex 6: Air Emission Levels for Hospital Waste Incineration Facilities
Annex 7: Guidance to Preparation of Chance Find Procedures
Annex 1: Minutes of the Consultative Public Participation

MINUTES OF THE CONSULTATIVE PUBLIC PARTICIPATION MEETING WITH STAKEHOLDERS HELD AT THE PROPOSED SITE ON 4TH JUNE, 2018 AT 11:30 AM – 12:30 PM

PRESENT (PARTICIPANTS)

1. Salahadin Shariff  
2. Abdulsalman Hussein  
3. Huqman Hussein  
4. Bokayo Halake  
5. Ahmed Sheik  
6. Robe Mark Kanchora  
7. Patrick Leadismo  
8. Tayba Abass  
9. Katu Jarso Yattani  
10. Abdulmatah Ali  
11. Mohammed Abdullahi  
12. Ali Elema Galgallo  
13. Ali Fernandes  
14. Mohamed Dima  
15. Esao Alex  

16. Daniel Dida  
17. James Gethiba  
18. Diko Boru Ele  
19. Abdikadir Kirija  
20. John Githinji  
21. Dhahabu Wario  
22. Mohamed Jamal  
23. Abdalla Nanu  
24. Hadija Ali Kambapo

Agenda 1: Preliminary
The meeting was called to order by the area assistant chief at 11.30am. He welcomed all participants and explained to them that the proposed project would affect them hence it was very important to hear their views towards the proposed project. He invited a participant who led in prayers and invited the consultant to make his presentation. The meeting was attended by residents within Marsabit Town, various business communities, local administration, and various stakeholders from far and wide who were interested or affected by the proposed project.

Agenda 2: Presentation of the project concept
The project ESIA expert explained the main objective of the exercise which was to inform stakeholders about the project and its likely effects, which in turn would incorporate the inputs, views and concerns and thus enable their views to be taken into account during the decision-making. The specific objectives of the consultations were geared towards:-

• Obtaining local and traditional knowledge that may be useful to decision making including Indigenous Knowledge Systems (IKS).
• Facilitating consideration of alternatives, mitigation measures and trade-offs (if any).
• Ensuring that important impacts are not overlooked and benefits are maximised.
• Reducing chances of conflicts through early identification of contentious issues.
• Providing an opportunity for stakeholders to influence the project design and operational plan in a positive manner.
• Improving transparency and accountability of decision making.
• Increase public confidence in the ESIA process.

The consultant, on behalf of the Ministry of Health, expounded in details the project design and told the participants that they are greatly involved in the project as key stakeholders.

Agenda 3: Open session
It was agreed that the proposed project had no major issues since it was just an expansion of facilities to an already existing public hospital.

Suggestions and recommendations
The participants discussed and made the following suggestions and recommendations:

(i) The locals should be given first priority for casual employment.
(ii) Dust and noise emissions to be reduced to the minimum.
(iii) Corruption to be avoided during the project cycle.
**Agenda 4: Questionnaires**
The ESIA consultants also explained more on the proposed project with the aid of structured questionnaires. The questionnaire involved clear explanation of the structure of the proposed development to the individual stakeholders within Marsabit County and appropriate response to their questions. The questionnaires were issued to those in the meeting to fill and return to the consultants.

The questionnaires issued contained a brief description of the proposed project, legal requirements and spaces for providing personal details (name, I.D/Passport number or phone numbers) and views regarding the proposed project. All the participants of the public consultative meeting filled a questionnaire.

