Environmental & Social Impact Assessment Study Report for the proposed Kenya Maritime Authority office block along Mbaraki Road, Mombasa County.

Proponent

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Consultants

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Report date: 27th January 2017

CERTIFICATION

Certification by Lead Experts

We hereby certify that this Environmental Impact Assessment (EIA) Study Report has been done under our supervision and that the assessment criteria, methodology and content reporting conform to the requirements of the Environmental Management and Coordination Act, (EMCA) 1999 (Rev. 2015) and Legal Notice No. 101 of 2003 (Rev 2016).

Signed: _____ _____

Names: **Mr. Simon Nzuki** (**NEMA 1350)** **Ms. Jane Gitau (NEMA 2015)**

Date: **27th January, 2017**

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Certification by Proponent

We, **Kenya Maritime Authority,** confirm that this EIA Study Report has been forwarded to NEMA with our Authority as the proponent.

Signed for and on behalf of **Kenya Maritime Authority**

Name: _____

Signature: _____**Date:** _____

Proponent Contact Details
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MOMBASA

Official Rubberstamp/Seal

Project site address: Plot L.R. No. Mombasa/Block XLVIII/128, along Mbaraki Road, Mbaraki area, Mombasa County

ACKNOWLEDGEMENTS

The successful completion of this EIA Study report was made possible by contributions from individuals and institutions as acknowledged below.

- The proponent i.e. **Kenya Maritime Authority,** provided project documentation, coordinated site visits and provided the financial resources required by the consultants to undertake the EIA process.

- The adjacent property owners supported the public consultation process by accepting to respond to questionnaires and participating in semi-structured interview sessions.

- ENVASSES Environmental Consultants as reference was made to previous similar EIA reports prepared by the consultants.

- We acknowledge the staff of Envasses Environmental Consultants who assisted with executing the public consultative process as well as data and information collection at the proposed development site and preliminary compiling of this EIA study report.

EXECUTIVE SUMMARY

Introduction

This EIA Study report outlines the results of the EIA process for the proposed office block to be located on Plot L.R. No. Mombasa/Block XLVIII/128, Mbaraki area of Mombasa County in compliance with Section 58 of EMCA, 1999 (Rev. 2015) and Legal Notice No. 101 of 2003 (Rev 2016). The site lies along Mbaraki Road on **Latitude 4° 04´ 03.24´´ South** and **Longitude 39°39´52.29´´ East,** and an elevation of **65ft ASL.** The assessment findings are presented in terms of the environmental and socio-economic considerations and observations recorded during site visits and report preparation

The Proponent –Kenya Maritime Authority

Kenya Maritime Authority (KMA) is a state corporation established under the Kenya Maritime Authority Act, 2006 with a mandate to regulate, coordinate and oversee maritime affairs. The Authority aims to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments.

Site status and Neighbourhood

The site is enclosed by a boundary wall and there is an existing disused one-storey building that will be demolished to pave way for the proposed office block. The rest of the plot is covered by grasses, herbs and few trees that will be cleared to allow for the construction.

The neighbourhood displays a mix of land uses including residential, commercial, light industrial etc. the dominant land uses are however residential owing to the presence of KPA and National Police Service staff houses; and commercial owing to the proximity to the Liwatoni Bay and the busy Mbaraki Road. Other notable establishments within proximity to the proposed site are Mbaraki Cemetery, The Little Theatre Club, Alpha Group Godowns, Kencont CFS and The Mombasa Sports Club.

Project activities

The project activities include;

- Drawing, design and engineering
- Acquisition of pertinent approvals from relevant government agencies
- Site preparation activities
- Actual construction of the office blocks
- Operation of the office blocks

- Possible decommissioning of the project

Building components

The proposed project will involve the construction, subsequent occupation and possible decommissioning of an office block and auxiliary amenities. Upon completion the building shall consist of 3 basement floors, Ground floor, 1st -15th floors, an observatory level and a roof level featuring a helipad.

Other key components of the building will include basement parking; backup power generator, an auditorium, lettable office spaces, a restaurant, prayer room, sanitary facilities and waste management chutes. External component will include a bio-digester, parking, entry & exit gates with sentry box and an enclosing boundary wall

Assessment methodologies and materials

The methodology for preparing the EIA study report followed on the guidelines provided by NEMA through Legal Notice No. 101 of 2003 (Rev 2016). Various tools and mechanisms were utilized during the initial survey to collect and collate data. Site data collection was implemented using a pre-determined checklist developed based on the screening criteria and the reconnaissance survey. Baseline information was obtained from the site visits, consultations with neighbors, desktop resources and literature review.

Public consultations were executed through

- Informal interviews and discussions
- Administration of semi-structured questionnaires by the EIA team.
- Consultative meetings

In terms of field equipment, a GPS enabled smart phone was used in concert with Google Earth © for the purposes of Geo-referencing site data and recording field observations respectively.

The information gathered using the above strategies was evaluated and data analyzed to determine the required level of environmental performance and prepare the Environmental Management Plan.

Project's benefits

The project's direct benefits include but are not limited to the following;

- Employment creation
- Income to other business establishments
- Income to the government in terms of taxes

- Contribution meeting demand for office space

Negative impacts of the project and mitigation measures

Against the background of the above positive impacts, negative impacts emanating from the construction and subsequent use of the proposed development are expected.

Initial demolition phase

Noise

Noise will be inevitable during demolition phase, but the levels can be controlled to significantly reduce the impact. The sources of noise will be from the deployed machinery, demolition works, delivery vehicles and workers

Mitigation measures

- Deploy acoustic screens around noisy working areas to contain noises
- Restrict demolition works to day time only
- Provide PPEs such as ear muffs and earplugs to workers

Accidents and risks

Safety of workers and neighbours will be compromised because there is a possibility of demolition rubble falling on them, accidents from heavy commercials as well as health hazards posed by dust.

Mitigation measures

- Provide full protective gear (PPE) to the workers
- Conspicuously display clear signposting and warning signs on site
- Investigate all accidents and put in place appropriate measures to prevent recurrence.

Dust

Demolition rubble and vehicles accessing the site will generate dust which is likely to spread to other areas especially when the wind intensity is high. This will be a nuisance to the neighbours as well as workers on site.

Mitigation measures

- Sound project planning to complete demolitions within the shortest time possible
- Restrict demolitions to daytime and schedule activities at times of low wind intensity

- Deploy fine dust screen and spray water on dusty materials/areas to contain dust
- Provide workers with the necessary PPEs such as dust masks and enforce their use

Demolition waste

Waste emanating from the demolition if not handled properly will be a source of environmental degradation. The wastes will include rubble, wood, metal reinforcements etc.

Mitigation measures

- Contract a private NEMA licensed solid waste handler to manage demolition wastes effectively
- Salvage reusable components and sell to re-users

Project construction phase

Continued sourcing of raw materials

To complete the construction phase, the project will still source raw materials from the environment including sand, ballast, building blocks, cement, steel, wood etc. These materials will have an impact on the environment at their point of origin either through extraction or industrial pollution associated with their production.

Mitigation measures

- The contractor will obtain raw materials for the construction from sources that are compliant with NEMA Regulations.
- The contractor will procure quantities that are sufficient for the intended works only and recycle as far as practical to curtail wastage.
- The contractor will commit to extensive use of recycled raw materials as will be appropriate and in a manner that does not compromise the safety of the development.

Destruction of the physical environment

Destruction to the physical environment during this stage is inevitable. Excavation, for the building foundation will create loose soil that may easily be carried away by water or wind. This causes soil erosion and disturbance in soil quality. Compaction also hinders the infiltration of water into the surface hence increasing the surface run-off increasing the possibility of flooding downstream of the site.

Mitigation measures

- Compacted areas to be ripped to prevent erosion
- Restore degraded areas through landscaping using trees and sediment binding grasses
- Control earthworks to prevent compaction of the loose soils.
- Obtain a permit to fell trees from KFS

Occupational health and safety hazards

The movement of materials into the construction site, and the actual construction activities by workers may cause accidents with a potential to cause injury, permanent disability or even death. The responsible contractor must ensure that all the site workers are briefed about the potential risks of injuries on site and psychologically prepared on how to handle them

Mitigation measures

- Provide adequate and appropriate Personal Protective Equipment (PPE) including safety shoes, helmets, gloves, overalls etc.
- Employees to be given the correct tools and equipment for the jobs assigned and trained on their use
- First aid services and an emergency vehicle to be readily available at site
- Moving parts of machines and sharp surfaces to be securely protected with guards to avoid unnecessary contacts and injuries during construction phase
- The contractor to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007
- First aid services and an emergency vehicle to be readily available at site

Safety of visitors, neighbors and general public

The proponent and the contractor will have an obligation to put in place measures that will protect the visitors to the construction site, neighbors, and the general public.

Mitigation measures

- Visitors to the project site must be provided with PPE at all times,
- Inform all neighbors in writing on the commencement of the project at least two weeks in advance,
- Restrict access to the site by the public by fencing off the construction site,
- Heavy Commercial Vehicles accessing the site to deliver construction materials must observe speed limits,
- Conspicuously display safety signs and warning posters visible to the public
- Provide for security services at the site.

Air pollution

At the construction phase dust will be expected from excavation of soil and movement of vehicles. If generated in large quantities dust may present a respiratory hazard and also cause visual intrusion. Air emissions would also be expected from exhausts of vehicles delivering construction material. Stand-by generators that may be brought in to serve during power outages are likely to release some emissions to the atmosphere.

Mitigation measures

- Contractor to deploy fine dust screens at the site during construction
- Sprinkle dust producing materials such as ballast with water during offloading on site
- Retain vegetation as much as possible to reduce bare areas exposed to wind
- Use low Suplhur fuels to power delivery vehicles and site machinery
- Provided employees with dust masks and goggles.

Solid waste generation

Metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, plastic paper bags, empty paint containers among others will be generated during construction phase of the project.

Mitigation measures

- Installation of litter bins and a receptacle that encourage separation of wastes at source to promote re-use and re-cycling,
- Procure the services of a NEMA licensed waste handler to manage solid wastes from the construction site
- All recyclable materials should be collected and sent to NEMA licensed recyclers

Noise pollution

Noise is expected from movement of vehicles and construction equipment. It would also arise from construction activities at the site such loading and offloading of material, carpentry and masonry activities.

Mitigation measures

- Deploy compact machinery and fit them with mufflers
- Personnel working at the site will be provided with Personnel Protective Equipment (PPE) such as earmuffs
- Deploy acoustic screens around noisy working areas to contain noises
- Limit construction works to daytime on weekdays only

Traffic Management

Traffic increase along Mbaraki Road may occur as contractors' vehicles bring in deliveries at the site and as workers leave or come to the site. However, it is foreseen that the day-to-day activities during the construction phase might not adversely impact on the normal traffic on the already busy Mbaraki Road.

Mitigation measures

- The contractor will ensure that the vehicles delivering materials do not block the road and accommodated within the site
- Heavy commercial vehicles delivering raw materials shall observe designated speed limits for the area.
- Proper signage and warnings to be placed along Mbaraki Road to forewarn other motorists on the use of the road by heavy commercial vehicles
- Deploy flagmen to guide traffic along the road during construction works adjacent to the road

Workforce effluent

The workforce at the site will require sanitation facilities.

Mitigation measures

- The contractor will deploy temporary sanitary units (Mobile toilets) as the construction phase
- The mobile units should be emptied by NEMA licensed effluent handlers

Increased water demand

Construction projects utilize significant quantities of water for mixing and casting concrete. Water will also be required for human use including drinking and sanitary needs.

Mitigation measures

- The contractor to ensure prudential use of water resources during construction by avoiding wastage such as running pipes and taps
- The proponent should obtain a water abstraction permit from WRMA and install a meter to monitor the water yields from the borehole

Insecurity

Due to the labor requirements of the site, there is likely to be cases of increase in insecurity in the area.

