ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS (BONDENI AFFORDABLE HOUSING ESTATE) ON NAKURU COUNTY GOVERNMENT HOUSING ESTATE ALONG KIVUMBINI/KALEWA ROAD.

PROJECT PROPONENT

NAKURU COUNTY HOUSING DEPARTMENT,
P.O. BOX 2870 - 20100,
NAKURU

C/O
Kings Sapphire Ltd
(Contractor)

This Environmental Impact Assessment (EIA) Project Report is submitted to Kenya National Environmental Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003.

JUNE 2021

CERTIFICATION

This Environmental Impact Assessment project report has been prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental (Impact Assessment) and Audit regulations 2003 which requires that every development project must have an EIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

EIA/EA LEAD EXPERT:

Name: Elizabeth Wakoli

NEMA Reg No.: 8825

Sign: …….

EIA/EA Associate EXPERT:

Name: Joel Waweru

NEMA Reg No.: 7436

Sign: …….

EIA/EA Associate EXPERT:

Name: Isaiah Ayeket

NEMA Reg No.: 10340

Sign: …….

PROPONENT: Nakuru County Housing Department

C/o: Kings Sapphire Limited

Name:……..

Designation:……

Signature:…….Date:…….

EXECUTIVE SUMMARY

Kenya being a developing country is urbanizing very fast and hence experiencing the challenges of urbanization. Our client Nakuru County Housing Department having contracted Kings Sapphire Limited to develop the modalities of the proposed Bondeni Affordable Housing Estate along Kalewa/Kivumbini Road. The Nakuru County Housing Department intend to develop a Thirteen residential Blocks with a range of mixed units comprising of three bedrooms, two bedroom and one bedrooms; kindergarten, community social hall, clinic, pharmacy and shops as well as other attendant facilities such as parking and ample security provided by perimeter wall.

Currently the rates of urbanization and population growth countrywide is increasing at a faster rate due to decentralized government and with it come the need for improvement in service provision especially in key urban areas. It's in line to this that the National government and the Nakuru County Housing department saw the need for improving provision of improved government housing services and especially at a low cost to cater for the low and middle income earners to meet the Nation's big 4 Agenda; a goal to be achieved through Public Private Partnership under the B.O.T model (Build-Operate-Transfer) between a private investor King's Sapphire Limited and Government of Kenya that is aimed at spurring economic growth and social development.

The government having provided such houses during the independence period, have decided to remodel these houses and those that are dilapidated are demolished to pave way for the proposed endeavor. This is intended to stimulate economic and social development of the residents and civil servants through the provision of social amenities and services that would make life both meaningful and honorable. This Environmental Impact Assessment examined the potential positive and negative impacts of the project on the immediate surroundings with due regard to all the phases from pre-construction, construction, occupation and decommissioning. The process encompassed all aspects pertaining to the physical, ecological, socio-cultural, health and safety conditions at the site and its environs before, during and after construction.

Environment, Health and Safety (EHS) section addresses environmental, health and safety concerns during projects' cycle. The main objective of the EHS on the proposed project is to develop guidelines for protecting, managing and responding, processes, situations/conditions

that might compromise health, safety of general public and ecological wellbeing. To wade off or reduce negative environmental impacts, mitigation measures have been proposed and an environmental management plan (EMP) formulated. The proponent is also expected to observe recommendations in the Environmental Management Plan (EMP) and carry out annual environmental audits once the project is in operation.

Overview of the project

The primary objective of the proposed project is to develop Residential apartments with all associated facilities. The main design components of the Proposed Project include, but not limited to the following:

Development of 13 Residential Block each 4 storied/5 leveled with a total of 605 mixed units with the following spatial distribution:

BLOCK	NO. OF BEDROOM	HOUSE UNITS
1	3	40
2	3	50
3	3	40
4	3	40
5	3	50
6	3	40
7	3	40
8	3	40
9	3	40
10	2	60
11	2	60
12	2	60
13	1	45

Conclusions and Recommendations'

In conclusion, results from ESIA project reporting show that the Proposed Residential Development project has significant impacts on the environment. Implementation of an Environmental Management Plan will assist in dealing with environmental issues during the project cycle. There are also guidelines for addressing environmental health and safety. This project is recommendable for approval by the National Environment Management Authority (NEMA) for issuance of an EIA license subject to annual environmental audits after operating

for one year. This will be in compliance with the Environmental Management and Coordination Act of 1999 and the Environmental Impact Assessment and Audit regulations, 2003.

LIST OF ABBREVIATIONS

B.O.T	Build-Operate then Transfer
°C	Degrees Celsius
NCG	Nakuru County Government
EHS	Environmental Health and safety
EIA	Environmental Impact Assessment
EMAP	Environmental Management and Action Plan
EMCA	Environmental Management and Coordination Act
GoK	Government of Kenya
NEC	National Environmental Council
NEMA	National Environment Management Authority
KP	Kenya Power
OHS	Occupational Health and Safety
TOR	Terms of Reference
WRA	Water Resources Authority

Table of Contents

CHAPTER ONE: INTRODUCTION

1.1 Background and Rationale for the EIA

Currently the rates of urbanization and population growth in the country are increasing fast and with it come the need for improvement in service provision, especially in our urban areas. Increased population due to rural-urban migration in search of job opportunities and or higher education in major towns of Kenya has increased demand for buildings, especially residential houses.

The principle measure of sustainable development is that all activities which are carried out to achieve development must take into account the needs of environmental conservation. The sustainability of the ecosystem requires the balance between human settlement development and the natural ecosystem, which is a symbiotic relationship. This can be achieved through careful planning and the establishment of appropriate management systems. Consequently a number of planning mechanisms have been put in place to ensure that minimum damage is caused to the environment. Environmental planning is also integrated with other planning processes such as physical planning, economic planning, and development planning. Environmental Impact Assessment (EIA) is considered part of environmental planning.

As part of the EIA process, it is necessary to devise alternatives to avoid undesirable impacts. Besides the alternative, identification of impacts may also lead to the development of mitigation measures i.e. means of reducing the impacts. As a tool of environmental planning, EIA is therefore precautionary in nature. Most development activities impact the environment hence a “no impact” interpretation of environmental impact assessment could lead to no development. In this development proposal, the proponent (Nakuru County Housing Department in conjunction with King’s Sapphire Limited) intends to construct Affordable Residential Apartments/Blocks within the Bondeni Estate which is a government-private project through a B.O.T program. It has been established that such projects have a potential of causing significant impacts on the environment. Under this premise the proponent through the contractor deemed it necessary to carry out an Environmental and Social Impact Assessment (ESIA) for the proposed project.

Environmental and Social Impact Assessment studies were carried out as per the provisions of Environmental (Impact Assessment and Audit) Regulations, 2003 .This report is a product of the entire process and will be used in various decision making platforms including consideration for issuance of an EIA license by the National Environment Management Authority (NEMA).

1.2 Need for the project

The proposed affordable housing project within Bondeni Estate is being developed by King's Sapphire Ltd and the Nakuru County Government (Ministry of Housing) under Public Private Partnership (B.O.T) framework. Rapid urbanization is a trend seen across the developing world, with the fastest rates of growth seen in Sub-Saharan Africa. Much of this is due to rural urban migration of people in search of jobs and or higher education or higher standards of living. The government has appreciated that there is scarcity of residential premises in our urban areas. There is a glaring gap between the demand and availability of affordable residential facilities in various sections of Nakuru and the large metro region. This has been largely so because most of the more recent large scale developments in areas near the major towns have tended to focus more on commercial and office use developments.

The conceived project is designed to be within character of the current housing trend for garden estate area in particular, where this survey revealed that apartments are allowed and are guaranteed of attracting the desired clientele in this case civil servants. The proponent (Nakuru County and King’s Sapphire) has established that demand exists for such development and that the target clientele tally with immediate environmental conditions.

This ESIA study report has been prepared based on the findings of screening and scoping study, field visits, public participation meetings and information collected from both primary and secondary sources including the information provided by the Project Proponent.

1.3 National Housing Policy and Housing Needs in Kenya

In August 2003, the government of Kenya through a Sessional Paper spelt out a Housing Policy whose overall goal was to facilitate the provision of adequate shelter and healthy living environment at an affordable cost to all socio-economic groups in Kenya in order to foster

sustainable human settlements. The aim is to minimize the number of citizens living in shelters that are below the habitable living conditions.

Among other things, the policy aims at facilitating increased investment by the formal and informal private sector, in the provision of housing units for low and middle-income dwellers. The estimated current urban needs are 150,000 units per year, which can be achieved if the existing resources are fully utilized by the private sector with the enabling hand of the government. It is estimated that the current production of new housing in urban areas is only 20,000-30,000 units annually, giving a short fall of over 120,000 units per annum. The shortfall in housing has been met through the proliferation of squatter and informal settlements and overcrowding.

To alleviate the huge shortfall of urban housing mentioned above and to curb the mushrooming of informal settlements/slums, various interventions and strategies have to be adopted. In the Policy Paper, the government correctly accepts the fact that it cannot meet the housing shortfall on its own and that the best policy is to encourage the private sector (like the proponent) to chip in while the government provides an enabling environment for development. The government will provide an enabling environment by doing the following:

i. Facilitating the supply of serviced land at affordable prices in suitable locations
ii. Expanding and improving infrastructure facilities and services
iii. Using research findings as well as innovative but cheap conventional building materials and technologies to improve production of housing units.
iv. Generally easing the path of funds from the private investor/government to the development project.
v. Issuing workable guidelines on Estate Management and maintenance.

The promotion of this development is therefore well within the government current and long term policies of ensuring housing for all by 2030 (Vision 2030). The housing policy does not address the demand for affordable residential houses, which are addressed by this report.

1.4 Scope of the Project

The scope of the study includes carrying out of environmental investigations in line with current provisions on environmental legislations. This has been done in line with the requirements of

Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment) and Audit regulations 2003. The report is aimed at analyzing the physical extent of the project site and its immediate environs, implementation works of the proposed development (ground preparations, foundation, walling, roofing, fixtures and fitting among other activities) and installation of key utilities and other facilities required for the project to function optimally.

1.5 Overall objective of the project

The proposed project has the overall objective of developing 13 blocks of 4 storied residential development within Bondeni Estate which is along the Kivumbuni Kalewa Road, Nakuru County. This will not only attempt to solve the current housing shortage but also meet the economic desires of the project proponent and the increasing housing needs in the Country.