**Agenda 5: Closing**
There being no other business, the meeting was adjourned at 12.30pm by the area assistant chief.
Annex 2: Approved Architectural Drawings
Annex 3: Standards for Effluent Discharge into the Environment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Max. Allowable Limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorides</td>
<td>0.05 mg/l</td>
<td>Based on total chlorine.</td>
</tr>
<tr>
<td>Ammonia-nitrogen</td>
<td>0.05 mg/l</td>
<td>Based on total nitrogen.</td>
</tr>
<tr>
<td>Dissolved Oxygen Demand (BOD)</td>
<td>5 mg/l</td>
<td>At 20°C (5°C).</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>10 mg/l</td>
<td></td>
</tr>
<tr>
<td>Pesticides (DDT, Dieldrin, Dieldrin)</td>
<td>0.001 mg/l</td>
<td></td>
</tr>
<tr>
<td>Polychlorinated biphenyls (PCB)</td>
<td>0.001 mg/l</td>
<td></td>
</tr>
<tr>
<td>Heavy Metals (Cu, Zn, Pb)</td>
<td>0.01 mg/l</td>
<td></td>
</tr>
<tr>
<td>Phenols (total)</td>
<td>0.01 mg/l</td>
<td></td>
</tr>
<tr>
<td>Petroleum hydrocarbons</td>
<td>0.01 mg/l</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>50 mg/l</td>
<td></td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>500 mg/l</td>
<td></td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>10 mg/l</td>
<td>Based on turbidity.</td>
</tr>
<tr>
<td>Total Solids</td>
<td>100 mg/l</td>
<td></td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>0.1 mg/l</td>
<td>Based on calcium carbonate.</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>30 mg/l</td>
<td>As CaCO₃.</td>
</tr>
<tr>
<td>Turbidity</td>
<td>5 NTU</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>25°C</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>6.5 to 8.5</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
- Each parameter shall be measured at the point of discharge.
- The standards are applicable to all industrial processes and operations.
- The standards are periodically reviewed and updated by the Authority.
- Any other parameters may be prescribed by the Authority from time to time.
Annex 4: Standards for Effluent Discharge into Public Sewers

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Maximum levels permissible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended solids (mg/L)</td>
<td>250</td>
</tr>
<tr>
<td>Total dissolved solids (mg/L)</td>
<td>2000</td>
</tr>
<tr>
<td>Temperature °C</td>
<td>20 - 35</td>
</tr>
<tr>
<td>pH</td>
<td>6.5</td>
</tr>
<tr>
<td>Oil and Grease (mg/L) - where conventional treatment shall be used</td>
<td>10</td>
</tr>
<tr>
<td>Oil and Grease (mg/L) - where ponds is a final treatment method</td>
<td>5</td>
</tr>
<tr>
<td>Ammonia Nitrogen (mg/L)</td>
<td>20</td>
</tr>
<tr>
<td>Substances with an obnoxious smell</td>
<td>Shall not be discharged into the sewers</td>
</tr>
<tr>
<td>Biological Oxygen Demand BOD$_3$ days at 20 °C (mg/L)</td>
<td>500</td>
</tr>
<tr>
<td>Chemical Oxygen Demand COD (mg/L)</td>
<td>1000</td>
</tr>
<tr>
<td>Arsenic (mg/L)</td>
<td>0.02</td>
</tr>
<tr>
<td>Mercury (mg/L)</td>
<td>0.05</td>
</tr>
<tr>
<td>Lead (mg/L)</td>
<td>1.0</td>
</tr>
<tr>
<td>Cadmium (mg/L)</td>
<td>0.5</td>
</tr>
<tr>
<td>Chromium VI (mg/L)</td>
<td>0.05</td>
</tr>
<tr>
<td>Chromium (Total) (mg/L)</td>
<td>2.0</td>
</tr>
<tr>
<td>Copper (mg/L)</td>
<td>1.0</td>
</tr>
<tr>
<td>Zinc (mg/L)</td>
<td>5.0</td>
</tr>
<tr>
<td>Selenium (mg/L)</td>
<td>0.2</td>
</tr>
<tr>
<td>Nickel (mg/L)</td>
<td>3.0</td>
</tr>
<tr>
<td>Nitrates (mg/L)</td>
<td>20</td>
</tr>
<tr>
<td>Phosphates (mg/L)</td>
<td>30</td>
</tr>
<tr>
<td>Cyanide Total (mg/L)</td>
<td>2</td>
</tr>
<tr>
<td>Sulphide (mg/L)</td>
<td>2</td>
</tr>
<tr>
<td>Phenols (mg/L)</td>
<td>10</td>
</tr>
<tr>
<td>Detergents (mg/L)</td>
<td>15</td>
</tr>
<tr>
<td>Colour</td>
<td>Less than 40 Hazen units</td>
</tr>
<tr>
<td>Alkyl Mercury</td>
<td>Not Detectable (nd)</td>
</tr>
<tr>
<td>Free and saline Ammonia as N (mg/L)</td>
<td>4.0</td>
</tr>
<tr>
<td>Calcium Carbide</td>
<td>Nil</td>
</tr>
<tr>
<td>Chloroform</td>
<td>Nil</td>
</tr>
<tr>
<td>Inflammable solvents</td>
<td>Nil</td>
</tr>
<tr>
<td>Radioactive xenides</td>
<td>Nil</td>
</tr>
<tr>
<td>Degreasing solvents of mono-di-trichloroethylene type</td>
<td>Nil</td>
</tr>
</tbody>
</table>
Annex 5: Effluent Levels for Health Care Facilities