Mitigation measures

- Proponent and contractor to vet all workers on site
- Require certificates of good conduct from potential employees and copies of identification documents for all workers to be retained by the contractor

Operational phase

Increased traffic

As the tenants move in the new commercial building for business, traffic increase is expected as vehicles access and leave the premises

Mitigation measures

- The development has incorporated adequate parking spaces to accommodate all vehicles accessing the site
- The development will be serviced by two gates and provide dedicated entry and exist lanes
- Collaborate with the Mombasa County Government and Kenya Urban Roads Authority (KURA) to install speed limit signage and hazard demarcations along Mbaraki Road to address safety concerns for pedestrians

Effluent generation and possible water quality degradation

Ground water sources may be polluted if sewage generated by the tenants, clients and workers at the commercial building is not managed in an appropriate manner. Being an office block, the wastewater will typically be domestic and will constitute a combination of flows from the kitchens, toilets and wash water. The proponent will install a bio-digester which is considered adequate to effectively manage the effluent emanating from the office block

Mitigation measures

- Contract a NEMA licensed effluent handler to empty the sludge from the bio-digester for proper disposal
- Conduct quarterly monitoring of the effluent discharged from the bio-digester against standards set out in schedule III of Water Quality Regulations, 2006
- Apply for an Effluent Discharge License from NEMA
- Explore technological options that promote usage of less water to reduce waste water generation at source.
- Contract reputable professionals to conduct regular inspections and maintenance works on the bio-digester

Increased water demand

The tenants, clients and workers of the premise will exert an extra demand on water, as it would be required for sanitation purposes among other uses. This causes strain on the water resources.

Mitigation measures

- Recycle the treated water from bio-digester for reuse in landscaping and firefighting
- Install water saving systems e.g. automatic water tap turnoffs, less water capacities cisterns, etc.
- Rain and storm water harvesting is recommended as a measure to provide for water for general cleaning
- A borehole to be drilled on site and reticulated supply are considered sufficient to meet the rise in demand for water resources. The proponent will liaise with WRMA to confirm this position in terms of yield and quality.

Solid waste

A lot of waste is expected to result from the operations of the building such as paper, cartons, plastics, broken glass and other related office wastes. The waste requires to be handled appropriately in order to maintain the aesthetic value of the neighborhood and avert other effects such as injuries, production of odour, public health hazards etc. This report recommends development of a solid waste management plan that exploits the 6Rs of waste management (Refuse, Reduce, Resuse, Recycle, Recovery of energy & Rot) in addition to the following measures:

Mitigation measures

- Provide litter bins that encourage the separation of wastes into paper, glass, plastics etc for recycling
- Contract a NEMA licensed solid waste handler to manage wastes from the development
- Proper records kept for collection and disposal for monitoring purposes.
- Develop a sound solid waste management plant that exploits a hierarchy of waste management options.
- Comply with Legal Notice No. 121 of 2006 in management of solid wastes generated by the development

E-waste

The use and activities to occur at the commercial building will generate e-waste mainly composed of;

- Used computers and computer accessories
- Obsolete electronic equipment
- Mobile phones
- Power accessories

Mitigation measures

- Proponent will provide dedicated bins for collection of e-waste
- E-waste to be collected by a NEMA licensed waste handler and conveyed to a recycling plant.
- Proponent to comply with E-waste management guidelines by NEMA

Increase in electricity demand

Operation of the premise will require use of electric energy in lighting and powering electrical installations. The development will exert more demand on the electricity infrastructure. An additional loading from the office block will have an impact on the supply.

Mitigation measures

- The proponent will make an application to Kenya Power to replace the power service capacity at the site to accommodate the new development within the national grid
- The overhead lines traversing the site should be replaced by suitable rating underground power cable
- Sensitize occupants to invest in energy-efficient lighting systems and equipment
- Monitor energy use during operations and maintain records
- Conduct annual energy auditing and implement recommendations

Fire Safety and security

Accidental leakage/ spillage of substances, electrical faults are some of the possible causes of fire, which can cause considerable losses in terms of injury to persons and damage to property. This has a negative financial impact both to the owner and tenants.

Mitigation measures

- Fire extinguishers will be provided at convenient locations within the building and regularly inspected and maintained by a reputable fire security company
- Install fire hydrants and alarm system throughout the building
- Develop an elaborate emergency response plan to address the risks associated with operation of the building
- Security will be enhanced by contracted security firm.

Decommissioning phase

Mitigation measures for the decommissioning phase can only be provided for actions that will be deliberate on the part of the proponent such as closure by government agencies due to non-compliance with environmental and health

regulations. Other factors that may contribute to the need for decommissioning including end of project life, an order by a court of law due to non-compliance with existing Regulations, Change of User, and Natural calamities etc.

The proponent will have a responsibility to ensure that the facility is licensed at all times as required by law and that it conforms to environmental standards.

At the decommissioning stage, the proponent will prepare a due diligence decommissioning audit report in line with Legal Notice No. 101 of 2003 and submit it to NEMA for approval at least three months in advance.

Environmental Monitoring Programme (EMP)

A plan for environmental monitoring is proposed and will involve measurements, observations, evaluations, assessment and reporting on various environmental attributes. The monitoring will also be a way of testing the efficacy of the EMP in proposed. The monitoring programme will involve the following parameters;

- Water Quality & Quantity monitoring
- Wastewater (Effluent) monitoring
- Solid and e-waste Management
- Socio economic issues especially concerns from third parties
- Energy Auditing
- Environmental Auditing

Conclusion

The proposed project is considered important and beneficial to both the proponent and the economy of Mombasa. The project will create employment, increase customer base for local businesses and has the advantage of efficient use of land which is a scarce resource within Mombasa Town. The project will also engender efficient provision of services to the public by the proponent

The proposal presents environmental impacts and challenges that are within a manageable scale and can be sufficiently mitigated to a level of minimal significance throughout the project cycle through full implementation of the proposed environmental management plans

Recommendations

On the basis of these findings and the ability of the proponent to commit resources and technology to implement the environmental management plan, we recommend the approval of the development.

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LIST OF ACRONYMS

CDA	Coast Development Authority
DEC	District Environment Committee
EA	Environmental Audit
ERC	Energy Regulatory Commission
EFT	Effluent Treatment Plant
EHS	Environmental Health and safety
EIA	Environmental Impact Assessment
EMAP	Environmental Management and Action Plan
EMCA	Environmental Management and Coordination Act
GIS	Geographic Information System
GoK	Government of Kenya
GPO	General Post Office
MMC	Mombasa Municipal Council
MOWASCO	Mombasa Water Supply & Sanitation Company
NEC	National Environmental Council
NEMA	National Environment Management Authority
NWCPC	National Water Conservation and Pipeline Corporation
OPDH	One Private Dwelling House
PCPB	Pest Control Products Board
PEC	Provincial Environment Committee
PPA	Participatory Poverty Assessment
PPE	Personal protective equipment
TORs	Terms of Reference
UNEP	United Nations Environment Programme
VAT	Value Added Tax
WRMA	Water Resources Management Author

1. PROJECT BACKGROUND AND CONTEXT

1.1. Introduction

This EIA Study report outlines the results of the EIA study process for the proposed office block to be located on Plot L.R. No. Mombasa/Block XLVIII/128, along Mbaraki Road, Mbaraki area of Mombasa County in compliance with Section 58 of EMCA, 1999 (Rev. 2015) and Legal Notice No. 101 of 2003 (Rev 2016). The assessment findings are presented in terms of the environmental and socio-economic considerations and observations recorded during site visits and report preparation.

1.2. The Proponent –Kenya Maritime Authority

Kenya Maritime Authority (KMA) is a state corporation established under the Kenya Maritime Authority Act, 2006 with a mandate to regulate, coordinate and oversee maritime affairs. The Authority aims to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments.

Project activities

The project activities include;

- Drawing, design and engineering
- Acquisition of pertinent approvals from relevant government agencies
- Site preparation activities
- Actual construction of the apartment blocks
- Occupation of the apartment blocks
- Possible decommissioning of the project

1.3. EIA project objectives

The EIA process purposes to ensure that environmental concerns are integrated in all phases of the project cycle in order to contribute to sustainable development.

The specific objectives were as follows;

- To identify and assess the potential environmental, health and safety impacts of the proposed development,
- To propose appropriate mitigation measures for the management of environmental, health and safety impacts emanating from the development,

- To make appropriate recommendations for environmental management organization and legislative compliance for the development,
- To ensure that issues raised by neighbors and project stakeholders are mainstreamed into the environmental management plan proposed for the project cycle.
- To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle,
- To present results of the EIA in such a way that they can guide informed decision making by NEMA.

1.4. Environmental screening criteria

In line with the second Schedule of Legal Notice No. 101 of 2003, the following considerations were taken into account in determining the environmental screening criteria.

- Ecological considerations (Biological diversity, sustainability, ecosystem maintenance)
- Social considerations (economic impacts, social cohesion and disruption, effect on human health, communication, effects on culture and objects of cultural value)
- Landscape impacts (views opened up or closed, visual impacts, compatibility with surrounding area)
- Land uses (effect of proposal on current land uses and land use potentials in the project area, possibility of multiple use, effects of proposal on surrounding land uses and land use potentials)
- Water (impact of proposal on water resources and drainage patterns or systems)

1.4.1. Results of screening criteria

The following table summarizes the results of the screening criteria.

Criteria	Results
Ecological impacts	– Existing trees at the site which will be cleared to pave way for the development – No endangered species of either plants or animals – No endemic species reported on site – Excavations will be undertaken and will impact on soil profile and micro-fauna
Social considerations	– Project will create employment – Revenue to the government – The proposed site neighbours the Little theatre Club which is a gazetted National Monument – No conflicts are likely to occur as a result of implementing the project
Landscape impacts	– The area is generally characterized by low and mid rise developments – Views will be closed up for buildings with fewer floors
Land uses	– Immediate neighborhood is characterized by commercial and residential land uses
Water	– Site will mainly rely on borehole water supply – Reticulated water supply from MOWASCO is available – Abstraction will have an impact on water resources in the area

1.5. The Scope of EIA proposal

1.5.1. Geographical scope

The geographical scope of the EIA focused on the project site area at Mbaraki area and the immediate surroundings.

1.5.2. Technical scope

The technical scope of the proposal considered all the environmental concerns of the project during construction, operation and possible decommissioning phases. Therefore the scope of this EIA proposal covered the following aspects;

- The nature and character of activities and processes at the site
- The baseline environmental and physical conditions of the project area,

- Detailed description of the project,
- Provisions of the relevant environmental, health and safety laws,
- Identification and analysis of any adverse impacts to the environment and neighboring communities likely to emanate from the project,
- Consultation with the immediate neighbors and key lead agencies on their opinion about the project,
- Development of proposals for implementation and monitoring of mitigation measures, and
- Provision of an outline of a detailed environmental management plan.

1.6. Assessment methodologies and materials

The methodology for preparing the EIA study report followed on the guidelines provided by NEMA through Legal Notice No. 101 of 2003 (Rev 2016). Various tools and mechanisms were utilized during the initial survey to collect and collate data. Site data collection was implemented using a pre-determined checklist developed based on the screening criteria and the reconnaissance survey. Baseline information was obtained from the site visits, consultations with neighbors, desktop resources and literature review.

Public consultations were executed through

- Informal interviews and discussions
- Administration of semi-structured questionnaires by the EIA team.
- Consultative meetings

In terms of field equipment, a GPS enabled smart phone was used in concert with Google Earth © for the purposes of Geo-referencing site data and recording field observations respectively.

The information gathered using the above strategies was evaluated and data analyzed to determine the required level of environmental performance and prepare the Environmental Management Plan.

1.7. EIA Study report format

Legal Notice No. 101 of 2003 (Rev 2016) specifies the manner in which EIA projects shall be conducted and the format to be adopted as follows;

- The nature of the project,
- The location of the project including the physical area that may be affected by the proponent's activities,
- The activities that shall be undertaken during the project construction, operation and decommissioning phases,

- The design of the project,
- The materials to be used, products and by-products including waste to be generated by the project and methods of their disposal,
- The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project,
- An action plan for the prevention and management of possible accidents during the project cycle,
- A plan to ensure the health and safety of the workers and neighboring community,
- The economic and socio-cultural impacts to the local community and the nation at large,
- The project budget, and
- Any other information that NEMA may require.

1.8. Reporting and documentation

The reporting and documentation follows on the format provided by NEMA through both EMCA, 1999 (Rev. 2015) and the Environmental Impact Assessment and Audit Regulations- Legal Notice No.101 of 2003. The proponent was continually informed throughout the period of report preparation to ensure that he was aware of the issues raised and the recommendations that were likely to be made regarding the best practices to mitigate environmental impacts.