1.6 Terms of Reference (TOR)

The TORs for this Project Report is the production of an EIA report to address the effects and impacts (Positive and Negative) of the proposed construction of residential development. The EIA firm of experts is under instructions from the project proponents to do a thorough environmental assessment with the aim getting approval from the National Environment Management Authority before commencement of the project. This report addresses the following key specific objectives:

i. To review existing legal and institutional framework related to the proposed developments complex project development.
ii. To collect and collate baseline information relevant to the proposed housing development
iii. To collect primary data through the community participatory process.
iv. To identify and assess positive and negative impacts of the proposed project
v. To identify and analyze alternative options for the proposed project
vi. To develop mitigation measures and cost estimates for the negative impacts of project.

vii. To design an Environmental Management Plan (including cost estimates) and a monitoring framework for the environmental impact of the project.

1.7 Content of project

The project assessment investigates and analyses the anticipated environmental impacts of the proposed development in line with the Environmental Impact Assessment and Audit regulations 2003 and in particular part II S 7[1] a-k. Consequently, the report will provide the following

- ✓ Nature of project
- ✓ The location of the project including the physical area that may be affected by the project's activities.
- ✓ The activities that shall be undertaken during the project construction operation and design of the project
- ✓ The materials to be used, products and by-product including waste to be generated by the project and the methods of disposal.
- ✓ The potential environmental impacts of the project and mitigation measures to be taken during and after the implementation of the project.
- ✓ An action plan for prevention and management of possible accidents during the project cycle
- ✓ A plan to ensure the health and safety of the workers and the neighbouring communities
- ✓ The economic and social cultural implications to local community and the nation in general

Any other information that the proponent may be requested to provide by NEMA.

All these aspects will be considered accordingly. This report also seeks to ensure that all the potential environmental impacts are identified and that workable mitigation measures are adopted. The report also seeks to ensure compliance with the provision of the EMCA 1999, and Environmental (Impact Assessment and Audit) Regulations 2003 as well as other regulations.

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

1.8 methodology

1.8.1 Environmental Screening.

Environmental screening was carried out to determine whether an EIA study is necessary for this project and at what level of evaluation. This took into consideration the requirements of the Environmental Management and Coordination Act (EMCA), 1999, and specifically the second schedule of the same act. From the screening process, it was understood that this project will cause significant impacts on the environment.

1.8.2 Environmental Scoping.

In scoping, focus was on environmental impacts of great concern. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts. This will include assessment of the proposed project in respect of but not limited to:

i. Project Background: this will give the brief history of the proposed project site, the parties involved and justification of the project in terms of demand or lack of the same, the project area, relevant policy and legislation, identification of any associated project, or any planned projects including products within the region which may compete for the same resources; the project including products, by-products, processes both at implementation and operational level, resources required for successful implementation and operation of the project and the different options considered.
ii. The proposed project objectives; both in the short and long run; and how they are linked to the overall objectives.
iii. Present environmental conditions; description of the project site, ecological zoning as well as the state of the environment and its surroundings. Attempts will state if it is already suffering from degradation, causes of the original degradation if any established.

iv. Identification of Environmental Impacts; the report will distinguish between significant positive and negative impacts, direct and indirect impacts and immediate and long term impacts which are unavoidable and / or irreversible,

v. Community/ Stakeholder Consultations: these will be undertaken to determine how the project will affect the local people / various stakeholders.

vi. Cost- Benefit Analysis; to evaluate the economics of the project and establish its viability in terms of the expected environmental concerns and measures.

vii. Development of an Environmental Management Plan (EMP); to mitigate negative impacts, recommending feasible and cost effective measures to prevent or reduce significant negative impacts to acceptable levels,

viii. Development of a Monitoring Plan; this will be used in monitoring the implementation of the mitigation measures and the impacts of the project during construction and operational phases, including an estimate of capital and operational costs, and Make necessary recommendations pertaining to the proposed development.

1.8.3 Desktop Study.

This involved review of project documents, architectural drawings, past EIA, relevant policy, legal and institutional frameworks. Documents containing climatic, demographic and hydrological data for Nakuru were also relied upon.

1.8.4 Site Visits and Public Participation.

Following the requirement by the National Environmental Management Authority that a public participation exercise be carried out at the preparation of every Environmental and Social Impact Assessment (ESIA), stakeholders' participation questionnaires were administered to the persons who would be affected by this housing development. At the stakeholders' participation consultation, the stakeholders were offered with appropriate information on the development intention and made aware of the anticipated environmental impacts and the plans that have been set to mitigate them. After thoroughly appraising the anticipated environmental impacts

during construction, operation and decommissioning phases, the stakeholders felt that these impacts have been appropriately mitigated.

Generally, there was no objection from the stakeholders against the construction of the proposed residential apartments. The stakeholders felt that this development will be beneficial to them for it will create a better neighbourhood, and also employment to the locals during construction and operation phases.

The stakeholders' participation exercise was an indication that this residential development is appropriate for this site, and the study recommends its approval so that the Bondeni people may realize these benefits. Expedited approval by the National Environmental Management Authority will be essential at employment creation and national development.

1.8.5 Reporting.

In the entire exercise, the proponent and EIA experts contacted each other on the progress of the study and signing of various documents. The proponent will have to submit ten copies of this report alongside a soft copy of summarized ESMP to the National Environment Management Authority for review and issuance of an EIA license. All the materials and workmanship used in the execution of the work shall be of the best quality and description .Any material condemned by the architect shall be removed from the site at the contractors cost. Environmental concerns need to be part of the planning and development process and not an afterthought. It is therefore advisable to avoid land use conflicts with the surrounding area through the implementation of the Environmental and Social Management Plan (ESMP).

CHAPTER TWO: POLICY, LEGAL AND LEGISLATIVE FRAMEWORK

Environmental Impact Assessment is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition of the Kenya Government for developers to conduct Environmental and Social Impact Assessment (ESIA) on the development Projects.

National Environment Policy, 2013 proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes vulnerable ecosystems and proposes appropriate policy measures to mainstream sound environmental management practices in all sectors of society and recommends strong institutional and governance measures to support the achievement of the desired objectives and goals.

Among the measures proposed include:

i. Promotion of environmental education and public awareness at all levels.
ii. Sensitize the public on sound Waste Management Approaches.
iii. Outline Safe handling of chemicals.
iv. Management of ecosystems and sustainable use of natural resources; like promoting sustainable use of fresh water and wetland resources and the conservation of river and lake ecosystems through development and implementation of river basin management plans.
v. Promoting greater environmental responsibility and development and diffusion of environmentally friendly technologies.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations, 2003 (Legal Notice No.101), construction of buildings require an Environmental Impact Assessment project report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual licensing before the development commences. This was necessary as many forms of developmental activities cause damage to

the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

2.1 Policy Framework.

Environmental policies cut across all sectors and government departments. As such policy formulation should be consultative steered by interdisciplinary committees. Recent policies which the government is working on include; Draft Wildlife Policy; Draft National Land Policy; and Wetlands Management and Conservation Policy among others.

2.1.1 National Environmental Action Plan (NEAP).

National Environmental Action Plan was a deliberate policy effort to integrate environmental concerns into the country's development initiatives/plans. This assumed a consultative and multi-sectoral approach. Such an approach ensured that environmental management and the conservation becomes integral in various decision making platforms.

As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, Environmental Impact Assessments were introduced targeting the industrialists, business community and County authorities.

2.1.2 National Shelter Strategy to the Year 2000.

Kenya adopted this strategy following the International Year of Shelter for the Homeless in 1987.This advocates for the involvement of various actors to come in and assist the government in providing housing. This took cognizance of the governments' inability to provide sufficient shelter for all its citizens. The government was to simply facilitate other actors such as developers to invest in shelter.

2.1.3 The National Poverty Eradication Plan (NPEP).

The objective NPEP is to alleviate poverty in rural and urban areas by 50 percent by the year 2015; as well as the capabilities of the poor and vulnerable groups to earn income. It also aims

to narrow gender and geographical disparities and a healthy, better educated and more productive population. This plan has been prepared in line with the goals and commitments of the World Summit for the Sustainable Development (WSSD) of 1995. Since poor housing is among the indicators of poor societies, pursuits to address it build individuals capacity to relieve poverty.

2.1.4 National Policy on Water Resources Management and Development

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It, therefore, calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. This implies that Industrial and business development activities should be accompanied by corresponding waste management systems to handle the waste water and other waste emanating there from. The same policy also requires that such projects undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood and further downstream are not negatively impacted by the emissions. As a follow-up to this, EMCA, 1999 requires annual environmental audits to be conducted in order to ensure that mitigation measures and other improvements identified during EIAs are implemented.

In addition, the policy provides for charging levies on waste water on the basis of quantity and quality. The "polluter-pays-principle" applies in which case parties contaminating water are required to meet the appropriate cost of remediation. Consequently, to ensure water quality, the policy provides for establishment of standards to protect water bodies receiving wastewater, a process that is ongoing. The standards and measures to prevent pollution to water resources are provided for in the Environmental Management and Coordination (Water Quality) Regulations, 2006 which is a supplementary legislation to EMCA, 1999.

2.1.5 Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999):

The key objectives of the Policy include: -

i. To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,
ii. To ensure that an independent environmental impact assessment (EIA) report is prepared for any industrial venture or other development before implementation,
iii. To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require a "sustainable development" approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness raising and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

2.2 Legal and Legislative Framework

2.2.1 Environmental Management and Coordination Act No.8 of 1999

This project report has been undertaken in accordance with the Environment (Impact Assessment and Audit) Regulations, 2003, which operationalizes the Environmental Management and Coordination Act, 1999. The report is prepared in conformity with the requirements stipulated in the Environmental Management and Coordination Act No. 8 of 1999 (EMCA) and the Environmental Impact Assessment and audit Regulations 2003, Regulation 7 (1) and the Second Schedule.

Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean environment for all, new projects listed under the second schedule of Section 58 of EMCA No. 8 of 1999 shall undergo an Environmental Impact Assessment. This includes development activities such as this

new housing development. In addition to the legal compliance above, the following legal aspects have also been taken into consideration or will be taken into consideration before commencement of construction:

The Environment Management and Coordination Act (EMCA), 1999 provides for the establishment of an umbrella legal and institutional framework under which the environment in general is to be managed. EMCA is implemented by the guiding principle that every person has a right to a clean and healthy environment and can seek redress through the High court if this right has been, is likely to be or is being contravened.

Pursuant to section 25 (4) of EMCA, National Environmental Management Authority (NEMA) is required to restore degraded environmental sites using the National Environmental Restoration Fund. Currently, the restoration fund consists of 0.1 % levied from industries and other project proponents through the EIA process. Section 58 of the Act makes it mandatory for an Environmental Impact Assessment study to be carried out by proponents intending to implement projects specified in the second schedule of the Act which are likely to have a significant impact on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the EIA process. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.