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Units</th>
<th>Guideline Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>SU</td>
<td>9 - 9</td>
</tr>
<tr>
<td>Biochemical oxygen demand (BOD5)</td>
<td>mg/L</td>
<td>50</td>
</tr>
<tr>
<td>Chemical oxygen demand (COD)</td>
<td>mg/L</td>
<td>250</td>
</tr>
<tr>
<td>Oil and grease</td>
<td>mg/L</td>
<td>10</td>
</tr>
<tr>
<td>Total suspended solid (TSS)</td>
<td>mg/L</td>
<td>50</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>mg/L</td>
<td>0.05</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>mg/L</td>
<td>0.5</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>mg/L</td>
<td>0.1</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>mg/L</td>
<td>0.01</td>
</tr>
<tr>
<td>Chlorine, total residual</td>
<td>mg/L</td>
<td>0.2</td>
</tr>
<tr>
<td>Phenols</td>
<td>mg/L</td>
<td>0.5</td>
</tr>
<tr>
<td>Total coliform bacteria</td>
<td>MPN/100 ml</td>
<td>400</td>
</tr>
<tr>
<td>Polychlorinated dibenzoaxin and dibenzofuran (PCDD/F)</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Temperature increase</td>
<td>°C</td>
<td>&lt;30</td>
</tr>
</tbody>
</table>

Notes:

- MPN = Most Probable Number
- At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity

**Source:** IFC/World Bank Group’s Environmental, Health, and Safety Guidelines for Health Care Facilities

https://www.ifc.org/wps/wcm/connect/bc554d80488658b6b6e6f66a6515bb18/Final%2BHealth%2BCare%2BFacilities.pdf?MOD=AJPERES&id=1323161961169
Annex 6: Air Emission Levels for Hospital Waste Incineration Facilities

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Units</th>
<th>Guideline Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Particulate matter (PM)</td>
<td>mg/Nm³</td>
<td>10</td>
</tr>
<tr>
<td>Total organic carbon (TOC)</td>
<td>mg/Nm³</td>
<td>10</td>
</tr>
<tr>
<td>Hydrogen Chloride (HCl)</td>
<td>mg/Nm³</td>
<td>10</td>
</tr>
<tr>
<td>Hydrogen Fluoride (HF)</td>
<td>mg/Nm³</td>
<td>1</td>
</tr>
<tr>
<td>Sulfur dioxide (SO₂)</td>
<td>mg/Nm³</td>
<td>50</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>mg/Nm³</td>
<td>50</td>
</tr>
<tr>
<td>NOx</td>
<td>mg/Nm³</td>
<td>200-400¹</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>mg/Nm³</td>
<td>0.06</td>
</tr>
<tr>
<td>Cadmium + Thallium (Cd + Tl)</td>
<td>mg/Nm³</td>
<td>0.05</td>
</tr>
<tr>
<td>Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V</td>
<td>mg/Nm³</td>
<td>0.5</td>
</tr>
<tr>
<td>Polychlorinated dibenzodioxin and dibenzofuran (PCDD/F)</td>
<td>mg/Nm³TEQ</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Notes:
- a. 200 mg/Nm³ for new plants or for existing incinerators with a nominal capacity exceeding 5 tonnes per hour, 400 mg/Nm³ for existing incinerators with a nominal capacity of 6 tonnes per hour or less
- b. Oxygen level for incinerators is 7 percent.