2. PROJECT DESCRIPTION

2.1. Project location

The proposed project will be undertaken on Plot L.R. No. Mombasa/Block XLVIII/128, Mbaraki area of Mombasa County. The site lies along Mbaraki Road on **Latitude 4° 04´ 03.24´´ South** and **Longitude 39°39´52.29´´ East,** and an elevation of **65ft ASL** (Figure 2-1).

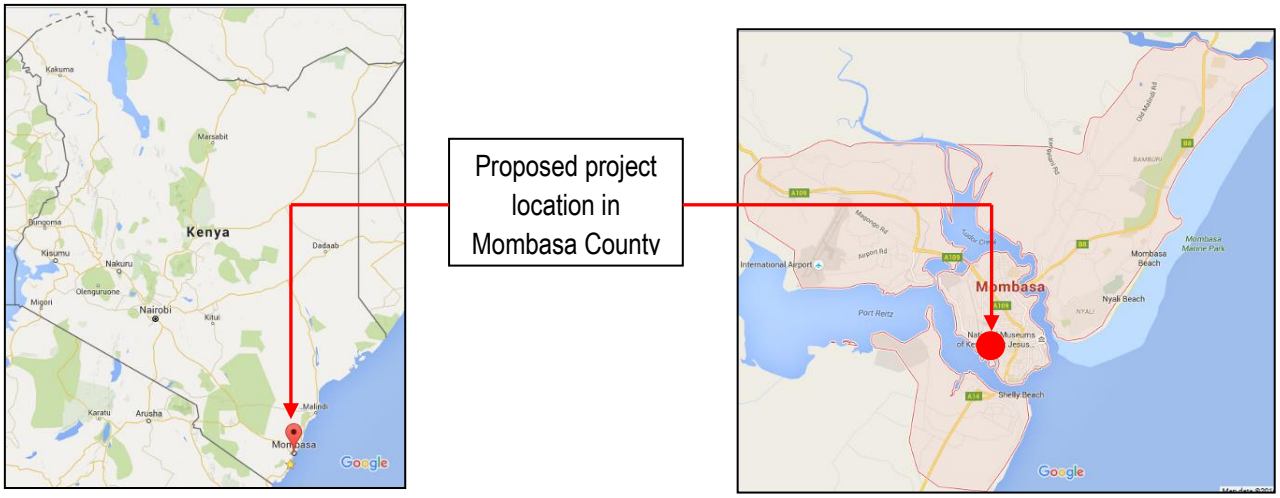
2.2. Current site status and land use

The site is enclosed by a boundary wall and there is an existing disused two-storey building that will be demolished to pave way for the proposed office block. The rest of the plot is covered by grasses, herbs and few trees that will be cleared to allow for the construction.

2.3. Project neighborhood

The neighbourhood displays a mix of land uses including residential, commercial, light industrial etc. the dominant land uses are however residential owing to the presence of KPA and National Police Service staff houses; and commercial owing to the proximity to the Liwatoni Bay and the busy Mbaraki Road. Other notable establishments within proximity to the proposed site are Mbaraki Cemetery, The Little Theatre Club, Alpha Group Godowns, Kencont CFS and The Mombasa Sports Club.

The East, West and Southern periphery of the site hosts informal food kiosks and temporary shacks put up by hawkers selling their wares to pedestrians using Mbaraki Road.



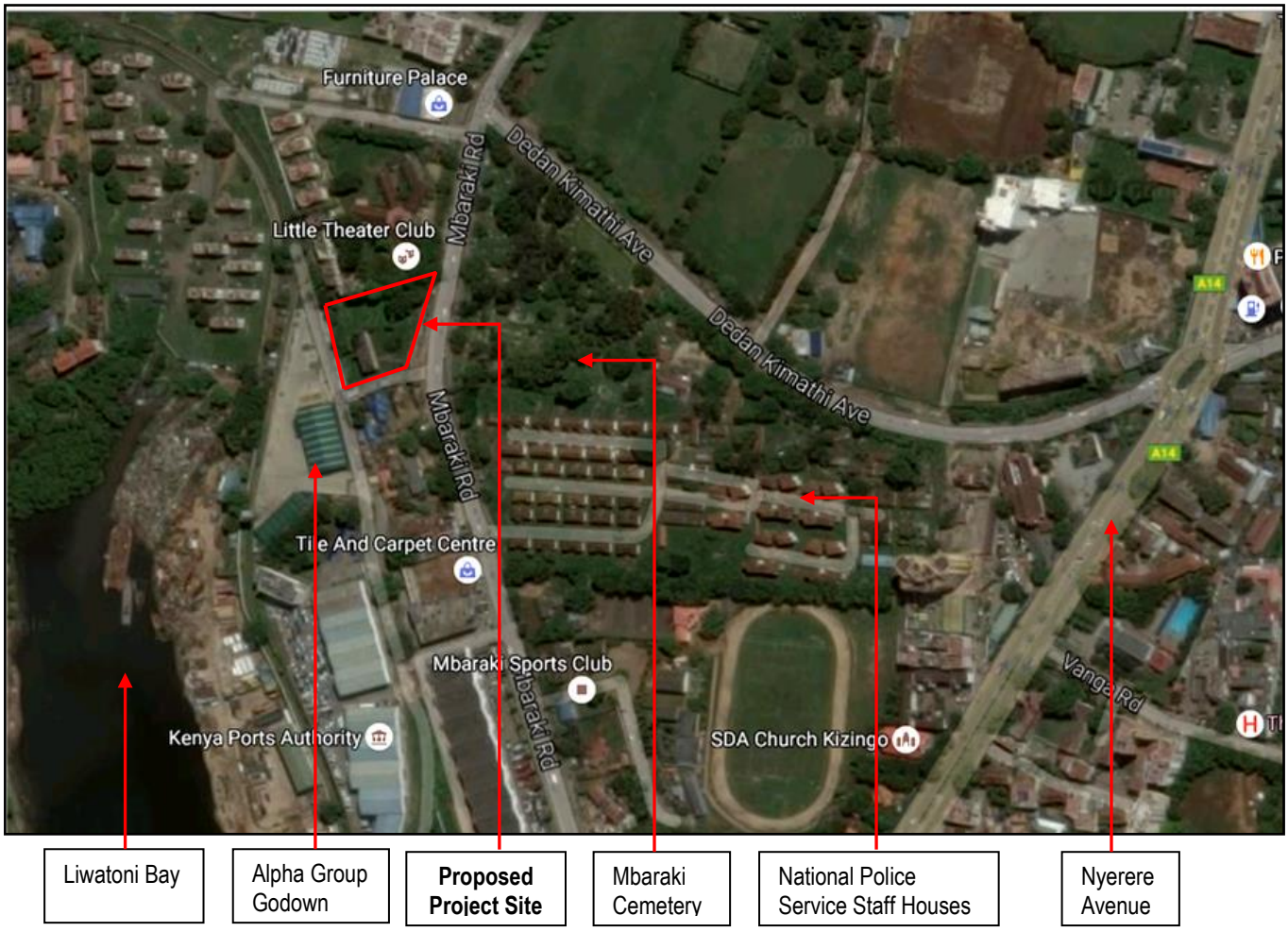


Figure 2-1: Google extract showing location of the proposed site.

Figure 2.2: The proposed site showing the existing structure to be demolished

Figure 2.3: A section of the proposed site showing trees that will be removed to allow for construction

Figure 2.4: A section of the proposed site showing the existing power installation & Boundary wall

Figure 2.5: A section of the project neighbourhood showing informal food kiosks adjacent to the site

Figure 2.6: A view from the proposed site showing the neighbouring residential units

2.4. Project activities

The project activities include;

- Drawing, design and engineering
- Acquisition of pertinent approvals from relevant government agencies
- Site preparation activities
- Actual construction of the office block
- Operation of the office block
- Possible decommissioning of the project

This report focuses on all these phases.

2.5. Building components

The proposed project will involve the construction, subsequent operation and possible decommissioning of an office block and auxiliary amenities. Upon completion the building shall consist of 3 basement floors, Ground floor, 1st -15th floors, an observatory level and a roof level featuring a helipad.

Other key components of the building will include basement parking; backup power generator, an auditorium, lettable office spaces, a restaurant, prayer room, sanitary facilities and waste management chutes. External component will include a bio-digester, parking, entry & exit gates with sentry box and an enclosing boundary wall

2.6. Construction process

The preparatory activities to be undertaken at the site will be initial demolition of existing building, site clearance followed by the excavation of the site to create trenches for use in laying footings for the development. Foundations will then be laid, and eventually the buildings. There will be use of machinery mainly for concrete mixing and lifting installations during the construction.

2.7. Construction technology to be used

Concrete mixing and mobile elevator equipment will be installed during the construction. Other equipment will include dump trucks and an assortment of hand tools. As such dust and noise will arise from the operation of the equipment and are likely to be issues of concern.

This requires the contractor to undertake the use appropriate technology that will reduce the impact of both noise and dust at the construction site.

2.7.1. Dust control technology

The contractor will deploy dust screens to mitigate the impact of dust during construction activities. The effectiveness of the screens will mainly depend on their sizes since fine screens are more effective compared to course ones. Their effectiveness will also be a function of how well the site is covered. Worn out screens will need to be replaced on a regular basis and the contractor will ensure that the site is secured with screens throughout.

2.7.2. Noise pollution control technology

Use of machinery at the site will be a source of noise for the neighbors. The contractor will therefore have an obligation to use suitable noise reduction strategies such as fitting silencers to machines that produce noise, locating noise producing machines as far away as practical from the residential area

2.8. Construction material

Structural construction of the site will largely apply ordinary materials that are not expected to have significant impact on the environment. Among the material to be used include:

- Mined sand and building blocks- to be obtained from quarries which are mainly located within the fringes of Mombasa County

- Wood will be obtained from exotic species like casuarina (*Casuarina equisetifolia*) sourced from planted woodlots and licensed mangrove poles
- Cement-manufactured locally - to be obtained mainly from suppliers in Mombasa town,
- Water fittings (pipes, valves and joineries) and other secondary materials such as, papers, polythene materials, and fabrics will be obtained from Mombasa town,
- Paints and decorating materials will be sourced from local outlets in Mombasa town,
- Electrical cables, lifts and other machinery will be sourced from Mombasa town,
- Finishing materials such as tiles, block boards are likely to be imported.

2.9. Use of the development

The proposed development is intended for commercial purposes as it will house KMA offices and lettable office spaces.

2.10. Aesthetic value considerations

To maintain the integrity of the surroundings the proponent will appreciate the need to have minimal impact on the aesthetic value of the area and landscape appropriately.

3. BASELINE INFORMATION FOR THE PROPOSED PROJECT SITE

3.1. Introduction

The following baseline information details on environmental, socio-economic and bio-physical characteristics of the site. It is meant to provide for a benchmark for continued monitoring and assessment of the impact of implementing the proposal on the environment.

3.2. Socio-economic setting

3.2.1. Livelihoods

Generally, the area is designated for residential purposes and has a cosmopolitan population due to its location. Majority of the home owners and tenants inhabiting Kizingo area work in Mombasa town and its environs. Only a minimal fraction of the population remaining work to service the residential developments in the area. These include house helps, security guards, gardeners etc.

3.2.2. Human and economic development

The economy of Mombasa Island is driven by maritime commerce and the tourism sector. The existence of the Kenya Ports Authority (KPA) and the attractions that Mombasa offers to tourists contributes significantly to the overall business activity within the County and its environs. The increase in the services offered by the transport sector has greatly been influenced by the cargo turnovers provided by the Port of Mombasa.

As demand for land use increases due to the increasing economic opportunities, available space per capita also decreases. For this reason, there are mixed economic operations in the larger Kizingo area on account of effects of market forces and the ever-changing people's needs. Provision of quality housing is one of the basic requirements of social-economic growth. This is a positive contribution to the commercial services and domestic consumption of Mombasa County.

There are also industrial establishments in Shimanzi, Kipevu and Changamwe all of which serve to provide employment, goods and services to the people of Mombasa County.

3.3. Demographic characteristics

The population growth of Mombasa town has been on the rise according to the 2009 population and housing census report. The high population growth rate averaging 3.14 % has been reported within the coastal towns of Mombasa, Kilifi and Malindi for the years between 1999 and 2009 which rose to an average of 3.6 % between 1999 and 2009.

Mombasa County has a total of approximately 1 Million people as per the 2009 census compared to approximately 650,000 people in 1999.