Section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. According to section 73 of the act, operators of projects which discharge effluent or other pollutants into the aquatic environment are required to submit to NEMA accurate information on the quantity and quality of the effluent. Section 76 provides that all effluent generated from point sources are to be discharged only into the existing sewerage system upon issuance of prescribed permit from the County authorities.

Section 87 (1) makes it an offence for any person to discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person.

The proponent will have to ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as sewerage connections, solid waste management plans, and landscaping and aesthetic improvement programme are implemented and maintained throughout the project cycle. As well the; proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water are implemented throughout the project cycle.

2.2.2 The Environmental Management and Co-ordination (Waste Management Regulations 2006)

The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including: domestic waste, industrial waste, hazardous and toxic waste pesticides, toxic substances, biomedical wastes and radioactive waste. The Legal Notice No. 121: Section 4-6Part II of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that: -

(1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

(2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations.

(3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose off such waste in a designated waste disposal facility. In addition, the Regulations state that:

(1) Waste generator shall minimize the waste generated by adopting the following cleaner production methods:

a). Improvement of production process through:-

i. Conserving raw materials and energy;
ii. Eliminating the use of toxic raw materials; and
iii. Reducing toxic emissions and wastes

b). monitoring the production cycle from beginning to end by:-

i. Identifying and eliminating potential negative impacts of the product;

ii. Enabling the recovery and re-use of the product where possible;

iii. Reclamation and recycling

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

(2) A waste generator shall segregate waste by separating hazardous wastes from non-hazardous waste and shall dispose of such wastes in such facility as shall be provided by the relevant County authority.

(23) No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by Authority under the provisions of the Act.

The proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project. During the construction phase of the project, the proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound Environmental Management and Coordination (Noise management of waste).

King's Sapphire will be required to ensure sound management of all solid waste generated throughout the implementation period of the proposed housing facility. The measures to be put in place include provision of solid waste containers for onsite use, segregation of waste at the source, ensuring final disposal of solid waste at designated dumpsite, contracting NEMA licensed waste handlers, transporter and maintaining waste tracking records on site.

2.2.3 Waste Water Management Regulation 2006;

Legal Notice No. 120; Part II – Protection of Sources of Water for Domestic Use. 4. (1) every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of these Regulations

(2) No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution

5. All sources of water for domestic uses shall comply with the standards set out in the First Schedule of these Regulations.

The proponent and project Architect as well as NAWASCO, County engineer will work together to ensure that drainage channels are well designed during the construction phase of the project, and upon completion the entire project will be connected the Nakuru main sewer-line.

King's Sapphire and the selected contractor shall be required to put in place necessary measures to prevent the potential of polluting surface water sources during the construction and operation phases of the proposed housing affordable development

2.2.4 Public Health Act Cap 242

Part IX section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that County Authorities take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health. The plans for the above project have been approved by Nakuru County.

King's Sapphire and the selected contractor shall take necessary measures to prevent public nuisance that may arise during the construction and/or operational phase of the proposed Housing development.

Contractor will also be required to provide suitable toilets for use by the workers during the construction phase of the proposed project.

2.2.5 Physical Land Use and Planning Act, 2019

The Act empowers the County Authorities to reserve and maintain all land planned for government projects like affordable housing, open spaces, parks, urban forests and green belts. The same section allows for prohibition or control of the use and development of an area. Section 30 state that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of

any building without a development permission granted by the respective County Authority-PLUPA. Section 9 of the subsidiary legislation (the development and use of land Regulations 1961) under which it requires that before the County authority to submit any plans to the minister for approval. Particulars of comments and objections made by the landowners should be submitted, which intends to reduce conflict of interest with other socio economic activities.

2.2.6 The National Construction Authority Regulations, 2014

Regulation 3 provides the procedure for application for registration as a contractor. According to regulation 5 (1), a person who qualifies for registration shall be issued with a certificate of registration by the National Construction Authority (NCA). Pursuant to regulation 17 all construction works, contracts or projects either in the public or private sector shall be registered with NCA. This shall be done in writing within thirty days from the date on which tender for construction works, contract or project is awarded to a contractor registered under the Act. Regulation 21 stipulates that construction site supervisor shall be accredited in accordance with the Act in one or more of the classes of works provided in the third schedule thereof to undertake supervision and coordination of construction works or other persons undertaking the same class of work for or on behalf of another person for a fixed sum, percentage or valuable consideration, wages or other reward. King's Sapphire will be required to comply with the above provisions during construction and operation phase of the proposed development of affordable housing units.

2.2.7 Building code 2000

A person who erects a building or develops land or changes the use of a building or land, or who owns or occupies a building or land shall comply with the requirements of these by- laws. For the purpose of this by- laws and the following operations shall be deemed to be the erection of a building:-

a. The alteration or extension of a building.
b. The changing of the use or uses to which land or building is put.
c. The formation or lying out of an access to a plot.

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the County authority for permit to connect to the sewer line and all the wastewater must be discharged in to sewers. The code also prohibits construction of structures or building on sewer lines.

2.2.8 Water Act

The water act No. 8 of 2002 provides for the management, conservation, use and control of water resources and for acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services. Section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-Section 3 mandates the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a site operator and the information thereof furnished to the authority.

Section 73 of the Act provides that a person who is licensed to supply water has a responsibility of safeguarding the water sources against degradation. According to section 75 (1) such a person is required to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

On the other hand section 76 makes it an offence for any person to discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee which should be sought by making an application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including payment of rates for the discharge as provided under Section 77 of the same Act.

Section 94 of the Act also makes it an offence to throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resource in such a manner as to cause, or be likely to cause, pollution of the water resource

The main contractor will be required to implement necessary measures to ensure water conservation and also to prevent potential for water contamination during the construction phase to comply with this the developer will use a channel to direct waste water (Effluent) into the existing sewerage and drainage system.

2.2.9 County Government Act

Section 160 of the act empowers municipal authorities to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with all kinds of refuse and effluent and where such service is established, compel its use by persons to whom the service is available.

Similarly, section 163 (e) empowers the County Authorities to prohibit businesses which by reason of smoke, fumes, chemicals, gases, dust, smell, noise , vibration or other cause , may be or become a source of danger, discomfort or annoyance to the neighbourhood, and to prescribe conditions subject to which such business shall be carried on. It is in this vain that section 165 mandates the council to grant or to renew business licenses or to refuse the same.

In order to discharge its duties effectively, section 170 of the act allows the right of access to private property at all times by County authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs of sewers. According to section 173, any person who, without prior consent in writing from the council, erects a building on; excavate or opens-up; or injures or destroys a sewers, drains or pipes shall be guilty of an offence. Any demolitions and repairs thereof shall be carried out at the expense of the offender. The Act, by virtue of section 176 also empowers the County authority to regulate sewerage and drainage, fix charges for use of sewers and drains and ensure that connecting premises meets the related costs.

2.2.10 The Energy Act,

Section 55 (1) in the execution of works in connection with the construction, modification, maintenance or operation of an electric supply line or apparatus or conductor connected thereto, every licensee shall:-

In no way injure the works, conveniences or property belonging to any such other such authority, company or person, nor obstruct or interfere with public traffic, except with the previous consent of the board. Take adequate precautions to protect from danger any person engaged upon such works by the provision and maintenance in safe and efficient conditions of the necessary safety appliances for the use of such persons and by ensuring their proper use, or by other means approved by the board.

2.2.11 The Factories and Other Places of Work (Hazardous Substances) Rules, 2007

These Rules were published in the Kenya Gazette Supplement No. 46, Legislative Supplement No. 28, Legal Notice No. 60 of 4th May, 2007 being a supplementary legislation to the Factories and Other Places of work Act, Cap 514 which was repealed. The rules provide for safety measures in handling of hazardous substances at work places including:

Occupational exposure limits;

Control measures;

i. Maintenance of Material Safety Data Sheets (MSDS);
ii. Provision and use of personal protective equipment;
iii. Sound disposal of hazardous materials;
iv. Provision of training and information to employees;
v. Air monitoring and measurement;
vi. Medical examination and
vii. Duties of employees.

King's Sapphire and the selected contractor will be required to ensure compliance with the hazardous substances rules by;

a) *Documenting safe working procedures on the use, handling and storage of hazardous materials;*
b) *Providing suitable personal protective equipment to employees in form of overalls, helmets, safety boots and gloves;*
c) *Providing first aid boxes at strategic points;*
d) *Carrying out regular monitoring of dust emissions and*
e) *Carry out EIA report for disposal of Asbestos sheets*

f) Maintaining at the point of use, MSDS for the various materials in use

2.2.12 The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005 – Legal Notice No.25

According to Rule 5, where noise in a workplace exceeds the continuous equivalent of 85 dB (A), the occupier must develop and implement an effective noise control and hearing conservation programme which must be in writing and should address:

a) Noise measurement;

b) Education & training;

c) Engineering noise control;

d) Hearing protection;

e) Posting of notices in noisy areas and

f) Annual programme review.

Rule 8 provides that all noise measuring equipment should be regularly calibrated, maintained, inspected and operated according to manufacturer's instructions. Rule 10 (2) requires occupiers to carry out regular inspection and maintenance of machines and installations to ensure that noise emission is prevented or controlled.

2.2.13 The Factories (Building Operations and Works of Engineering Construction) Rules, 1984

Rule 7 requires every contractor who employs more than twenty persons to appoint a safety supervisor who should be experienced in the works being carried out at the site. Rule 48 (1) prohibits any timber or material with projecting nails to be placed or be allowed to remain in any place at a site where they are a source of danger to persons employed. Rule 55 (C) provides that properly maintained scaffolds or; where appropriate, ladders or other means of support which shall be sufficient and suitable for the purpose shall be provided, placed and kept in position for use where work cannot be safely done on or from the ground or from part of a building or other permanent structure.

2.2.14 The Occupational Safety and Health Act, 2007

The Act provides for the safety, health and welfare of workers and all persons lawfully present at any workplace. It provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

The key areas addressed by the Act are:

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

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

Registration of workplaces;

General Health Provisions including cleanliness, ventilation, lighting and sanitary conveniences;

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

Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas;

Chemical safety including the use of Material Safety Data Sheets (MSDS), control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials;

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

Offences, penalties and legal proceedings.

Under section 6 of this Act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7).

King's Sapphire will establish and document the Occupational Health and Safety Management System (OHSMS). Some of the measures to be put in place include;

Develop a well-functioning health and safety committee, conducting statutory inspections of equipment and machinery

Provide applicable induction and trainings to engaged workers and sub-contractors,

Supply wholesome drinking water to its employees,

Ensure a well-equipped first aid boxes and firefighting equipment are provided and are accessible by all workers.