Source: IFC/World Bank Group’s Environmental, Health, and Safety Guidelines
https://www.ifc.org/wps/wcm/connect/bc554d80488658b6b6e6f66a6515bb18/Final%2BHealth%2BCare%2BFacilities.pdf?MOD=AJPERES&id=1323161961169
Annex 7: Guidance to Preparation of Chance Find Procedures

Contracts for civil works involving excavations should normally incorporate procedures for dealing with situations in which buried physical cultural resources (PCR) are unexpectedly encountered. The final form of these procedures will depend upon the local regulatory environment, including any chance find procedures already incorporated in legislation dealing with antiquities or archaeology. For Marsabit County Referral Hospital, chance finds procedures contain the following elements:

1. PCR Definition
In some cases, the chance finds procedure is confined to archaeological finds; more commonly it covers all types of PCR. In the absence of any other definition from the local cultural authorities, the Kenya National Museum, the following definition could be used: “movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance”.

2. Ownership
The identity of the owner of the artifacts found should be ascertained if at all possible. Depending on the circumstances, the owner could typically be, for example, the state, the government, a religious institution, the land owner, or could be left for later determination by the concerned authorities.

3. Recognition
As noted above, in PCR-sensitive areas, recognition and confirmation of the specific PCR may require the contractor to be accompanied by a specialist. A clause on chance finds should be included in every contractor’s specifications.

4. Procedure upon Discovery

Suspension of Work
If a PCR comes to light during the execution of the works, the contractor shall stop the works. Depending on the magnitude of the PCR, the contractor should check with the Resident Engineer and MOH for advice on whether all works should be stopped, or only the works immediately involved in the discovery, or, in some cases where large buried structures may be expected, all works may be stopped within a specified distance of the discovery. MOH’s decision should be informed by a qualified archaeologist certified by the Kenya National Museum. After stopping work, the contractor must immediately report the discovery to the Resident Engineer who will in turn report to MOH and the Kenya National Museum. The contractor may not be entitled to claim compensation for work suspension during this period. The Resident Engineer may be entitled to suspend work and to request from the contractor some excavations at the contractor’s expense if he thinks that a discovery was made and not reported.

Demarcation of the Discovery Site
With the approval of the Resident Engineer, the contractor is then required to temporarily demarcate, and limit access to, the site. The contractor secures the site to prevent any damage or loss of removable objects. In cases of anticipated theft, a guard shall be present until the responsible authorities take over the site.

Non-Suspension of Work
The procedure may empower the Resident Engineer to decide whether the PCR can be removed and for the work to continue, for example in cases where the find is one coin.

Chance Find Report
The contractor should then, at the request of the Resident Engineer, and within a specified time period, make a *Chance Find Report*, recording:

- Date and time of discovery;
- Location of the discovery;
- Description of the PCR;
- Estimated weight and dimensions of the PCR;
- Temporary protection implemented.

The *Chance Find Report* should be submitted to the Resident Engineer, and other concerned parties as agreed with the cultural authority, and in accordance with national legislation. The Resident Engineer, or MOH, other party as agreed, is required to inform the cultural authority accordingly.

**Arrival and Actions of Cultural Authority**

The cultural authority undertakes to ensure that a representative will arrive at the discovery site within an agreed time and determine the action to be taken. Such actions may include, but not be limited to:

- Removal of PCR deemed to be of significance;
- Execution of further excavation within a specified distance of the discovery point;
- Extension or reduction of the area demarcated by the contractor.

These actions should be taken within a specified period. The contractor may or may not be entitled to claim compensation for work suspension during this period. If the cultural authority fails to arrive within the stipulated period (for example, 24 hours), the Resident Engineer may have the authority to extend the period by a further stipulated time. If the cultural authority fails to arrive after the extension period, the Resident Engineer may have the authority to instruct the contractor to remove the PCR or undertake other mitigating measures and resume work. Such additional works can be charged to the contract. However, the contractor may not be entitled to claim compensation for work suspension during this period.

**Further Suspension of Work**

During this notification period, the cultural authority may be entitled to request the temporary suspension of the work at or in the vicinity of the discovery site for an additional period of time. The contractor may, or may not be, entitled to claim compensation for work suspension during this period. However, the contractor will be entitled to establish an agreement with the cultural authority for additional services or resources during this further period under a separate contract with the cultural authority.

**Resumption of Works**

Construction work will resume only after authorization is given by the responsible national authority, Kenya National Museum, concerning the safeguard of the property.

**Supervision and Monitoring**

These procedures must be reflected to as standard provisions in the constructor’s contract, and the Site Engineer shall monitor its implementation during project supervision.