The main factors that have attributed to the population growth include increase in fertility rate and improved health services. Rural-urban migration and the continued influx of tourists and foreign investors have also contributed significantly to the growth. Migration from other districts has basically been triggered by employment opportunities in the tourism and the transport sector. In the Kenyan Coast as a whole, population distribution in the inter-lands is mainly affected by rainfall distribution, altitude, agro-ecological zones and administrative policy through which a number of settlement schemes have been created.

3.4. Poverty levels

Poverty is defined as the inability to afford daily basic needs to support life, comprising food and non food items i.e. clothing shelter and food, inability to access basic services i.e. education, health, water and sanitation and inability to access and control factors of production i.e. land, capital including information, life skills and employment. The causes of poverty in Mombasa County has been attributed to unemployment, landlessness, high and increasing cost of living, inaccessibility to credit facilities, lack of entrepreneurial skills, low incomes and HIV/AIDS. The underlying causes of poverty include poor governance, poor resource management, gender inequality, ignorance and marginalization of the disadvantaged. The poor in the district are also found in the division but according to the District Poverty Assessment Report (PAR) Likoni division was ranked with highest followed by Kisauni, Changamwe and Island Divisions in that order.

3.5. Cultural Heritage

Mombasa County hosts one of the oldest towns in the country which has hence contributed to the existence of many historical and archeological features. The indigenous inhabitants of the district at large are the Digos, Giriama's, Swahili's and a mix of Arab communities. The indigenous communities belong to the larger Mijikenda ethnic grouping. Overtime there has been an influx of investors and increase in population occasioned by a rural urban migration driven by a search for job and business opportunities.

The proposed site neighbours Little Theater Club which is a Gazetted National Monument and protected under the Monuments and Antiquities Act.

3.6. Environmental quality

3.6.1. Solid waste management

Solid waste generation in Mombasa District is estimated at 700metric tons per day. The waste is either organic or inorganic with the inorganic forms being non-biodegradable. The main waste generation sources are domestic, commercial ventures, hotels, markets, industries and institutions including health facilities. The types of waste that are generated include: Plastic waste including papers and hard plastics, Organic materials including food remnants and wooden debris, rubber, paper, metals, chemicals, glass, biomedical waste.

Waste materials are collected from point sources or municipal dustbins in mixed form and transported to the Mwakirunge dumpsite which is the only one serving Mombasa as well as the newly created Kilindini Districts. All types of waste are transported to the site including hazardous types containing pesticides, heavy metals, oils, batteries, acids, domestic and hospital wastes. The distance to site (16km) and the lack of adequate facilities for waste transport at the Mombasa Municipal Council has created a waste management problem for the city. The council has only about 10, seven ton tippers, 2 bulldozers, 2 compactors which are grounded and six tractors/trailers which are inadequate to efficiently dispose off all the waste generated by the city. As a result much of the waste remains largely uncollected.

3.6.2. Sewage disposal

The sewerage system faces a similar predicament to that of solid waste management. The system is connected to two treatment plants i.e. Kipevu treatment plant located on the West Mainland area and Kizingo Treatment Plant located in Kizingo area within Mombasa Town. Whereas the Kizingo plant is currently inefficient, the Kipevu one operates at 30% potential leading to the disposal of partially treated sewage into the sea at Makupa, Ziwani and Port Tudor. The rest of the County depends on privately constructed soak pits and pit latrines which have a potential to pollute water sources. There is little evidence of adherence to the Water Act 2002 that stipulates the requirements for boreholes and pit latrines to be located at far distances to protect ground water sources from contamination.

The proposed site is not serviced by a municipal sewer system and previously relied on a septic tank and soak pit system to manage sewage.

3.6.3. Water Quality

The water quality within the larger Mombasa area has been dropping in quality due to the pollution of ground water resources by improper disposal of liquid waste. The development will source water from reticulated supply by MOWASCO supplemented by borehole supply. It is a recommendation that the proponents undertakes tests on yields

and analysis of the water quality to determine capacity to meet the demand and conformity to Schedule 1 of the Water Quality Regulations, 2006.

3.7. Biophysical profile

3.7.1. Fauna

We established that there are no dominant or threatened fauna at the site. The most common wildlife forms in the area are birds which are also found within the Mombasa urban nature reserves.

3.7.2. Vegetation and biodiversity

Due to the low altitude of many areas within Mombasa County (mean= 30m) and the existence of poorly drained clay soils the main vegetation types consist of shrub material which has been extensively described by Fitzgerald (1898); Dale (1939); Edwards (1952) and were classified in detail by Moomaw (1960). Other vegetation types include planted casuarinas, coconut trees and baobab. Although rare shrub species have been recorded in other areas along the Kenyan coast for example in Kwale, none has been observed within Mombasa Town.

Natural ecosystems around the site have been interfered with by the developments and other economic activities, with only few patches of vegetation within the residential compounds and Mbaraki Cemetery. The dominant tree cover in the area is comprised of Neem and Casuarina Spp.

3.7.3. Topography

Mombasa County in particular is situated in coastal lowland with extensive flat areas rising gently from 8 meters to 100 meters above sea level in the west mainland region. The proposed development site is generally a flat land

3.8. Geographical setting

3.8.1. Topography, geological features and soils

The site lies within an area dominated by dead coral limestone. Mombasa County has no permanent rivers, but due to the favorable geology of some parts of the municipality, the water table is high and the sinking of boreholes and wells has led to the increased supply of water to supplement the reticulated supply.

3.8.2. Climatic conditions

The climatic changes of the project site are greatly influenced by the Migratory Inter-Tropical Convergence Zone (ITCZ) characterized by monsoon winds. The climatic regime favors the existence of a bimodal rainfall pattern (Fig.3-

1) with the long rain season occurring from April to July and the short rains occurring from October to December. The average annual rainfall for Mombasa County varies from 940mm in areas within the coastal zone and decreases to less than 500mm further inland.

Temperatures are fairly constant throughout the year ranging from 23°C to 28^{0}C. The warmest temperatures are generally recorded during the months of November to April (mean daily temperature of 27^{0}C) while slightly cooler temperatures are experienced from May to October (mean daily temperature of 24.5^{0}C). The average annual evaporation rate within the project area is 2300mm and the climate is generally classified as semi to sub-humid as the ratio of rainfall to evaporation ranges from 57-68%.

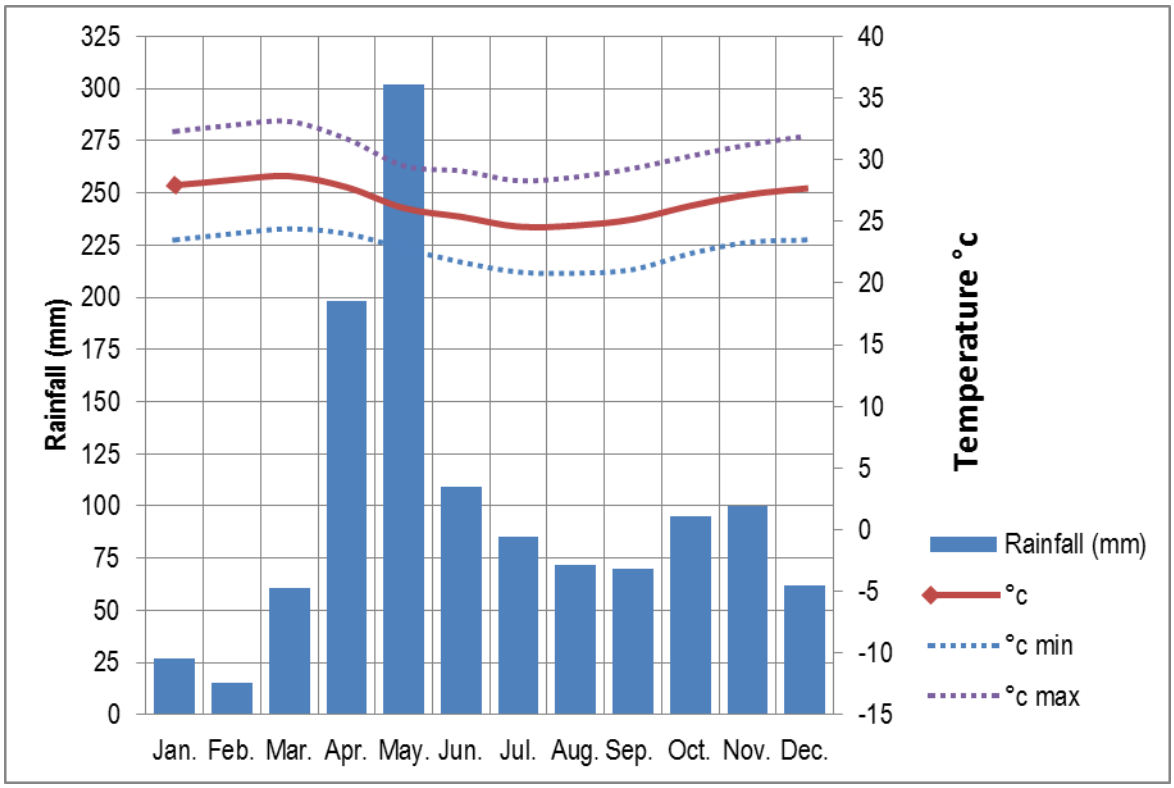


Figure 2. Annual distribution of rainfall and temperature range within the project site (Source: Nzuki & Gitau, 2012, data from meteorological department).

4. INSTITUTIONAL AND LEGISLATIVE FRAMEWORK

4.1. Introduction

In Kenya the requirement for development and existing projects to undergo EIA and EA respectively follows the enactment by the Kenya parliament of the Environmental Management and Coordination Act No. 8 of 1999 and section 3 of the Environment (Impact and Assessment) regulation No. 101 of 2003. Under this legal provision development projects are required to undergo the EIA process whose report is later submitted to NEMA for approval and awarding of a license after demonstrating that the possible negative environmental impacts of a given project will be effectively mitigated.

Similarly existing projects with a potential to impact on the environment, health and safety of communities are required to undergo an initial environmental audit and later annual self audits to determine compliance with environmental management plan.

For the proposed development for the building, the key legislative and regulatory requirements relate to proper management of the environment as well as safety aspects. The legislative and legal frameworks would therefore seek to address the issues that include among others;

- Approval of building plans by the County Government of Mombasa,
- Occupational Health and Safety during construction phase,
- Use of environmental resources to implement the proposal
- Waste generation and disposal
- Air pollution
- Noise pollution

4.2. Institutional Arrangements Relevant to the Project

The main institutions relevant to the proposed development are summarized in the table below. The summary includes the name of the institution, envisioned role (s) in the project cycle and the project phase required.

Table 4-1. Key institutions relevant to the proposed development

Institution	Envisioned role in the proposed project	Project phase required
National Environmental Management Authority(NEMA)	- Issuance of EIA license, - Monitoring for compliance with regulations, such as waste management, water quality and noise pollution control.	- Construction, - Operation, and - Decommissioning
County Government of Mombasa	- Approval of plans, - Building inspections, - Issuance of licenses	- Construction, - Decommissioning
Mombasa Water and Sewerage Company	- Supply of water for the entire development,	- Construction, - Operation, and - Decommissioning
Water Resources Management Authority	– Permit for extraction of water resources	– Construction, – Operation
Directorate of Occupational Health and Safety	- Registration of the construction site as a work place - Enforcing compliance with Occupational Health and Safety Regulations at the construction site	- Construction
Physical Planning Department	- Building certifications - Approval of planning considerations	- Implementation

4.3. Legal Framework

The following legislative provisions and regulations are considered key to management of the environmental, health and safety aspects related to the proposed development.

4.3.1. The Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. Any other law that is inconsistent with the Constitution is null and void to the extent of its inconsistency. Under Chapter IV, article 42 provides for the right to a clean and healthy environment for all. Further, Chapter V of the Constitution deals with Land and Environment. Specifically Part 2 elaborates on the following components regarding the protection of the environment.

- Obligations in respect of the environment
- Enforcement of environmental rights
- Agreements relating to natural resources

- Legislation relating to the environment

Relevance to the proposed project

- The proponent has a right to carry out the project within legal limits.
- The proponent must ensure that the project is carried out in an ecologically, economically and socially sustainable manner.
- The proponent is entitled to a fair administrative decision making process from NEMA and other State organs.
- The proponent must ensure that all the applicable provisions of the Constitution are observed at all times.