2.2.15 The Work Injury Benefits Act, 2007

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. The act was published on 26th October, 2007.

The salient features addressed by the act are as follows:

i. Obligations of employers to register all injuries, incidences and accidents that have occurred in a workplace;
ii. Right to compensation to an injured worker;
iii. Reporting of accidents, incidences or accidents that have occurred to the County Occupation and Health;
iv. Provide appropriate Compensation in relation to accrued injury;
v. Provide means for managing Occupational/work related diseases;
vi. Provide Medical Aid and Appeals to an injured employee

2.2.16 The HIV and AIDS Prevention and Control Act (CAP. 14 of 2006)

According to section 4 (1), the Government shall promote public awareness about the causes, modes of transmission, consequences, and means of prevention and control of HIV and AIDS through a comprehensive nationwide educational and information campaign conducted by the Government through its various Ministries, Departments, Authorities and other agencies.

Pursuant to subsection (2), the educational and information campaign referred to in subsection (1) shall-

a. employ scientifically proven approaches;
b. focus on the family as the basic social unit;
c. encourage testing of individuals; and

Subsection (3) provides that in conducting the educational and information campaign referred to in this section, the Government shall collaborate with relevant stakeholders to ensure the involvement and participation of individuals and groups infected and affected by HIV and AIDS, including persons with disabilities.

According to section 31 (1) No person shall be-

- denied access to any employment for which he is qualified; or
- Transferred, denied promotion or have his employment terminated, on the ground only of his actual, or suspected HIV status

The contractor will be required to promote HIV/AIDS educational and information campaign during the construction phase of the proposed project. In addition, King's Sapphire shall ensure that the contractor does not discriminate workers on the basis of their HIV status.

2.3 Other relevant Provisions

The following are the relevant environmental treaties to which Kenya is signatory in order of ratification:

- Montreal Protocol on Substances that Deplete the Ozone Layer (1987) ratified 9 November 1988
- United Nations Convention to Combat Desertification (1994), ratified 12 June 1994
- United Nations Framework Convention on Climate Change (1992), ratified 30 August 1994
- Convention on Biological Diversity (1992), ratified 11 September 1994
- Bamako Convention (1991), ratified 17 December 2003
- Kyoto Protocol (2004), ratified 25 February 2005

2.4 Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Forestry Department, Kenya Wildlife Services (KWS) and others. There are also counties and

international NGOs involved in environmental activities that impact on the environment in one way or the other in the country.

2.4.1 National Environmental Management Authority (NEMA).

The object and purpose for which NEMA is established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director General appointed by the president heads NEMA. The Authority shall, among others:

Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilization of the natural resources environment on a sustainable yield basis for the improvement of the quality of human life in Kenya.

Take stock of the natural resources in Kenya and their utilization and consultation, with the relevant lead agencies, and develop land use guidelines.

Examine land use patterns to determine their impact on the quality and quantity of the natural resources among others. Moreover NEMA mandate is designated to the following committees:

2.4.2 County and District Environment Committees.

According to EMCA, 1999, the Minister by notice in the gazette appoints County and county Environment Committees of the Authority in respect of every province and district respectively.

2.4.3 County Environment Committee.

The County Environment Committee has an oversight and decision making role at the County level. Like in the case of County Environment Committees, the County Environment Committees are responsible for the proper management of the environment within the province, which they are appointed. They are also to perform such additional functions as are prescribed by this Act or as may from time to time be assigned by the Minister by gazette notice.

2.4.4 Public Complaints Committee.

The Committee is charged with the following functions:

Investigating allegations/ complaints against any person or against the Authority (NEMA) in relation to the condition of the environment and its management, Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment, and to perform such other functions and excise such powers as may be assigned to it by the Council.

2.4.5 National Environment Action Plan Committee.

This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall contain:

Analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time, and Analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity among other duties as the EMCA specifies.

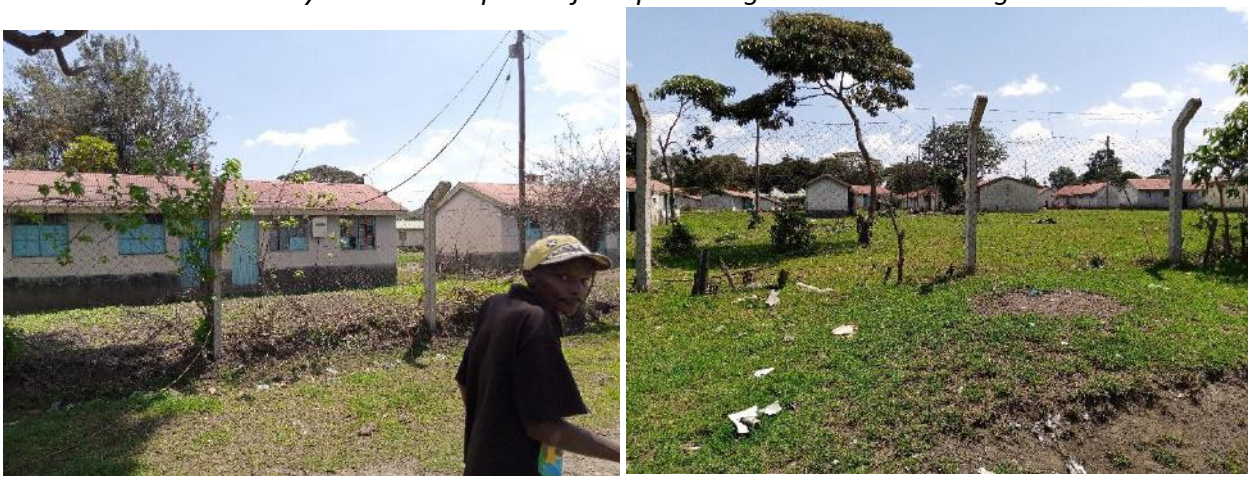
CHAPTER THREE: PROJECT DESCRIPTION

3.1 Project Background

3.1.1 Neighbourhood Characteristics

The Land parcel where the project is initiated is located in an area that was once developed with Single Government Houses which some have been demolished and the rest yet to be demolished to pave way for the proposed development. Immediate neighborhood are Kivumbuni and Flamingo Government Houses and A.I.C Bondeni Church. The strategic location of the land parcel and immediate neighborhood has however changed with the increasing demand for housing forcing the proponent (Nakuru Government-Housing Department) to construct more accommodation facilities for the growing population.

Partly demolished parts of dilapidated government housing



Units that are yet to be demolished to pave way for developments

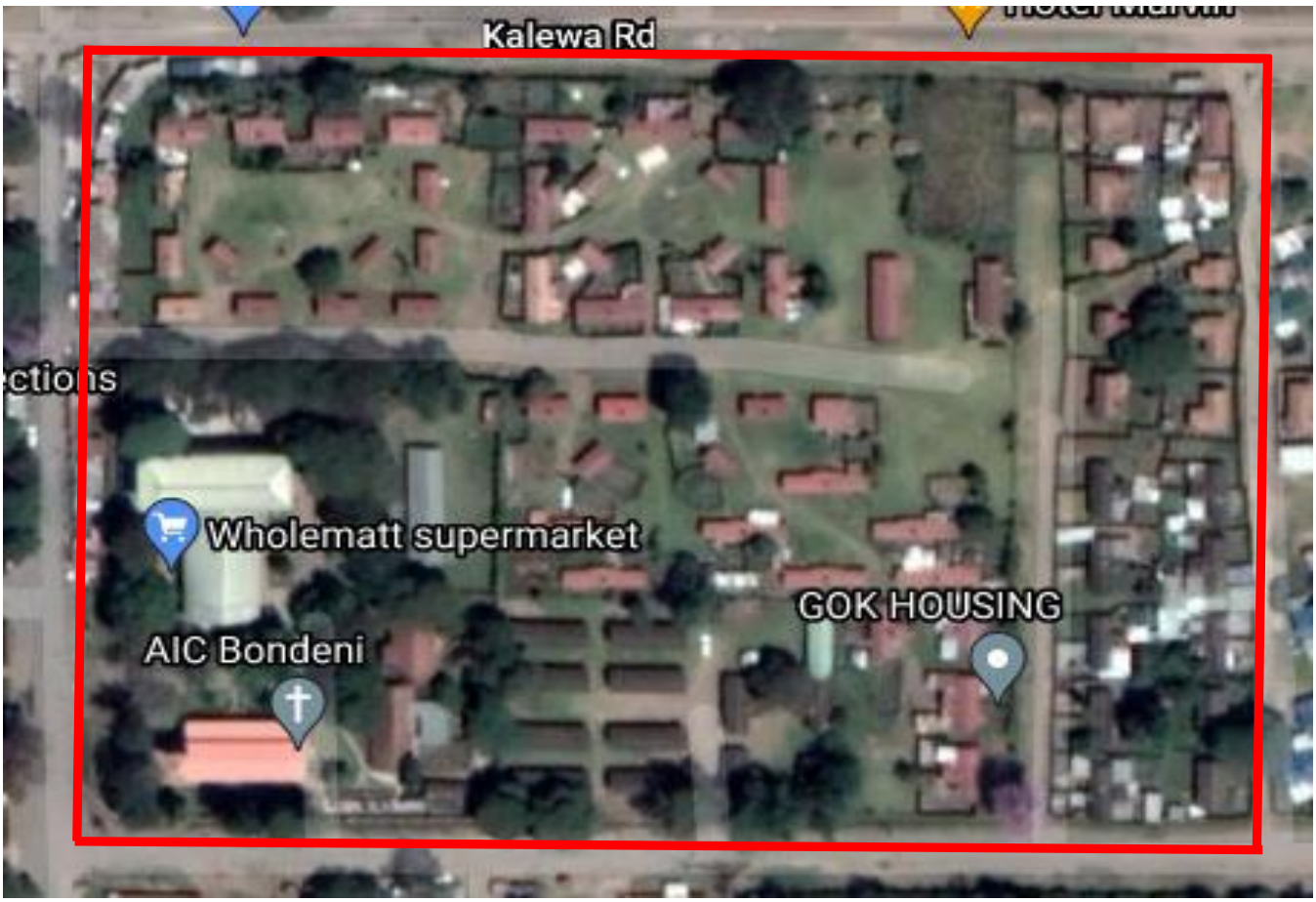
Immediate neighborhood to the proposed site (St, Theresa, and Kivumbini Estate)

Existing drainage system adjacent to Sewer-line that links the entire estate to main Sewerage treatment plant


Kivumbini and Kalewa Road connecting in and out of the site

3.1.2 Location of project site

The proposed development site is located within Bondeni Estate along Kivumbini/Kalewa Road of Nakuru East Sub-county.



Satellite View of the Project Site and immediate neighboring estate

3.1.4 Proposed Development Design

The motivation for establishment of the project is the existing high demand for affordable houses within Bondeni and the wider Nakuru County as a flagship project of Agenda Four of the Jubilee government of providing affordable housing to the low and medium income earners. The conceived project is designed to be within character of the current housing trend of the project area. Thus such developments are guaranteed of attracting the desired clientele within Nakuru County where a population of about 605 household will be served.

Development of Thirteen residential Blocks/apartment with a total of 605 house units complete with the following components will be developed:

BLOCK	**UNITS DISPERSION**	**HOUSE UNITS PER BLOCK**
1	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
2	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	50
3	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
4	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
5	3 Bedrooms, lounge, dining, kitchen, store and washroom/shower	50
6	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
7	3 Bedrooms, lounge, dining, kitchen, verandah store and washroom/shower	40
8	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
9	3 Bedrooms, lounge, dining, kitchen, verandah, store and washroom/shower	40
10	2 bedroom, lounge/dining, kitchen, store shower and washroom	60
11	2 bedroom, lounge/dining, kitchen, store shower and washroom	60
12	2 bedroom, lounge/dining, kitchen, store shower and washroom	60
13	Ground floor: 8 shops, kindergarten, Restaurant/Café, Dining Kitchen First floor: Community Hall, clinic, Pharmacy and emergency unit, Resident doctor 1 & 2	
	Typical 2nd, 3rd & 3rd floor: 15, 1 bedroom, lounge, kitchen and washroom	45

3.2 Infrastructure

The development will have a comprehensive and robust infrastructure including access roads, parking areas, water storage, electricity distribution and waste disposal mechanism.

3.2.1 Electrical system

There will be connection to the existing electricity main line of the Kenya Power Company, which will be used in all phases of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

3.2.2 Water Reticulation system

Water from NAWASCO service provider will be used during construction and operation phases. Moreover a number of boreholes will be drilled to facilitate water demand for construction activities and the anticipated the populace during operation. There will be water storage tanks connected to each residential block, where each block and house unit will be articulated with master water meter for billing and monitoring abstraction levels from boreholes and from NAWASCO. The proponent do propose to drill one sustainable borehole to supplement the increased water demand during construction and operation phase

3.2.3 Sewerage System

The wider Bondeni, Flamingo and Kivumbini area is connected to Nakuru main sewer line, thus, all effluent to be generated will be channeled to the subterranean Gas/Effluent Pipeline to the Sewerage treatment plant. Storm water will be discharged into road drainage system.

3.2.4 Solid Waste

Solid waste management systems will consist of waste receptacles that will be provided at each residential block and will be protected from rain and animals pests. The waste from each receptacle unit will be collected by Nakuru Environment Unit- Department of Waste Management. NEMA will from time to time man the operation (Collection, storage,

transportation and safe disposal of the collected waste at the approved county dumpsite to curb any likely pollution from poor handling, transportation and disposal.

3.2.5 Parking area

From the design, drive way and parking area will be provided, which will be paved, and spacious to accommodate the required clientele.

3.2.6 Perimeter Fence

Perimeter fence in form of barbed wire will be installed around the project site before development commences to enhance security and minimize access point.

3.2.7 Landscaping

The site will be landscaped after construction, using plant species available locally. This will include establishment of flower gardens and lush grass lawns to improve the visual quality of the site where pavements will not have taken space.

3.2.8 Buildings Construction

The technology used in the design and construction of the apartments will be based on international standards, which have been customized by various housing units in Kenya.

The project will consist of residential apartments complete with associated facilities, parking's and infrastructure as presented in the architectural drawings in the appendix.

The buildings will be constructed as per the respective structural engineer's detail as provided for in the drawings presented in the Appendix. Basically, the building structures will consist of concrete appropriately reinforced with metal (steel and iron). The roof will consist of structural timber and steel members and roofing tiles. The buildings will be provided with a well-designed concrete staircase for every house.

3.3 Description of the Project's Construction Activities

3.3.1 Pre-construction Investigations

The implementation of the project's design and construction phase will start with thorough investigation of the site's biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle. Before clearing the site for development, existing building will be demolished and resultant debris be dumped at approved dumpsite-Kyoto. Other building materials like building stones will be reused back in the construction activities like back-filling.

3.3.2 Sourcing and Transportation of Building Materials

Building materials will be transported to the project site from their extraction, manufacture, or storage sites using transport trucks. The building materials to be used in construction of the project will be sourced from Nakuru and neighbouring areas such as Bahati and Mzee Wanyama or any other extraction sites. Greater emphasis will be laid on procurement of building materials from within the local area.

3.3.3 Clearance of Vegetation.

The site has no vegetation of significance since it was it was habited by the evicted person save for grass and mature trees growing in it and other ornamentals. Before commissioning the project, the proponent in conjunction with the contractor shall ensure that trees and grass has been planted on undeveloped area as much as possible.

3.3.4 Storage of Materials

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities of materials on site, the contractor will order bulky materials such as sand, gravel and stones in bits. Materials such as cement, paints and glasses among others will be stored in temporary storage structures, which will be constructed within the project site for this purpose.

3.3.5 Excavation and Foundation Works

The soil cover in the proposed area is thin and the rocks are exposed to the surface in some areas, with a thin layer of black cotton soil about 4 inches deep. However this shall be excavated and disposed off in approved sites (preferably exhausted quarries).

3.3.6 Masonry, Concrete Work and Related Activities

General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.

3.3.7 Structural Steel Works

The building will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection.

3.3.8 Roofing and Sheet Metal Works

Roofing activities will include sheet metal cutting, raising the roofing materials such as clay roofing tiles and structural timber to the roof and fastening the roofing materials to the roof.

3.3.9 Electrical Work

Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

3.3.10 Plumbing

Installation of pipe-work for water supply and distribution as well as containment of effluent from each house units will be carried out by qualified experts and good workmanship will be employed at all avenues. Due diligence for piping works will be done to connect all effluent

from each residential block to the main subterranean gas/effluent pipe to discharge it to the Nakuru Sewerage Treatment Plant.

3.4 Description of the Project's Operational Activities

3.4.1 Residence

About 605 families will reside within the project site once it's commissioned for occupation. Several domestic activities such as cooking, washing, use of vehicles, and leisure and recreational activities will thus accompany residence. In addition, there will be production of domestic and sanitary wastes.

3.4.2 Solid Waste

During operational phase, county government of Nakuru (Department of Environment and waste management) will be responsible for management and disposal of all generated wastes within the housing estate. The proponent (Nakuru County Housing Department) will provide facilities for handling solid waste generated at central receptacle points within the estate. These wastes will be collected, transported and disposed occasionally (twice a week) by the assigned County Environment unit at the approved Nakuru county dumping site. Timely collection and disposal of all generated wastes from the estate will wade off any associated effects resulting from organic biodegradable and inorganic waste like pests and diseases.

3.4.3 Effluent Management

Effluent that will be generated from each house unit will be discharged into the Nakuru main sewer line, through the subterranean Gas/Effluent Pipeline to the Sewerage treatment plant. Storm water will be channeled through the pavement drainage system connecting the residential blocks which will later connect to the road drainage system. From time to time caretaker-Nakuru Housing, will work hand in hand with NAWASCO to check on blockage and leakage from the system to curb any chances of surface overflow and resultant flow.

3.4.4 General Repairs and Maintenance

The Houses and associated facilities will be repaired and maintained regularly during the operational phase of the project by the Nakuru County housing department. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of refrigeration equipment, repairs of leaking water pipes, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others.

3.5 Description of the Project's Decommissioning Activities

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. The following should be undertaken to restore the environment.

i. Remove all underground facilities from the site
ii. The site should be well landscaped by flattening the mounds of soil and
iii. Planting indigenous trees and flowers
iv. All the equipment should be removed from the site
v. Fence and signpost unsafe areas until natural stabilization occurs
vi. Backfill surface openings if practical

3.5.1 Dismantling of Equipment and Fixtures

All equipment including electrical installations, furniture partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of these equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of this equipment to schools, churches and charitable institutions.

3.5.2 Site Restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

3.5.3 Solid Waste Generated

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus oil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. The proponent will take steps to minimize the generation of such waste and to ensure proper disposal procedures.

A lot of domestic waste such as waste from foodstuffs, empty plastic containers, cartons, etc will be generated during the operational phase of the project. The proponent will be responsible for waste management within the Housing Project and will put in place measures such as provision of waste handling facilities and ensuring prompt and regular waste disposal.

On decommissioning, large quantities of solid waste will be generated from demolition works and equipment dismantling. The proponent will provide measures for recycling, reuse or disposal of such wastes.

CHAPTER FOUR: BASELINE INFORMATION

This section provides detailed information of the site where the project is to be undertaken. It broadly examines the physiographic factors, social and economic forces both visible and invisible as they operate and the stimuli the project is likely to inject. All major parameters are assessed to establish their capacities and abilities.

4.1 Location

The proposed development project is located along the Kalewa/Kivumbini Road within Bondeni Estate-Government Housing facility of Nakuru County. The area is served with with key infrastructure in range of power (electricity), sewerage system, good road networks, communication facilities to mention but a few. The proposed development is therefore in harmony with the existing neighbourhood, since it involve upgrading of the existing single dwelling to multi-dwelling.

4.1.1 Proposed Site & Zone Character

Most developments within the area-site (Bondeni) are government owned rental houses and private owned residential units and institution like the Kisulisuli and Bondeni Primary School. From the foregoing mixed use within the zone provides urban services to many residents of Bondeni, Kivumbuni and Flamingo. The proposed development is bound to improve the social amenity and the general well-being of the estate by upgrading growth and economic development of the area.

4.2 Physical Environment

4.2.1 Climate

The climate of the area is characterized by a bimodal rainfall pattern where short rains are experienced from October to December, and long rains from March to June. April is the wettest month throughout the year. Annual mean temperature of the area varies between 16°C to 28°C. Hot and dry months are December to February with an average daily temperature of 27°C. The June to July period is characterized by a cold spell with an average daily temperature

of 22°C. The mean annual rainfall is about 1100 mm with an annual potential evaporation of about 1650 mm.

4.2.3 Soils and Geology

The soils within Bondeni area and wider Nakuru Municipality mainly consist of Latosolic origins and traces of imperfectly drained loams with dark brown sub soils type covering the Menengai Crater. The wider area is influenced with planasolic soils characterized by poorly drained black cotton clay, developed from the volcanic activities that are major foundations of soil formation of Great Rift Valley

4.3 Biological Environment

4.3. 1 Flora

The site is located within an estate that was once developed with dilapidated colonial single dwelling units. Out of the estate developments are characterized by mixed land uses where human settlement and activity has altered the flora. There is no vegetation within the site save for grass and lowly cultured ornamentals and trees. From the architectural plans, its envisaged pavements and undeveloped area will be planted with assorted vegetation.