4.3.2. The Environmental Management and Co-ordination Act, 1999 (Rev. 2015)

The purpose of this Act aims at improving the legal and administrative co-ordination of the diverse sectored initiatives in the field of environment so as to enhance the national capacity for its effective management. To administer the Act, two major institutions have been established. They include the National Environmental Council (NEC) and the National Environmental Management Authority (NEMA). It has several Regulations that are discussed in the proceeding sections.

4.3.2.1. EIA/EA Regulations (Legal Notice No. 101 of 2003)

The EIA/EA Regulations are meant to ensure the implementation of Sec. 58 of EMCA. It makes it illegal for anyone to undertake developments without an EIA licence and stipulates the ways in which environmental experts should conduct the Environment Impact Assessment and Audits reports in conformity to the requirement stated. It is concise in its report content requirements, processes of public participation, licensing procedures, inspections and any possible offences and penalties under the Act.

Relevance to the proposed project

- Acquisition of EIA license to commence project development. The operations of the project are similarly licensed since the EIA report contains an Environmental Management Plan which forms the basis for approval of the project by NEMA and imposition of conditions to safeguard the environment. Due to its transparent nature, the EIA process builds neighborhood support and sustainability into the project.

4.3.2.2. Water Quality Regulations (Legal Notice No. 120 of 2006)

Water quality regulations were gazetted as a legislative supplement to mainly address the challenges of pollution of water sources and conservation. It consists of VI parts and eleven schedules dealing with protection of water sources

for domestic use to miscellaneous provision. Effluent discharge and water for industrial use are dealt with under part III which sets out the following:

- Standards for discharge into the environment,
- Standards for discharge monitoring, and
- Application for effluent discharge license.

Generally the act addresses the challenges of pollution of water resources as well as their conservation. The regulation provides guides for water use and conservation as well as effluent standards for discharge.

Relevance to the proposed project

- The proponent should ensure that effluent meets the standards set out under Schedule III of Legal Notice No. 120 of 2006. Monitoring activities will follow the guide values provided under schedule IV.
- Establish an Effluent Treatment Plant and obtain an effluent discharge licence from NEMA.

4.3.2.3. Waste Management Regulations (Legal Notice No.121 of 2006)

In pursuit of the provisions of the Environmental Management and Coordination Act, 1999, the Minister for Environment in 2006 gazetted the waste management regulations focusing on management of solid wastes, industrial wastes, hazardous wastes, pesticides and toxic substances and radioactive substances The regulations are aimed at addressing the following concerns;

- Licensing of waste disposal sites and transport,
- Reduction of waste through adoption of cleaner methods of production,
- Responsibilities for waste generators and obligations for disposal,
- Proper transportation and disposal of wastes,
- Management of waste disposal sites,
- Waste treatment requirements,
- Application of existing regulations in relation to waste management,
- Licensing of waste handlers and disposal sites, and
- Licensing fees and procedures for waste handlers and pollution penalties

Relevance to the proposed project

- Provide mechanisms for the separation of wastes

- Ensure there exists proper contractual agreement with NEMA licensed solid waste handlers and that solid wastes are collected in a timely manner and disposed responsibly

4.3.2.4. Noise Regulations (Legal Notice No. 61 of 2009)

These Regulations were gazetted to manage noise levels to levels that do not cause a disturbance to the public. The proposed activities will however have a potential for the production of noise above the acceptable limits. The background noise along links road is also comparatively higher than that which is likely to be produced by machinery at the construction site.

Relevance to the proposed project

- Ensure compliance with the set noise level limits for the site especially during construction. The contractor should ensure that employees are not exposed to noise levels above 85 dB (A) and in such cases provide suitable personnel protection equipment (ear protective devices).

4.3.2.5. Air Quality Regulations, (Legal Notice No. 34 of 2014)

These regulations were aimed at controlling, preventing and abating air pollution to ensure clean and healthy ambient air.

Relevance to the proposed project

- The proponent will ensure that operations at the site do not generate dust, particulates and other emissions beyond the allowable limits especially during construction
- Deploy efficient dust screens and provide dust masks to workers during construction

4.3.2.6. E-waste guidelines

NEMA has developed E-waste guidelines to manage wastes emanating from information technology and household as well as industrial activities. For the proposed office block, the types of e-waste that are likely to be generated will include used printers, computers, among other electronic and electrical waste.

Relevance to the proposed project

- The proponent along with the tenants will need to comply with the e-waste guidelines as issued by NEMA, especially with regard to disposal of obsolete electronic and electrical equipment (EEE) through approved recycling facilities.

4.3.3. The Water Act No. 8 of 2002

While developing the National Water Policy, the Government also established a National Task Force to review the Water Act, Chapter 372 and draft a Bill to replace the Water Act, Chapter 372. The Water Bill 2002 was published on 15th March 2002 and passed by Parliament on 18th July 2002. It was gazetted in October 2002 as the Water Act, 2002 and went into effect in 2003 when effective implementation of its provisions commenced. The legal framework under the Water Act 2002 provides the guidelines in line with the existing policy changes, four key institutions with separate functions and decentralized decision making systems. These institutions are summarized in the table below.

Table 4-2. Water Resources Management Institutions and their roles as established under the Water Act, 2002.

Institution	Role under the revised Water Act, 2002
Water Service Boards (WSBs)	Development and maintenance of regional water provision infrastructure
Water Service Providers (WSPs)	Provision of water to households
Water Resources Management Authority (WRMA)	The Authority is responsible, among other things, for the issuance of reclamation permits and diversion of river courses.
Water Services Regulatory Board (WSRB)	The Regulatory Board is mandated to license all providers of water and sewerage services who supply water services to more than twenty households

In furtherance to the Water Act 2002, the Ministry of Water and Irrigation and Water resources Management Authority (WRMA) in collaboration with other stakeholders has prepared a set of Regulations which have now been gazetted under the Legal Notice No. 171 of 28th September 2007 to give guidelines on water permit acquisition and adherence to conditions attached and also enforcement of the user fee charges.

Relevance to the proposed project

- The proponent should ensure that water usage in all phases of the project cycle is in line with the provisions of this Act
- Obtain a permit from WARMA if a borehole will be considered as a source of water to supply the facility.

4.3.4. Electricity Power Act No. 11 of 1997

The Act establishes the Energy Regulatory Commission (ERC) with a mandate for the management of energy issues in Kenya.

Part III of this Act is dedicated to Electricity energy. Section 30 of this part stipulates that any electrical installation work should be conducted by such a person as one licensed by the ERC as an electrician or an electrical contractor.

The Energy Act repealed The Electric Power Act No. 11 enacted in 1997 which dealt with the generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes.

Relevance to the proposed project:

- Electricity power installation and usage should be done in a manner that seeks to protect the health and safety of the project employees; the local and other potentially affected communities as well as the environment.
- Electrical installation to service the facility should be done by a licensed electrician under ERC.
- Liaison with relevant agencies such as KPLC should be sought where necessary.
- Proponent should adhere to provisions of this Act in all phases of the project.

4.3.5. Occupational Health and Safety Act No. 15 of 2007

The OSHA No. 15 of 2007 repealed the Factories Act, Cap 514 Laws of Kenya which had been originally adopted in 1962 and revised in 1972, underwent further and extensive amendments in 1990. The provisions of OSHA have far reaching implications on safety and health at the work place. The OSHA sets out to make provisions that aim to eradicate or minimize accidents at the work place. Throughout the world, work related accidents are a major concern for Governments and industry, the hospitality industry included. The ILO estimates that there are over 250 million work related accidents per year; 160 million work related ill health every year and that 3000 people are killed at work per day.

Of particular importance to the proposed project is the requirement that all work places must be registered with the Department of Occupational Safety and Health Services. Further, there is a requirement that a Safety and Health Committee must be put in place and that employees and members of this committee must be inducted and trained on the provisions of the Act accordingly. The Act imposes various obligations on both employers and employees.

Relevance to the proposed project

- Strict provisions are made self-acting machines, hoists and lifts and the requirement for supervision and training of inexperienced workers.

- Provision of personal protective equipment (PPE) to workers in hazardous areas and ensuring their use.
- Register the construction site as a workplace with the Directorate of Occupational Health and Safety

4.3.6. The Public Health Act- Laws of Kenya, Chapter 242

The Act prohibits activities that may be injurious to health. It then becomes the responsibility of the local authority to maintain clean and sanitary conditions. This affects the cleanliness of a premise, the quality of water supplied for drinking purposes, the types of wastes discharged and possible air emissions that may be injurious to health. Under this act the proposed facility must be kept clean, daily removal of accumulated dust from floors, free from effluvia arising from any drain, sanitary convenience or nuisance and without prejudice to the generality of the foregoing provisions.

Relevance to the proposed project

- Applicable during the entire project cycle in ensuring that proper and hygienic methods are used.
- Maintain the site according to standards, ensure access to safe drinking water and put measures to prevent activities that would be a nuisance to the public.

4.3.7. The Physical Planning Act, Cap. 286

The local authorities are mandated 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 the prohibition or control of the use and development of land and buildings in the interests of proper and orderly forms of development in the area.
Section 36 of the Act allows local authorities to order for the project to comply with NEMA regulations i.e. EIA reports if the authority deems that the project has injurious impacts on the environment.

EMCA, 1999 stipulates the procedures for conducting the EIA process and recommends annual audits to monitor progress of implementation and environmental performance. In general, this Act provides for the preparation and implementation of physical development plans. They formulate national, regional and local development policies, guidelines and strategies. The director also advises the Commissioner of Lands on appropriate uses of land and land management. The Act directly prohibits or controls the use and development of land and buildings in accordance to the projected development plans of the area.

Relevance to the proposed project

- Applicable during the entire project cycle. The proponent will obtain development approvals and requisite operational licenses from the County Government of Mombasa.

4.3.8. The building code 2000

The Building Code 2000 is especially important with regard to the observation of setback lines and provisions to ensure habitable existence with other neighbouring buildings

4.3.9. Occupiers Liability Act Cap 34

An act of parliament to amend the law as to liability of occupiers and others for injury or damage resulting to persons or goods lawfully on land or property from dangers due to the state of the property or to things done or omitted to be done there.

Relevance to the proposed project

- Ensure safety of workers during construction and possible decommissioning phases and occupants upon occupation of the office block.

4.3.10. County Government by-laws

Prescribes the necessary easements required for the establishment of any project within the County.

Relevance to the proposed project

- Ensure adherence to the by-laws provisions and acquire the necessary approvals and permits.

5. PUBLIC CONSULTATIVE PROCESS AND RESULTS

5.1. Introduction

Public consultations were held through two strategies to obtain the views and comments of neighbors regarding the development. These were;

- Administration of semi-structured questionnaires with major headings on the environmental impacts of the development on neighbors. The questionnaires also collected information on the profile of neighbors including proximity to the site and whether there were any benefits associated with the development. The questionnaires were distributed on a door to door basis by personnel employed by the consultants.
- Informal discussions with neighbors to the project site

5.2. Neighborhood responses and concerns

The table below gives a summary of the issues raised by the neighbours interviewed. The filled in questionnaires from the neighbors and their comments are appended in this report.

Table 5-1: Summary of issues raised by project neighbours

Respondents profile				**Comments**
	Name	***Stakeholder status***	***Contacts***	
1.	**Patrick Njoroge** (D.OCPD) c/o Mbaraki Police Depot	**Neighbor**	**0721478544**	– No objections to the proposed development.
2.	**Maurice N. Obogo**	**Neighbor**	**P.O.Box 95328-Msa.**	– No objections to the proposed development. – Possible provision of employment opportunities. – Growth of the environment around the site.
3.	**Mumo Ngui**	**Neighbor**	**0708946291**	– No objections to the proposed development. – Enhance area development. – Air pollution. – Noise nuisance during construction – Enhanced security in the locality. – Employment of the local youths.
4.	**Nina Jane**	**Neighbor**	**0707785373**	– No objections to the proposed development. – Enhance area development. – Apply pollution prevention measures during construction – Enhanced security in the locality.

				– Employment of the local youths.
5.	**Leonard Kirui**	**Neighbor**	**0723395154**	– No objections to the proposed development. – Enhance area development. – Apply pollution prevention measures during construction – Enhanced security in the locality. – Employment opportunities to the local youths.
6.	**Muiruri Ignatius**	**Neighbor**	**0714366565**	– No objections to the proposed development. – Enhance area development. – Air pollution. – Noise nuisance during construction – Enhanced security in the locality. – Source of employment to the local youths.
7.	**The Little Theatre Club**			– Pending
8.	**Kenya Ports Authority (Staff Quarters)**			– Pending
9.	**Alpha Logistics**			– Pending
10.	**Furniture Palace**			– Pending

6. IMPACT IDENTIFICATION ANALYSIS AND MITIGATION

6.1. Introduction

This section brings together both the environmental baseline and project characteristics in the previous sections. The proposed development is expected to change both the biophysical, environmental and socio-economic character of the proposed project area. Environmental impacts are expected to arise from the construction, operation and possible decommissioning phases, and the assessment is thus done to cover these phases.

6.2. Initial demolition phase

6.2.1.1. Positive impacts

6.2.1.2. Employment and sale of services

At the initial demolition, a number of workers both skilled and unskilled will be required to bring the existing building down. Waste handlers will also benefit by selling their services in handling the waste emanating from the demolition.

6.2.1.3. Recovery of construction material

Some of the materials will be recovered for re-use, thus reducing expenditure on the construction material, as well as reducing pressure on the environmental resources in acquiring new materials.

6.2.2. Negative impacts

6.2.2.1. Noise

Noise will be inevitable during demolition phase, but the levels can be controlled to significantly reduce the impact. The sources of noise will be from the deployed machinery, demolition works, delivery vehicles and workers

Mitigation measures

- Deploy acoustic screens around noisy working areas to contain noises
- Restrict demolition works to day time only
- Provide PPEs such as ear muffs and earplugs to workers

6.2.2.2. Accidents and risks

Safety of workers and neighbours will be compromised because there is a possibility of demolition rubble falling on them, accidents from heavy commercials as well as health hazards posed by dust.

Mitigation measures

- Provide full protective gear (PPE) to the workers
- Conspicuously display clear signposting and warning signs on site
- Investigate all accidents and put in place appropriate measures to prevent recurrence.

6.2.2.3. Dust

Demolition rubble and vehicles accessing the site will generate dust which is likely to spread to other areas especially when the wind intensity is high. This will be a nuisance to the neighbours as well as workers on site.

Mitigation measures

- Sound project planning to complete demolitions within the shortest time possible
- Restrict demolitions to daytime and schedule activities at times of low wind intensity
- Deploy fine dust screen and spray water on dusty materials/areas to contain dust
- Provide workers with the necessary PPEs such as dust masks and enforce their use

6.2.2.4. Demolition waste

Waste emanating from the demolition if not handled properly will be a source of environmental degradation. The wastes will include rubble, wood, metal reinforcements etc.

Mitigation measures

- Contract a private NEMA licensed solid waste handler to manage demolition wastes effectively
- Salvage reusable components and sell to re-users

6.3. Project construction phase

6.3.1. Positive impacts

6.3.1.1. Employment

Besides consultants, architects, surveyors, EIA experts and engineers already engaged in the project planning and design, the construction phase will further employ both skilled and unskilled personnel. The overall impact of the project to servicing employment needs is considered low due to the scope of the project and its short time implications

The income obtained from the employment will help be better the lives of the persons affected.

6.3.1.2. Income to the local population

If the economic labor policy is focused on the local community, unskilled labor from the neighborhood will earn them income. The income will boost the economic power of the residents of the area therefore bettering their lives.

6.3.1.3. Income to other businesses

Suppliers of raw materials will derive an added business opportunity from the construction needs of the project. Also facilities to provide services to the work force at the site such as restaurants and hotels will benefit from an added customer base.

6.3.1.4. Income to the government in terms of taxes

The government intends to get income/revenue in terms of taxes generated during the acquisition of licenses. The construction material to be used during construction will also be taxable (16% VAT). Through the revenues generated, the government will be capable of financing its obligations to the country.

6.3.2. Negative Impacts

6.3.2.1. Continued sourcing of raw materials

To complete the construction phase, the project will still source raw materials from the environment including sand, ballast, building blocks, cement, steel, wood etc. These materials will have an impact on the environment at their point of origin either through extraction or industrial pollution associated with their production.

Mitigation measures

- The contractor will obtain raw materials for the construction from sources that are compliant with NEMA Regulations.
- The contractor will procure quantities that are sufficient for the intended works only and recycle as far as practical to curtail wastage.
- The contractor will commit to extensive use of recycled raw materials as will be appropriate and in a manner that does not compromise the safety of the development.

6.3.2.2. Destruction of the physical environment

Destruction to the physical environment during this stage is inevitable. Excavation, for the building foundation will create loose soil that may easily be carried away by water or wind. This causes soil erosion and disturbance in soil quality.

Soil compaction, a characteristic of construction activities, seals the soil on the surface hence hindering the penetration of air or water beneath the surface. This limits the aerobic activities of the organisms underneath the soil, hence affecting soil productivity. Compaction also hinders the infiltration of water into the surface hence increasing the surface run-off increasing the possibility of flooding downstream of the site.

Mitigation measures

- Compacted areas to be ripped to prevent erosion
- Restore degraded areas through landscaping using trees and sediment binding grasses
- Control earthworks to prevent compaction of the loose soils.
- Obtain a permit to fell trees from KFS

6.3.2.3. Occupational health and safety hazards

The movement of materials into the construction site, and the actual construction activities by workers may cause accidents with a potential to cause injury, permanent disability or even death. The responsible contractor must ensure that all the site workers are briefed about the potential risks of injuries on site and psychologically prepared on how to handle them

Mitigation measures

- Provide adequate and appropriate Personal Protective Equipment (PPE) including safety shoes, helmets, gloves, overalls etc.

- Employees to be given the correct tools and equipment for the jobs assigned and trained on their use
- First aid services and an emergency vehicle to be readily available at site
- Moving parts of machines and sharp surfaces to be securely protected with guards to avoid unnecessary contacts and injuries during construction phase
- The contractor to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007
- First aid services and an emergency vehicle to be readily available at site

6.3.2.4. Safety of visitors, neighbors and general public

The proponent and the contractor will have an obligation to put in place measures that will protect the visitors to the construction site, neighbors, and the general public.

Mitigation measures

- Visitors to the project site must be provided with PPE at all times,
- Inform all neighbors in writing on the commencement of the project at least two weeks in advance,
- Restrict access to the site by the public by fencing off the construction site,
- Heavy Commercial Vehicles accessing the site to deliver construction materials must observe speed limits,
- Conspicuously display safety signs and warning posters visible to the public
- Provide for security services at the site.

6.3.2.5. Air pollution

At the construction phase dust will be expected from excavation of soil and movement of vehicles. If generated in large quantities dust may present a respiratory hazard and also cause visual intrusion hence presenting accident risks. Dust is also a mechanical irritant to the eye.

Air emissions would also be expected from exhausts of vehicles delivering construction material. Stand-by generators that may be brought in to serve during power outages are likely to release some emissions to the atmosphere.

Mitigation measures

- Contractor to deploy fine dust screens at the site during construction
- Sprinkle dust producing materials such as ballast with water during offloading on site
- Retain vegetation as much as possible to reduce bare areas exposed to wind
- Use low Suplhur fuels to power delivery vehicles and site machinery
- Provided employees with dust masks and goggles.

6.3.2.6. Solid waste generation

Metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, plastic paper bags, empty paint containers among others will be generated during construction phase of the project.

Mitigation measures

- Installation of litter bins and a receptacle that encourage separation of wastes at source to promote re-use and re-cycling,
- Procure the services of a NEMA licensed waste handler to manage solid wastes from the construction site
- All recyclable materials should be collected and sent to NEMA licensed recyclers

6.3.2.7. Noise pollution

Noise is expected from movement of vehicles and construction equipment. It would also arise from construction activities at the site such loading and offloading of material, carpentry and masonry activities.

Mitigation measures

- Deploy compact machinery and fit them with mufflers
- Personnel working at the site will be provided with Personnel Protective Equipment (PPE) such as earmuffs
- Deploy acoustic screens around noisy working areas to contain noises
- Limit construction works to daytime on weekdays only

6.3.2.8. Traffic Management

Traffic increase along Mbaraki Road may occur as contractors' vehicles bring in deliveries at the site and as workers leave or come to the site. However, it is foreseen that the day-to-day activities during the construction phase might not adversely impact on the normal traffic on the already busy Mbaraki Road.

Mitigation measures

- The contractor will ensure that the vehicles delivering materials do not block the road and accommodated within the site
- Heavy commercial vehicles delivering raw materials shall observe designated speed limits for the area.
- Proper signage and warnings to be placed along Mbaraki Road to forewarn other motorists on the use of the road by heavy commercial vehicles
- Deploy flagmen to guide traffic along the road during construction works adjacent to the road

6.3.3. Workforce effluent

The workforce at the site will require sanitation facilities.

Mitigation measures

- The contractor will deploy temporary sanitary units (Mobile toilets) as the construction phase
- The mobile units should be emptied by NEMA licensed effluent handlers

6.3.3.1. Increased water demand

Construction projects utilize significant quantities of water for mixing and casting concrete. Water will also be required for human use including drinking and sanitary needs.

Mitigation measures

- The contractor to ensure prudential use of water resources during construction by avoiding wastage such as running pipes and taps
- The proponent should obtain a water abstraction permit from WRMA and install a meter to monitor the water yields from the borehole

6.3.3.2. Insecurity

Due to the labor requirements of the site, there is likely to be cases of increase in insecurity in the area.

Mitigation measures

- Proponent and contractor to vet all workers on site
- Require certificates of good conduct from potential employees and copies of identification documents for all workers to be retained by the contractor

6.4. Operational phase

6.4.1. Positive impacts

6.4.1.1. Income to the Proponent

The proponent will accrue income from leasing out the lettable office spaces

6.4.1.2. Employment creation

Employment opportunities will arise from the need for workers to service the development such as cleaners, security, personnel, and others. The Proponent will further source for services in waste management, pest control thus indirectly create employment for the service providers. This will boost the quality of life for both the skilled and unskilled workers.

6.4.1.3. Provision of services

The operation of the commercial building will render to the business community availability of rental space to conduct transactions as well as providing ample office space for the proponent to provide services to the public

6.4.2. Negative impacts

6.4.2.1. Increased traffic

As the tenants move in the new commercial building for business, traffic increase is expected as vehicles access and leave the premises

Mitigation measures

- The development has incorporated adequate parking spaces to accommodate all vehicles accessing the site
- The development will be serviced by two gates and provide dedicated entry and exist lanes
- Collaborate with the Mombasa County Government and Kenya Urban Roads Authority (KURA) to install speed limit signage and hazard demarcations along Mbaraki Road to address safety concerns for pedestrians

6.4.2.2. Effluent generation and possible water quality degradation

Ground water sources may be polluted if sewage generated by the tenants, clients and workers at the commercial building is not managed in an appropriate manner. Being an office block, the wastewater will typically be domestic and will constitute a combination of flows from the kitchens, toilets and wash water. There is little data on wastewater productions rates and therefore the estimated wastewater production for the proposed office block has been derived using the recommended parameters for domestic sewage for developing countries. The parameters (BOD, COD, NH3-N, & suspended solids) use recommended averages for residual gray water and domestic sewage combined.

Table 6-1 below provides a summary of the typical composition of untreated domestic wastewater.

Table 6-1: Typical composition of untreated domestic sewage *

Constituent	Weak	Medium (all mg/l)	Strong
Alkalinity (as CaCo3)	50	100	200
Biological Oxygen Demand (BOD)	100	200	300
Chemical Oxygen Demand (COD)	250	500	1000
Total Suspended Solids (TSS)	100	200	350
Total Dissolved Solids (TDS)	200	500	1000
Total Nitrogen**	20	40	80
Total Phosphorous**	5	10	20

*adapted from Davis-Cromwell: Introduction to Environmental Engineering, pp 353

** Total Nitrogen is a measure of the total organic and ammonia nitrogen in the wastewater.

Phosphorus may appear in many forms in wastewater. Among the forms found are the orthophosphate, polyphosphates, and organic phosphates, all these are grouped as total phosphorus.

The environmental impact of wastewater relates to its pollution potential through disposal. Improper disposal methods can impact on water resources and air quality.