4.3.2 Fauna

The site being a government estate, with no significant vegetation, it was established that no faunae was identified except for birds of the air. Far from the site is the riparian buffer zone that forms part of the Lake Nakuru Ramsar Site, thus no habitat for any threatened native species will be affected by the project except for soil macro and micro-organism small insects.

4.4 Socio-Economic Environment

Kenya's real gross domestic product (GDP) grew by 11.5% in 2019 against a revised growth of 8.5.5 percent in 2015 (CBS 2019).The major growth sectors were agriculture and forestry; transport and communications; manufacturing; and wholesale and retail trade. Nakuru is a major contributor to the country's economy: it generates over 45 per cent of GDP; employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2018).

Environmental resources such as forests, water and land have a vital role to play in boosting economic growth and reducing poverty. Poverty rate of the county is estimated at 19.6% (2019)

4.4.1 Land use:

The site where the project is to be initiated falls under the residential development as evidenced by housing units which the government had already initiated the project in earlier years like Kivumbi, Flamingo and Lower Bondeni. Coming up with the proposed development will realize the economic value of this government land and will in turn improve aesthetic value of the area and Nakuru Municipality.

4.4.2 Population

Population is a major driver of environmental change in Nakuru and as such is a determinant of other parameters such as solid and liquid waste-generation and disposal rates, land-use patterns and settlement, and water consumption. By 2019, the population of Nakuru County had grown to 2,162,202 being the third populous county after Nairobi and Kiambu. Taking the 2019 census figures as a baseline, it is projected that the county's population by the next census in 2029 will be approaching about 3 million, thus, issue of providing affordable housing might be a problem.

4.4.4 Employment Trend

As Nakuru population increases, so does the demand for jobs. Currently, the unemployment rate of persons between 18-65 yrs reads at 10% and employed at 35% and the rest are self-employed in different fields. 56.6% of women and 68.6 % of men aged between 15 and 50 are economically active (CBS et al. 2019).

4.5 Socio-economic Importance of the proposed project

The proposed project is in line with the governments' housing policy that aims to facilitate the attainment of adequate shelter and healthy living environment to all socioeconomic groups in Kenya. The project will therefore help to increase living standards of the people in the region by

investing in the housing facility; the proponent will also contribute towards the economic growth of the county and nation through revenue collection.

CHAPTER FIVE

5.0 PUBLIC PARTICIPATION

5.1 General Overview

Regulation 17 of the Environmental (Impact Assessment and Audit) Regulations, 2003 requires project proponents to seek the views of the public pertaining to ESIA/EIA study for any of the projects listed under the second schedule of EMCA, CAP 387. Due to the scale and the envisaged negative impacts associated with the proposed development of affordable housing, an ESIA project report has been prepared for submission to NEMA.

5.2 Objectives of Public Consultation and Participation

The ESIA team conducted the public consultation and participation, with respect to the proposed housing development, to fulfil the following objectives:

i. To inform the potentially affected parties about the proposed project;
ii. To disclose the findings of the ESIA study to the potentially affected parties; and
iii. To provide an opportunity for the potentially affected parties to provide their oral and/or written views about the proposed project thereby contributing positively to the decision making process.

5.3 Public Consultation and Participation Approach

Public consultation and participation was achieved through the following approaches:

i. Site Visit and Ground Breaking

Briefing and ground breaking ceremony was organized through the governor's office, County commissioner, MCA office and Chief Kivumbini that propelled officiating of the affordable housing project by the PS Housing and Urban Development Hon. Charles M. Hinga accompanied with His Excellency Hon. Lee Kinyanjui Nakuru County Governor. After ground breaking area chief and four village elders, ward MCA coordinated for visit to the project site was undertaken by King's Sapphire representative and the ESIA team on 20th May 2021. The objective was to ascertain the current baseline conditions and the location of the site with respect to site situations, waste management and effluent generation and disposal. This was a prerequisite for completing the questionnaire.


ii. Stakeholder Mapping

The potentially affected parties were identified through a stakeholder mapping process that was conducted during scoping phase of the ESIA study. The output of this process was the list of stakeholder categories that were to be consulted. The stakeholders considered were; representatives of residents of Bondeni Estate, Area Chief, Kivumbini/Manyani Ward MCA, Physical Planning officer, Kivumbini, Bondeni and Flamingo Village elders, Bondeni OCPD, and King's Sapphire staff working at the technical and architectural drawing and related modalities.


Area chief alerting AP police on security issue and contractor exposing on the project modality

Physical planning representative together with contractor outlining project distribution on site to MCA, Chief and village Elders

iii. One-on-one Meetings and Administration of Questionnaires

One-on-one meetings were carried out with Kivumbini MCA Mr. Wilburforce, Kivumbini sub-location Chief Mrs. Jane Muthoni and King's Sapphire staff madam Anne Kirobi. The meeting provided an opportunity to shed some light on the proposed project. Area MCA, Bondeni OCPD and Assistant chief organized for 5 village elders(Mary Kilovi, Stanley Kinuthia, John Malinda, Jane Nyandiko, Lydia Mwangi and Collins Otieno) who later called for 3 village members (as resident)to submit their views in relation to the proposed project. Thereafter, structured questionnaires were administered to the chosen sample population.

MCA Area Chief and Contractor's representative sensitizing village elders on the benefits of the proposed development

Village elders and the selected immediate resident filling in the questionnaire

Area chief closing up the meeting with invited village elders

iv. Focus Group Meeting with Bondeni Residents

A focus group meeting was held on 15th May 2021 at the Bondeni Grounds/site, adjacent to AIC church. The meeting involved local administration police and leaders from Bondeni village and was chaired by the Assistant Chief – Kivumbini sub-location. A total of six (6) leaders were in attendance. Administration police was incorporated due to insecurity that has been experienced in the area since eviction and demolition order was given. Also due to insecurity a selected number of key village members was considered.

5.4 Summary of Public Consultation and Participation Results

The summary of comments from the focus group meeting and the filled in questionnaires.

Summary of Comments Received during the Focus Group Meeting.

Comments Received	Feedback from King's Sapphire & ESIA Team
i. King's Sapphire is required to disclose job opportunities (skilled and unskilled persons) that the proposed project will generate prior to commencement of works. ii. Area chief suggested that at least 75% of jobs created should be given to local community especially youths to make the project sustainable and curb any insecurity threats that was earlier on realized when eviction order was given as well as theft of iii. MCA and area chief should advise the contractor to contract the registered Bondeni Environmental Group for provision of waste management services and greening of project site during and after construction before the project is commissioned-this will create a sustainable jobs to a number of youths iv. Liquid effluent spilling on the surface during operation due blockage of subterranean gas pipe	i. King's Sapphire and Housing department will engage the community representatives during construction and phase of the proposed project. ii. Available job opportunities will be disclosed. iii. The community representatives were advised to submit a proposal, for environmental greening and waste management for consideration by the King's Sapphire Corporate Social Responsibility (CSR) committee. iv. Kings's Sapphire ESIA team enlightened MCA, Chief and village elders that Environmental Group will need to have a vehicle that is licensed by NEMA to transport solid waste within estate as provided for by the Waste Management Regulations, 2006. v. Based on qualification, the contractor will decide on who to award the contract for collection and transportation of waste as long as the firm is licensed by NEMA. vi. Nakuru housing department in conjunction will provide onsite workers who will inspection of all manholes and timely fixing of any blockage.
i. Bondeni community members (esp youth) should be given the first priority when employment opportunities arise. ii. King's Sapphire should be transparent when awarding jobs and tenders and also follow the right procedures to avoid complaints by the community members	i. Contractor will adhere to the requirements of the jobs and tender Procurement in awarding jobs and related to the proposed project. ii. The community representatives were encouraged to inquire of available jobs and requirement and apply where necessary, especially those for the special group category (women, youths and the disabled persons).
i. King's Sapphire and NAWASCO should confirm whether the existing sewerage piping system and existing treatment plant will be able to handle the waste water from the proposed estate (housing) and associated utilities.	i. Representative from NAWASCO assured that the existing subterranean system will be able to serve the new development and is able to handle the waste water from the housing units.

CHAPTER SIX: IMPACT ASSESSMENT METHODOLOGY & ANALYSIS OF ALTERNATIVES

6.1 Introduction

This chapter will describe the impact assessment methodology to be used for this project. The methodology has been adopted to provide a relatively objective approach for the assessment of potential impacts.

6.2 Methodology

To ensure a direct comparison between various impacts, standard rating scales have been defined for assessing and quantifying the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

i. Relationship of the impact to temporal scales – the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
ii. Relationship of the impact to spatial scales – it defines the physical extent of the impact.
iii. The severity of the impact – the severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
iv. The likelihood of the impact occurring –as a result of project actions which differs between potential impacts.

There is no doubt that some impacts would occur (e.g. loss of vegetation, disturbance of soil structure and properties) but other impacts are not as likely to occur (e.g. accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance. Each criterion is ranked with scores assigned to determine the overall significance of an activity.

6.3 Analysis of Alternatives

6.3.1 The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained i.e. no construction/development activity to take place. This option is most suitable

alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, the need for such development is high and the anticipated insignificance environmental impacts resulting from construction have already been experienced. This option will however, involve several losses both to the project proponent/County and National Government. The property will remain under-utilized or neglected. The No Project Option is the least preferred from the socio-economic and partly environmental perspective if the project is not done: -

The economic benefits especially during constriction i.e. provision of jobs for skilled and non-skilled workers will not be realized.

There will be no generation of employment by the developer and the Government.

The social-economic status of resident Kenyans would remain unchanged.

Discouragement for investors to produce this level of standard and affordable developments.

6.3.2 The relocation Alternative

Relocation option to a different site is an option available for the project implementation. The site having had dilapidated single dwelling houses prompted the proponent to demolish and initiate multi-dwelling better housing units at the same available space. At the moment, this is the best preferred site that can accommodate the proposed 605 house units. (i.e. though the proponent has other alternative site, they chose this one because of its dilapidated state). If the alternative is to be adopted, it will mean that the proponent-Nakuru County Housing Department will look for a different estate to accommodate the proposed number. It's also worth noting that the said project is already underway in terms of seeking development approvals in various government departments. The project proponent would spend another long period of time on design and approvals of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for costs; already incurred in the proposed development i.e. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option. From the analysis above, it becomes apparent that the No Project Alternative is not the appropriate alternative to the local people, Kenyans, and the Government of Kenya.