Mitigation measures

- The proponent will install a bio-digester which is considered adequate to effectively manage the effluent emanating from the office block
- Contract a NEMA licensed effluent handler to empty the sludge from the bio-digester for proper disposal

- Conduct quarterly monitoring of the effluent discharged from the bio-digester against standards set out in schedule III of Water Quality Regulations, 2006
- Apply for an Effluent Discharge License from NEMA
- Explore technological options that promote usage of less water to reduce waste water generation at source.
- Contract reputable professionals to conduct regular inspections and maintenance works on the bio-digester

6.4.2.3. Increased water demand

The tenants, clients and workers of the premise will exert an extra demand on water, as it would be required for sanitation purposes among other uses. This causes strain on the water resources.

Mitigation measures

- Recycle the treated water from bio-digester for reuse in landscaping and firefighting
- Install water saving systems e.g. automatic water tap turnoffs, less water capacities cisterns, etc.
- Rain and storm water harvesting is recommended as a measure to provide for water for general cleaning
- A borehole to be drilled on site and reticulated supply are considered sufficient to meet the rise in demand for water resources. The proponent will liaise with WRMA to confirm this position in terms of yield and quality.

6.4.2.4. Solid waste

A lot of waste is expected to result from the operations of the building such as paper, cartons, plastics, broken glass and other related office wastes. The waste requires to be handled appropriately in order to maintain the aesthetic value of the neighborhood and avert other effects such as injuries, production of odour, public health hazards etc.

Mitigation measures

Solid waste management plan

The solid waste management plan for the proposed office block will focus on the storing, collection, and disposal of all the solid waste that is produced. This program will implement and develop waste minimization strategies designed to maximize the use of recyclable and reusable materials as well as to report the generated volumes and its reduction schemes. Both construction and operational phase wastes will be treated according to the Waste Management Regulations (Legal Notice No. 121 of 2006).

With this in mind, the solid waste produced by the office block will be separated into organic and inorganic with the inorganic being further separated into combustible and non-combustible.

Waste Minimization

Waste management by whatever means is will require a substantial financial input. The project proponent will bear this cost and therefore will aggressively pursue other less expensive options as long as they are compatible with maintaining sound environmental practices. With this in mind, the proponent will resort to the 6Rs of waste management (Refuse, Reduce, Resuse, Recycle, Recovery of energy & Rot).

If incorporated, these practices will greatly reduce the solid waste volume produced by the project and also the associated costs and overhead expenditures that accompany the solid waste management programs

Solid Waste Collection

The solid waste generated on site will be divided into two i.e. organic and inorganic forms. Garbage receptacles will be placed at strategic locations for the collection and storage of garbage. This will be especially important in considering the need for effective management of the solid wastes. Non-combustible wastes such as glass, iron, aluminum, some plastics and others will be further separated and sent to recycling plants.

The entire solid waste from the office block will be collected on a regular basis by a NEMA licensed waste contractor. The collection schedule may vary from time to time depending on the volume and available human resources, nevertheless the endeavor will still remain a weekly operation

Commercial waste management

- Used tires will be stockpiled and taken out for disposal by licensed contractors
- These will be adequately stored and discarded by a certified disposal for recycling.
- Toxic waste is outright dangerous to human health and should only be handled with specialized equipment and carefully disposed of far away from any inhabited area.

Final waste disposal

- For the wastes that could not be re-used, composted or recycled, a NEMA licensed waste contractor will be engaged to facilitate a final disposal of such wastes.
- Proper records kept for collection and disposal for monitoring purposes.
- Waste management and disposal will be in The Waste Management Regulations, Legal Notice No. 121 of 2006

6.4.2.5. E-waste

The use and activities to occur at the commercial building will generate e-waste mainly composed of;

- Used computers and computer accessories
- Obsolete electronic equipment
- Mobile phones
- Power accessories

Mitigation measures

- Proponent will provide dedicated bins for collection of e-waste
- E-waste to be collected by a NEMA licensed waste handler and conveyed to a recycling plant.
- Proponent to comply with E-waste management guidelines by NEMA

6.4.2.6. Increase in electricity demand

Operation of the premise will require use of electric energy in lighting and powering electrical installations. The development will exert more demand on the electricity infrastructure. An additional loading from the office block will have an impact on the supply.

Mitigation measures

- The proponent will make an application to Kenya Power to replace the power service capacity at the site to accommodate the new development within the national grid
- The overhead lines traversing the site should be replaced by suitable rating underground power cable
- Sensitize occupants to invest in energy-efficient lighting systems and equipment
- Monitor energy use during operations and maintain records
- Conduct annual energy auditing and implement recommendations

6.4.2.7. Fire Safety and security

Accidental leakage/ spillage of substances, electrical faults are some of the possible causes of fire, which can cause considerable losses in terms of injury to persons and damage to property. This has a negative financial impact both to the owner and tenants.

Mitigation measures

- Fire extinguishers will be provided at convenient locations within the building and regularly inspected and maintained by a reputable fire security company

- Install fire hydrants and alarm system throughout the building
- Develop an elaborate emergency response plan to address the risks associated with operation of the building
- Security will be enhanced by contracted security firm.

6.5. Decommissioning phase

Mitigation measures for the decommissioning phase can only be provided for actions that will be deliberate on the part of the proponent such as closure by government agencies due to non-compliance with environmental and health regulations. Other factors that may contribute to the need for decommissioning including end of project life, an order by a court of law due to non-compliance with existing Regulations, Change of User, and Natural calamities etc.

The proponent will have a responsibility to ensure that the facility is licensed at all times as required by law and that it conforms to environmental standards.

6.5.1. Solid wastes

Decommissioning activities will be accompanied by generation of solid wastes especially due to the end of project life or change of user. Solid wastes expected at this phase include among others; Plastics, wood, glass, metal, papers, iron sheet, electricity gadgets, concrete blocks, among others.

6.5.2. Insecurity

The abandoned site may pose a security risk upon decommissioning as the unoccupied structures within the site may act as a den of criminals and robbers. Besides, the security boost that had been provided by the security guards deployed at the site and by day-to-day operations

6.5.3. Safety risks

Decommissioning of projects would normally be accompanied by safety risks from any leftover electrical cables, uncovered manholes and structures that may collapse and injure passers-by if left on site for a long time. There may also be environmental hazards from exposed left over substances which may cause soil and water contamination or generate noxious odor

6.5.4. Environmental management at decommissioning phase

At the decommissioning stage, the proponent will prepare a due diligence decommissioning audit report in line with Legal Notice No. 101 of 2003 and submit it to NEMA for approval at least three months in advance.

7. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1. EMP outline

The following section presents the management plans for the identified environmental impacts of the proposal. Two management plans are presented to address environmental challenges. Each one is further organized into the following sections;

- Environmental impact
- Proposed mitigation measures
- Parties responsible for the implementation of the mitigation measures
- The timeframe
- The costs (Kshs) of implementing and/or monitoring the mitigation measures

7.2. Initial Demolition Phase Environmental Management Plan.

Environmental Impact	Mitigation Measures	Implementing Party	Timeframe	Cost (Kshs)
Noise	– Deploy acoustic screens around noisy working areas to contain noises – Restrict demolition works to day time only – Provide PPEs such as ear muffs and earplugs to workers	Contractor & workers	During initial demolition	200,000 for PPE
Accidents and risks	– Provide full protective gear (PPE) to the workers – Conspicuously display clear signposting and warning signs on site – Investigate all accidents and put in place appropriate measures to prevent recurrence.	Contractor & workers	During initial demolition	10,000 for signage Cost of PPE already factored
Dust	– Sound project planning to complete demolitions within the shortest time possible – Restrict demolitions to daytime and schedule activities at times of low wind intensity – Deploy fine dust screen and spray water on dusty materials/areas to contain dust – Provide workers with the necessary PPEs such as dust masks and enforce their use	Contractor & workers	During initial demolition	200,000 for dust screen Cost of PPE already factored
Demolition waste	– Contract a private NEMA licensed solid waste handler to manage demolition wastes effectively – Salvage reusable components and sell to re-users	Contractor & NEMA licensed waste handler	During initial demolition	15,000 monthly for waste collection

7.3. Construction phase Environmental Management Plan

Environmental Impact	Mitigation Measures	Implementing Party	Timeframe	Cost (Kshs)
Sourcing of raw materials	– The contractor will obtain raw materials for the construction from sources that are compliant with NEMA Regulations. – The contractor will procure quantities that are sufficient for the intended works only and recycle as far as practical to curtail wastage. – The contractor will commit to extensive use of recycled raw materials as will be appropriate and in a manner that does not compromise the safety of the development.	Contractor	During construction of the office block	Nil
Destruction of the physical environment	– Compacted areas to be ripped to prevent erosion – Restore degraded areas through landscaping using trees and sediment binding grasses – Control earthworks to prevent compaction of the loose soils. – Obtain a permit to fell trees from KFS	Contractor in consultation with the proponent	Upon completion of the main construction works	200,000 for landscaping 20,000 for KFS permit to fell trees
Occupational Health and Safety of Workers	– Provide adequate and appropriate Personal Protective Equipment (PPE) including safety shoes, helmets, gloves, overalls etc. – Employees to be given the correct tools and equipment for the jobs assigned and trained on their use – First aid services and an emergency vehicle to be readily available at site	Contractor, workers and site supervisors Directorate of Occupational Health and Safety	During construction of the office block	800,000 for procurement of full PPE

Environmental Impact	Mitigation Measures	Implementing Party	Timeframe	Cost (Kshs)
	– Moving parts of machines and sharp surfaces to be securely protected with guards to avoid unnecessary contacts and injuries during construction phase – The contractor to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007 – First aid services and an emergency vehicle to be readily available at site			
Safety of visitors, neighbors and general public	– Visitors to the project site must be provided with PPE at all times, – Inform all neighbors in writing on the commencement of the project at least two weeks in advance, – Restrict access to the site by the public by fencing off the construction site, – Heavy Commercial Vehicles accessing the site to deliver construction materials must observe speed limits, – Conspicuously display safety signs and warning posters visible to the public – Provide for security services at the site.	Contractor , drivers and contracted private security firm	During construction of the office block	cost of PPE already factored 15,000 for signage 10,000 monthly for security services
Air pollution	– Contractor to deploy fine dust screens at the site during construction – Sprinkle dust producing materials such as ballast with water during offloading on site	Contractor and workers	During construction of the office block	500,000 for procurement of dust screens

Environmental Impact	Mitigation Measures	Implementing Party	Timeframe	Cost (Kshs)
	– Retain vegetation as much as possible to reduce bare areas exposed to wind – Use low Suplhur fuels to power delivery vehicles and site machinery – Provided employees with dust masks and goggles.			Cost of PPE already factored
Solid wastes at construction site	– Installation of litter bins and a receptacle that encourage separation of wastes at source to promote re-use and re-cycling, – Procure the services of a NEMA licensed waste handler to manage solid wastes from the construction site – All recyclable materials should be collected and sent to NEMA licensed recyclers	Contractor and NEMA licensed solid waste handler	During construction of the office block	20,000 monthly for solid waste management
Noise pollution	– Deploy compact machinery and fit them with mufflers – Personnel working at the site will be provided with Personnel Protective Equipment (PPE) such as earmuffs – Deploy acoustic screens around noisy working areas to contain noises – Limit construction works to daytime on weekdays only	Contractor	During construction of the office block	Nil as cost of PPEs is catered for elsewhere 500,000 for acoustic screens
Traffic Management	– The contractor will ensure that the vehicles delivering materials do not block the road and accommodated within the site – Heavy commercial vehicles delivering raw materials shall observe designated speed limits for the area.	Contractor and drivers	During construction of the office block	Internal costs

Environmental Impact	Mitigation Measures	Implementing Party	Timeframe	Cost (Kshs)
	– Proper signage and warnings to be placed along Mbaraki Road to forewarn other motorists on the use of the road by heavy commercial vehicles – Deploy flagmen to guide traffic along the road during construction works adjacent to the road			
Workforce sanitation	– The contractor will deploy temporary sanitary units (Mobile toilets) as the construction phase – The mobile units should be emptied by NEMA licensed effluent handlers	Contractor, NEMA licensed waste handler and workers	During construction of the office block	80, 000 once for portable toilets 20,000 monthly for workforce Sanitation
Increased demand for water	– The contractor to ensure prudential use of water resources during construction by avoiding wastage such as running pipes and taps – The proponent should obtain a water abstraction permit from WRMA and install a meter to monitor the water yields from the borehole	WRMA, contractor and the proponent	During construction of the office block	200,000 for borehole and meter 12,500 for water abstraction permit
Insecurity	– Proponent and contractor to vet all workers on site – Require certificates of good conduct from potential employees and copies of identification documents for all workers to be retained by the contractor	Contractor and proponent	During construction of the office block	Nil