6.3.2 Alternative Land Use Activities

The site where the project is to be initiated is based in a residential zone (Government Housing) i.e. used for residence. Alternative land use activities such as farming, grazing land and car repairs will conflict with surrounding land use activities. For uniformity purposes, the proponent is interested in construction of residential houses with a slight change from single dwelling to multi-dwelling units.

6.3.3 Alternative to Construction Materials and Technology

There is a wide range of construction and furnishing materials which can be sourced locally and internationally. In this construction, certified raw materials/equipment and modern technology will be used. Also, electrical appliances that save energy will be given first priority. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Kenya Bureau of Standards requirements.

6.3.4 Solid Waste Management Alternatives

Throughout construction, the project will produce wastes debris from demolition works, such as soil, wood chips, metal scraps and paper wrappings among other which will be disposed off at approved dumping site or used as land-fill. Wastes to be generated during operation phase are mainly domestic in nature. The Proponent is expected to observe EMCA (Waste Management Regulations, 2006). Priority will be given to reduction of wastes, recycling, and reuse. This will minimize environmental pollution.

6.3.5 Project Design

This Environmental Impact Assessment Project Report is based on information and consultations with the project proponent, the Architect and details contained in the architectural plans and drawings of the project. The project will entail construction of 13 residential apartments with 605 house units.

CHAPTER SEVEN: ANTICIPATED IMPACTS AND MITIGATION MEASURES

A number of processes that may impact negatively on the environment, workers, neighbors, pedestrians and society at large are anticipated. The impacts may be positive or negative. This report proposes mitigation measures for the negative impacts and identifies the desirable social and economic benefits as discussed in the following paragraphs.

7.1 Negatives factors

7.1.1 Solid waste

The activities during excavation and construction will generate considerable solid waste in the form of soil, stones, tiles, timber, metal, glass, plastics and other debris. The soil generated from excavation and other solid waste will be disposed off at sites approved by the local authority. Useful wastes such as building stones, roofing tiles and timber will be recycled. Useful material not required will be stored in the contractor's yard. Waste storage receptacles will be provided within the premises for temporary storage of solid waste before it is transported to designated disposal site by the county government.

7.1.2 Liquid and human waste

Liquid waste is anticipated from wastewater during construction and water supply pipes during operation. The proponent has confirmed that the site engineers will closely supervise related activities to ensure that leakages are avoided. Storm water will be channeled to storm drainage channels. After construction, wastewater will be discharged into the subterranean Gas pipeline which will channel the effluent to the County/Municipal sewage treatment plant.

7.1.3 Biodiversity Some vegetation will be cleared at the development site.

Grasses dominate the specific development site. Proper mitigation measures will be put in place to ensure that there will be landscaping upon completion of the project. During construction, disturbed birds and insects will find refuge in the neighborhood where there is sufficient vegetation to accommodate them. The proponent has confirmed that the undeveloped parcel will be landscaped rehabilitated with grass and trees.

7.1.4 Increased water demand

Demand for water will increase during construction and occupation. The contractor and the house occupants are expected to use water conservatively during construction and occupation respectively to avoid wastage. It is expected that the NAWASCO will continuously monitor water demand and improve supply with the new developments taking place in the area. The proponent is in conjunction with the Rift Valley Water Services propose to drill at least two borehole to facilitate water supply for the anticipated populace.

7.1.5 Air pollution

Air quality will be affected by dust during demolition and subsequent excavation for the foundation, burning material, hydrocarbons, nitric/nitrous and sulphuric/sulphurous oxides from vehicles and other automotive machinery in use. The proponent has been advised to fence the site during construction, to wet suppress all loose soil and debris, to provide workers with masks, and to properly service all automotive machinery to reduce emission of exhaust fumes. If these measures are implemented, the amount and harmful effects of air pollutants will be minimal and temporary. As stated earlier, excavation of the foundation and other air pollution generating activities will have minimal impact; in any case, most of the pollutants will be dissipated widely by the wind, thus reducing concentration at the source and in the immediate neighbourhood.

7.1.6 Noise pollution

Increased noise levels are anticipated, mostly from excavation of the foundation, heavy vehicles supplying construction material and workers' generated noise. However, all machines that will not be in use should be switched off to minimize amount of noise generated.

7.1.7 Traffic hazard

Vehicular traffic will comprise of Lorries supplying building material to the site and more traffic is anticipated during occupation. Erection of warning signs that construction is in progress, and strict observation of highway safety code will greatly reduce chances of vehicle accidents.

7.1.8 Health and safety of workers, students and neighbours

Health and safety of the workers, students and neighbours is of critical concern. The main concerns are physical injuries, site accidents, exhaust fumes and noise. Workers will be exposed to possible machinery injury, dust, gaseous emissions from transport vehicles and other automotive machinery on site, noise, and falling material such as masonry stones, timber, and steel. Health risks associated with gas emissions from exhaust are considered to be relatively low. Dust and fumes will have a bigger impact on workers, as they will be working at the sources of emission. The amount of dust so generated will be minimal if buffer fences are erected and water sprayed on all loose soil and other debris.

The following are the predictable negative impacts with the proposed mitigations,

Predictable negative impacts	**Impact Stage**	**Proposed Mitigations**	**Significance**
Air and dust pollution	Demolition Construction Decommissioning	Fence the site to minimize the amount of dust generated during excavation, construction and demolition during project decommissioning. Buildings under construction should be covered with dust arrestors during construction. Spray water on loose soil and debris during excavation and construction phases. Minimize emission of exhaust fumes through servicing of machinery in use. Provide site workers with nose masks.	Moderate
Noise Pollution	Demolition Construction Decommissioning	Provide workers with ear plugs and muffs. Ensure Lorries supplying building materials and other site machinery are well serviced to reduce noise emission.	Low

		Machinery that makes excessive noise should fixed with silencers. Designate one gate exclusively for material delivery and deliver materials during non-school hours and weekends.	
Solid waste	Demolition Construction Occupation Decommissioning	Dispose solid waste and construction debris at dumping sites approved by the county government. Reuse/Recycle useful material in the construction. Store unused useful materials in the contractor's yard. Compost or incinerate waste as appropriate	Moderate
Liquid & Human waste	Construction Occupation	Provide toilets for workers during construction. Channel all wastewater and human waste during occupation to the sewage treatment facility. From the sewage treatment facility the waste will be pumped to the sewer line which passes near the land parcel.	Moderate
Increased traffic	Construction Occupation	Designate one gate exclusively for material delivery and deliver materials during non-school hours and weekends. Provide adequate on plot parking for the occupants	Low
Occupational health and safety of students	Demolition Construction Occupation Decommissioning	Sensitize workers on safety measures required during construction. Provide workers with appropriate personal protective clothing, helmets & boots.	Moderate

& workers		Provide well stocked first aid kits Fence off construction sites Buildings under construction should be covered with dust and debris arrestors during construction.	
Increased water consumption	Construction Occupation	Harvest rainwater and drill a number of sustainable borehole to supplement NAWASCO water supply. Use water conservatively.	Moderate
Fire	Construction Operation	Install fire alarms and firefighting equipment. Sensitize workers, students and occupants on firefighting skills.	High
Surface water pollution	Demolition Construction Operation Decommissioning	Channel liquid and human waste to the sewage treatment facility. From the sewage treatment facility waste should be pumped to the sewer line which passes near the plot	High
Soil erosion	Demolition Construction Operation Decommissioning	Spray soil with water during excavation and construction Contain soil erosion Landscape the site with grass, flowers, ornamentals and other vegetation on project completion	High

7.2 Positive Impacts

7.2.1 Employment during Construction and Operation

Employment for different cadre of professionals and other workers will be created during, construction, occupation and decommissioning phases. These workers include professionals (e.g. architects and engineers, technicians, electricians, artisans, masons, carpenters, plumbers) and manual workers. As is usual at the construction sites, kiosk-type food providers will feed workers and earn a living. These activities will create employment and generate incomes for the

workers and their families. These outcomes are desirable and are in line with government goals of employment and wealth creation.

7.2.2 Improved Business

The project will improve income of various suppliers of construction material such as building stones, hard-core, ballast, sand, cement, steel, tiles, timber, glass, sanitary ware and paints. Business around the area will also realize increased sales.

7.2.3 Increased education facilities.

This project when completed will ensure more modern housing facilities in the neighbourhood. This will greatly help at solving the current shortage of housing.

7.2.4 Land Use Intensification

The development will result to a more economical use of the land without significant environmental degradation.

CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT PLAN (EMP) GUIDELINES

8.1 Introduction

Integrating environmental issues in business management, such as those related to real estate development is that it increases efficiency while enhancing the project proponent financial and environmental management. These issues, which are normally of financial concern, are: costs, product quality, investments, level of productivity and planning.

Environmental planning and management as a concept seeks to improve and protect environmental quality for both the project site and the neighbourhood through segregation of activities that are environmentally incompatible. Environmental planning and management integrates land use structure, social systems, regulatory law, environmental awareness and ethics. Environmental management plan (EMP) for development projects such as the proposed residential development complex development is aimed at providing a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, EMP assigns responsibilities for action to various actors, and provides time frame within which mitigation measures can be done.

EMP is a vital output for an environmental impact assessment as it provides a checklist for project monitoring and evaluation. A number of mitigation measures are already incorporated into the project design. The EMP outlined in Table 8-1 has addressed the identified potential negative impacts and mitigation measures for the proposed residential development.