7.4. The Operational Phase Environmental Management plan

Environmental impact	Mitigation measure	Implementing Party	Timeframe	Cost (Kshs)
Increased traffic	– The development has incorporated adequate parking spaces to accommodate all vehicles accessing the site – The development will be serviced by two gates and provide dedicated entry and exist lanes – Collaborate with the Mombasa County Government and Kenya Urban Roads Authority (Proponent) to install speed limit signage and hazard demarcations along Mbaraki Road to address safety concerns for pedestrians	Proponent and KURA	During operational phase of the office block	Internal and administrative liaison costs
Wastewater generation	– The proponent will install a bio-digester which is considered adequate to effectively manage the effluent emanating from the office block – Contract a NEMA licensed effluent handler to empty the sludge from the bio-digester for proper disposal – Conduct quarterly monitoring of the effluent discharged from the bio-digester against standards set out in schedule III of Water Quality Regulations, 2006 – Apply for an Effluent Discharge License from NEMA – Explore technological options that promote usage of less water to	Proponent, maintenance engineers, NEMA designated laboratory, NEMA licensed effluent handler	During operational phase of the office block	50,000 periodically for sludge management 30,000 quarterly for effluent monitoring 40,000 annually for EDL

Environmental impact	Mitigation measure	Implementing Party	Timeframe	Cost (Kshs)
	reduce waste water generation at source. – Contract reputable professionals to conduct regular inspections and maintenance works on the bio-digester			
Increased water demand	– Proponent to undertake monthly monitoring of the water from the borehole in terms of quality (at a NEMA designated laboratory) and quantity (yields) – Recycle the treated water from bio-digester for reuse in landscaping and firefighting – Install water saving systems e.g. automatic water tap turnoffs, less water capacities cisterns, etc. – Rain and storm water harvesting is recommended as a measure to provide for water for general cleaning	Proponent & WRMA	Prior to resumption of construction works	Market costs Internal costs
Solid waste generation	– Provide litter bins that encourage the separation of wastes into paper, glass, plastics etc for recycling – Contract a NEMA licensed solid waste handler to manage wastes from the development – Proper records kept for collection and disposal for monitoring purposes. – Develop a sound solid waste management plant that exploits a hierarchy of waste management options – Comply with Legal Notice No. 121 of 2006 in management of solid	Proponent, NEMA licensed solid waste handlers and residents	During operational phase of the office block	1,000,000 for waste collection systems and 30,000 monthly for waste contractor

Environmental impact	Mitigation measure	Implementing Party	Timeframe	Cost (Kshs)
	wastes generated by the development			
E-waste generation	– Proponent will provide dedicated bins for collection of e-waste – E-waste to be collected by a NEMA licensed waste handler and conveyed to a recycling plant. – Proponent to comply with E-waste management guidelines by NEMA	Proponent	During operational phase of the office block	Nil as proponent will liaise with recyclers to collect e-waste
Increase in electricity demand	– The proponent will make an application to Kenya Power to replace the power service capacity at the site to accommodate the new development within the national grid – The overhead lines traversing the site should be replaced by suitable rating underground power cable – Sensitize occupants to invest in energy-efficient lighting systems and equipment – Monitor energy use during operations and maintain records – Conduct annual energy auditing and implement recommendations	Proponent, KPLC	Prior to commissioning the development	Cost will be provided as a quotation by KPLC
Fire Safety and security	– Installations and maintenance of fire fighting systems – Install fire hydrants and alarm system throughout the building – Develop an elaborate emergency response plan to address the risks associated with operation of the building – Security will be enhanced by contracted security firm.	Proponent, contracted fire company, contracted security firm	During operational phase of the office block	Market costs for installations 100,000 monthly for security services

7.5. Possible decommissioning phase Environmental Management Plan

Environmental Impact	Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Demolition waste management	– Use of an integrated solid waste management system i.e. through a hierarchy of options: Source reduction, Recycling, Composting and reuse, Combustion Sanitary Land filling. – All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible – All foundations must be removed and recycled, reused or disposed of at a licensed disposal site. – Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site. – Donate reusable demolition waste to charitable organizations, individuals and institutions	Proponent & Contractor	Once-off	350,000
Rehabilitation of project site	– Implement an appropriate re-vegetation programme to restore the site to its original status. – Consider use of indigenous plant species in re-vegetation. – Trees should be planted at suitable locations so as to interrupt slight	Proponent & Contractor	Once-off	550,000

	lines (screen planting), between the adjacent residential area and the development.			

8. PROJECT ALTERNATIVES

8.1. The 'No Project' alternative

The NO Project alternative would ideally be the best way to mitigate against the predicted environmental impacts as the status quo would be maintained. However this alternative is not considered the best as the proponent has invested substantial resources in the acquisition of the land, has already invested in design of the building and the fact that the proposal is consistent with the land use character. This alternative will also deny the proponent sufficient room for doing business.

8.2. The "Yes Project" alternative

This alternative is socially and economically viable in the light of the information available concerning the development. The limiting factor in the consideration of this alternative would be the inability of the proponent to ensure that the development is environmentally sound by implementing the mitigation measures that are proposed EMP.

8.3. Construction of residential units

The proponent could also opt to construct residential units such as maisonettes or apartments. However this option is limiting because of the following reasons.

- The need for the proponent to provide adequate office space for herself
- Low returns on investment compared to the proposed development
- Location of the site within a prime commercial area

8.4. Alternative site

An alternative site could be considered for the development if site suitability presents serious environmental challenges that cannot reasonably be effectively mitigated. The proposed site is however considered suitable if the proposed mitigation measures are implemented. Further alternative land would imply cost implications on the part of the proponent and financial loss in respect to the current development and lease of land.

9. ENVIRONMENTAL MONITORING PROGRAMME

9.1. Introduction

A monitoring plan is essential to assess the impact of the development on the environmental setting of the area. The principles underlying an environmental monitoring plan as it relates to any given development is to document, track and report any changes in environmental parameters over time that would be associated with the project. These changes would in principle vary over time in both magnitude and direction. In the case of the latter it is important to bear in mind that changes in environmental parameters may be positive or negative.

Thus in principle a monitoring program for the project would not necessarily focus only on the perceived or anticipated negative changes precipitated by a given development activity, but also on the positive or beneficial changes. The parameter chosen are those that have been identified in the analytical process as being affected in the most significant way by the proposed development.

9.2. Specific monitoring issues

The proposed monitoring plan for the project will entail those parameters and environmental issues that have been identified through the mitigation matrix and other mitigation components. A number of these issues have also been highlighted in the mitigation plans and matrices associated with the previous sections. These issues include:

- Water Quality & Quantity monitoring
- Wastewater (Effluent) monitoring
- Solid and e-waste Management
- Socio economic issues especially concerns from third parties
- Energy Auditing
- Environmental Auditing

The proposed monitoring program has been developed not only in relation to satisfying the statutory requirements of the EIA process, but also as a proactive tool for the proper implementation of the proposed development, within the context of its relationship to the integrity of the environment as well as the stakeholders in the area.

9.3. Water quality and quantity monitoring

The proponent will have a water monitoring programme that examines

- The quality of the water discharging from the borehole
- The quantity of water (yields) from the borehole

Pollution from all the different sources can pose a serious threat to the water resources in the area and therefore considering the negative impacts, the proposed development will have to incorporate a complete water quality monitoring program. This program, which will further be developed by the proponent and WRMA in collaboration with accredited laboratories.

Water samples will be collected and analyzed on a quarterly basis for the following parameters using the recommended protocol required by Water Quality Regulations (Legal Notice No. 120 of 2006).

9.3.1. In situ Measurements

In situ measurements will include;

- Salinity
- Turbidity
- Temperature
- Total Dissolved Solids
- Dissolved Oxygen
- Conductivity
- Ph

9.3.2. Laboratory Analysis

This will include the determination of the following effluent characteristics.

- BOD
- COD
- Total Suspended Solids
- Total Nitrate
- E. Coli
- Total Phosphate
- Total and Fecal Coliform

9.3.3. Wastewater Monitoring Program

Just as with the water resources monitoring program the proposed development intends to develop a wastewater monitoring program. This program among others will monitor the quantity and quality of treated effluent (wastewater) discharged into the sewer system or generated by the treatment plant.

In addition, the program will also develop a maintenance plan encompassing structural failures, inspections, monitoring of equipment (sewer conveyance pipes, treatment plant, grease traps, oil/water separators, etc.) short and long term repairs as well as training for new employees in charge of supervising the plant.

Samples of the treated wastewater will be collected quarterly and sent to a NEMA designated laboratory for testing. In any event, the proponent will comply with all applicable laws relating to this matter. The parameters (BOD, COD, TSS, Nitrates, and E. Coli etc) to be incorporated in the monitoring programme are those included under Schedule III of Legal Notice No. 120 of 2006.

9.3.4. Solid waste monitoring plan

As part of the overall management structure, the proposed development plans to undertake an intensive solid waste monitoring plan in order to address all the relevant issues that can arise from the collection, storage and disposal of garbage. Table 9-1 describes the outline for which the activity will be monitored.

Indicators will be developed to keep track of this activity and report to the building's property managers on a monthly basis.

Table 9-1. Outline for solid waste monitoring plan

Parameter	Frequency
Collection	Daily
Disposal	Weekly
Storage	Daily
Management	Daily

The plan can become more dynamic if columns on critical levels and targets as well as responsible persons are added. This can be done once the development is at full occupancy.

9.3.5. Social Monitoring Plan

The proponent will have a social monitoring plan that targets to ensure compliance with the environmental mitigation measures that address neighborhood concerns. In this regard, the proponent will keep a record of all complaints and comments coming from third parties and action taken to remedy the situation.

9.3.6. Energy Auditing

Energy auditing provides a clear understanding of energy consumption in buildings, machinery, appliance and other facilities within the premises. Quantitative audit findings aim to inform substantial practical guidelines for:

- Continuous improvement of consumption efficiency
- Identifying cost saving opportunities in energy efficiency

9.3.7. Environmental audits

The proponent will undertake annual environmental audits aimed at;

- Complying with Legal Notice No. 101 of 2003
- Testing the efficacy of the EMP
- Addressing neighborhood concerns on environmental performance of the development

10. CONCLUSIONS AND RECOMMENDATIONS

10.1. Conclusion

The proposed project is considered important and beneficial to both the proponent and the economy of Mombasa. The project will create employment, increase customer base for local businesses and has the advantage of efficient use of land which is a scarce resource within Mombasa Town. The project will also engender efficient provision of services to the public by the proponent

The proposal presents environmental impacts and challenges that are within a manageable scale and can be sufficiently mitigated to a level of minimal significance throughout the project cycle through full implementation of the proposed environmental management plans

10.2. Recommendations

On the basis of these findings and the ability of the proponent to commit resources and technology to implement the environmental management plan, we recommend the approval of the development.

11. REFERENCES

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9. **Republic of Kenya Statutes:**
    - **i.** The Constitution of Kenya (2010)
    - **ii.** The Environmental Management and Coordination Act No. 8 of 1999
    - **iii.** Legal Notice No. 101 of 2003, Environmental Impact Assessment and Audit Regulations.
    - **iv.** Legal Notice no. 120 of 2006, Water Quality Regulations
    - **v.** Legal Notice no. 121 of 2006, Waste Management Regulations
    - **vi.** Legal Notice No. 61 of 2009, Noise and Excessive Vibrations, Regulations
    - **vii.** Occupational Safety and Health Act (OSHA) No. 15 of 2007
    - **viii.** The Electricity Power Act No. 11 0f 1997
    - **ix.** The Building Code 2000
    - **x.** Public Health Act Cap 242
    - **xi.** Occupiers Liability Act Cap 34
    - **xii.** The Physical Planning Act, Cap 286
    - **xiii.** The Water Act, 2002

10. The National Water Services Strategy (NWSS) 2007-2015, May 2007.
11. **UNEP, 1998:** Environmental Impact Assessment – Basic Procedures for Developing Countries.
12. Project documentation provided by the proponent.

12. APPENDICES

1. Copy of Certificate of Lease
2. Evidence of public consultations (questionnaires appended).
3. Copies of practicing licenses of lead experts and Firm
4. Copy of firm's NEMA registration certificate
5. Building plans for the development.