8.2 Environmental Monitoring and Evaluation

Environmental monitoring and evaluation are essential in the project lifespan as they are conducted to establish if the project implementation has complied with the set environmental management standards as articulated in the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, and its attendant Environmental (Impact Assessment and Audit) Regulations, 2003.In the context of the proposed project, design has made provisions for an elaborate operational monitoring framework for the following among others:

- Disruption of natural environment and modification of microclimate
- Air and noise pollution
- Workers accidents and health infections during construction process

ENVIRONMENTAL IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COST (KES)	MONITORING MEASURES
Commissioning of the Construction Works	- Site hand-over and Ground breaking	Project team (Lead Consultant/Architect, contractor Proponent)	Covered in the Project Cost	Presence of the project Team
Securing the Construction Site	- Construction of Perimeter Wall and Hoarding	Contractor	Covered in the Project Cost	Presence of Perimeter Fence
Housing for Construction/ Site staff	Construction of Labour Camp	Contractor	-	Presence of Labour Camp
Security for Construction Material	- Construction of Site Stores - Construction materials to be delivered in small quantities to minimize storage problems	Contractor	-	Presence of Site store/security officer
Extraction and Use of Building Materials	- Availability and sustainability of the extraction sites as they are non-renewable in the short term - Landscape changes e.g. displacement of animals and vegetation, poor visual quality and opening of depressions on the surface	Contractor/Proponent/project team	-	Material site rehabilitation
Collapse of Building during Construction	- Ensuring Building Strength and stability - Use of appropriate construction materials and reinforcements as per specifications - Ensuring building components are as per designs - Ensure proper timelines are followed e.g. curing time	Contractor/project team	Covered in the Project Cost	Presence of the project Team
Disturbance of Traffic flow during construction Construction phases	- Proper signage - Awareness creation - Education to truck drivers	Contractor/Project team and general public	-	- Presence of site Notice Board /Hoarding - Presence of Security guards to control traffic - Presence of warning signs
Soil Excavation leading to site disturbance	- Excavate only areas to be affected by buildings - Dumping of excess excavated materials to sites designated by NEMA and Council - Restoration of sites Excavated	Contractor	-	Landscaping after completion of construction
Soil Erosion	- Create and Maintain soil traps and embankments.	Contractor/Proponent	-	Lack/Absence of

	- Landscaping after completion of	Architect/Site engineer Landscape Architect		Soil Erosion
Noise Pollution and Vibration	- Ensure use of serviced and greased equipment - Switch off engines not in use - Construction work to be confined to between 8am-5pm - Ensure use of earmuffs by machine operators	Proponent and Contractor	Part of Routine operation procedure	Lack of complaints
Air Quality	- Water sprinkling of driveways or the use of biodegradable hydrant e.g. Terrasorb polymer will reduce dust emission during construction - Ensure servicing of vehicles regularly	Proponent and Contractor	Part of Routine operation procedure	- Lack of complaints - Workers wearing protective clothing and earmuffs
Risks of Accidents and Injuries to Workers	- Education and awareness to all construction workers - Ensure use of appropriate personal protective clothing - Provide First Aid Kits on site - Ensuring Building Strength and stability - Proper supervision	Proponent Contractor	Part of Routine operation procedure	- Well-equipped First Aid kit - Presence of Security Guards on site - Incidence register on site
Health and Safety	- Provide First Aid Kits on site - Proper signage and warning to public of heavy vehicle turning - Ensuring Building Strength and stability - Provide clean water and food to the workers - The contractor to abide by all construction conditions especially clause B12 which stipulates health safety and workforce welfare	Proponent Contractor	Part of Routine operation procedure	- Presence of well-equipped First Aid kit - Presence of Security Guards on site - Incidence register at site
Solid Waste Generation	- Ensure waste materials are disposed of on County and NEMA approved sites - Ensure re-use of materials that can be re-used - Use of the 3rs – Reduce, Re-use, Re-cycle	Proponent Contractor	-	- Absence of Solid waste on the site
Energy Consumption	- Use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability - Use of Standby Generators	Proponent Contractor	-	- Presence of KPLC power lines - Presence of Generators

Excessive Water Use	- Excessive water use may negatively impact on the water source and its sustainability	Proponent Contractor	-	- Presence of NAWASCO water lines - Metering of water - Drilled Bore-hole
OCCUPATIONAL PHASE				
- **Solid Waste Generation and Management**	- Regular inspection and maintenance of the waste disposal systems during operation phase - Establish a collective waste disposal and management system - Provide waste disposal bins to each house well protected from adverse weather and animals - Ensure waste materials are disposed of on Council and NEMA approved sites - Use of the 3rs – Reduce, Re-use, Re-cycle	Proponent Estate Managers	-	- Presence of NEMA registered waste management companies - Presence of waste handling bins - Absence of wastes
Liquid Waste Generation and Management	- Regular inspection and maintenance of the waste disposal systems during the operation phase - Connection to Sewer system/septic tank	Proponent Estate Managers	-	- Conventional sewer line and or septic tank - Presence of waste handling bins - Absence of wastes
Increased loading on Infrastructure services - Increased vehicular and/or pedestrian traffic - Increased demand on water, sanitation services	- Have paved local access road and walkway system - Encourage rainwater harvesting - Provision of increased water storage capacity - Provide adequate storm water drainage system	Contractor Proponent Estate Managers	-	- Absence of run-off - Presence of good roads - Pavements and drainage channels
Traffic	- Provide adequate parking facilities within the project site	Contractor/Proponent Residents	Routine operation procedure	- Presence of amble parking in the premises

Increased social conflict	- Increased Housing stock in the area and Kenya - Increased economic activities –employment generation. - Encourage formation of community policing and formation of neihgbouhood associations	Contractor Proponent Neighbourhood associations Estate Managers	**	Social welfare within the estate
Storm Water impacts	- Provide roof gutters to collect and direct roof water to drains - Construct drains to standard specifications - Develop a storm water drainage system and linkage to natural drains	Proponent Contractor	-	Absence of Flooding and dampness in the building
Disruption of existing natural environment and modification of micro-climate – - Increased development density - Reduced natural ground cover/surface run-off	- Development restricted to follow zoning policy/approved density – building line, plot coverage and plot ratio. - Careful layout and orientation of buildings to respect wind and sun direction. - Adequate provision of green and open space planted with grass, shrub and tree cover. - Minimum use of reflective building material and finishes for roof, wall and pavement.	Project team (Contractor Proponent, Architect or Lead Consultant, etc)	-	Proper orientation Planted trees/Landscaping
Insecurity	- Ensure secure perimeter wall where applicable - Have a single entry point that is manned 24 hours	Contractor, Proponent Neighbourhood associations Estate Managers	-	Presence of perimeter wall Presence of day and night security guards
DECOMMISSIONING PHASE				
Building Safety	Assess the condition of buildings to ascertain usefulness	Engineer/Proponent	-	Engineer and Tests on the building
Land and Building use	Ascertain the Planning development policy	County Authority Physical Planner	-	Consultants present
Accidents/Injuries	Securing the Site by fencing off	Contractor/Proponent	-	Presence of perimeter fence

CHAPTER NINE: ENVIRONMENTAL HEALTH AND SAFETY (EHS)

9.1 EHS Management and Administration

The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools / equipment and the biotic environment. The objective of the EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:

Avoidance of injuries

Provision of safe and healthy working environment for workers comfort so as to enhance maximum output.

Control of losses and damages to plants, machines, equipment and other products.

Enhance environmental sustainability through developing sound conservation measures.

9.2 Policy, Administrative and Legislative Framework

It is the primary responsibility of the contractor to promote a safe and healthy environment at the workplace and within the neighborhood in which the proposed project will be constructed by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property. The EHS Management Plan when completed will be used as a tool and a checklist by the contracted engineers in planning and development of the construction of this project.

9.3 Organization and implementation of the EHS Management Plan

The contactor shall use the EHS plan at the proposed project site both during construction and operation. The engineer will use it during construction phase with the assistance of an EHS consultant who shall enforce its provision throughout the life of the project.

9.4 The Guiding Principles to be adopted by the contractor

The company will be guided by the following principle: -

It will be a conscious organization committed to the promotion and maintenance of high standards of health and safety for its employees, the neighboring population and the public at large.

Ensuring that EHS activities are implemented to protect the environment and prevent pollution.

Management shall demonstrate commitment and exercise constant vigilance in order to provide employees, neighbors of the project and the environment, with the greatest safeguards relating to EHS.

Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public as it relates to the EHS management plan.

9.5 EHS management strategy to be adopted by the contractor

The following strategies will be adopted to achieve the above objectives:

Create an Environment Health and Safety Management committee and incorporate EHS as an effective structure at various levels and units to manage and oversee EHS programs in all construction and operation phases of the project

Maintain an effective reporting procedure for all accidents.

Provide appropriate tools and protective devices for the success of the project.

Encourage, motivate, reward and support employees to take personal initiatives and commitment on EHS.

9.6 Safety Agenda for both the proponent and contractor

A permanent EHS committee will be formed to oversee all issues pertaining environment, health and safety agenda during construction and operation phase.

(a) Contractors

The EHS management plan code of practice shall be applicable to the contractors working in the premises, and shall be read and signed. It shall be incorporated into the contract to perform work. This should also remind the contractor of his/her;

Legal requirements.

Statutory obligations.

Obligation to lay-down a system for reporting accidents and to ensure that he obtains detail of jobs and areas where permit-to-work must be issued.

Responsibility to ensure that his/her employees are supplied with personal protective equipment and where applicable as per the EHS management plan for the whole project.

(b) All residents' and workers' responsibility

Know the location of all safety equipment, and learn to use them efficiently

9.7 Safety requirement at the project site during construction and operation Period

(a) The contractor

The contractor will ensure that:

Safe means of entry and exit at the proposed project site.

Ensure adequate briefing of job at hand on the safe system of work before commencement of work.

The EHS coordinator must be in attendance at all times throughout the duration of the project.

The EHS consultant must maintain constant assessment of the risk involved as the work progresses

A safety harness must be worn before entry into all confined spaces

An EHS consultant must be posted at the entrance at the project site to monitor progress and safety of the persons working at the construction site.

(b) The Traffic / Drivers

Within the construction premises, the following traffic rules will be observed: -

Observe speed limits and all other signs and obey traffic rules.

Use the vehicle for the purpose to which it is intended only.

c) Fire hazard at the construction site,

Workers at the site shall ensure that: -

Oxy-acetylene cylinders are not contaminated with grease or oil.

Oxy-acetylene cylinders are not subjected to direct sunlight or heat.

Oxy-acetylene cylinders are not to be used or stored standing in a vertical position.

When in use, ensure the inclination should never be over 30° from the vertical.

9.8 Welding at the construction site

It is the responsibility of the contractor during construction to: -

Ensure that welding clamp is fixed such that no current passes through any moving parts of any machine.

Ensure that all welding clamps are in good operating condition and conduct current without arcing at the point of contact.

Ensure that welding clamps are free from any contact with explosive vapors i.e. Oil spillage, Fuel tanks, Coal dusts and miscellaneous combustible material (e.g. Cotton rags filter bags, rubber belting, and wood shavings).

Ensure that any slag or molten metal arising from welding activities does not start up fires by:

Clearing combustible material to a distance of at least 3 meters away from the working area or covering area with metal or asbestos sheet.

Appropriate fire extinguisher is to be kept available for immediate use at all times

9.9 Emergency procedure during construction and operation

An emergency situation means:

Unforeseen happening resulting in serious or fatal injury to employed persons or the neighbouring communities.

Fire or explosion.

Natural catastrophe.

In the event of such an emergency during construction, the workers shall:

Alert other persons exposed to danger.

Inform the EHS coordinator.

Do a quick assessment on the nature of emergency.

Call for ambulance on standby.

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

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

Alert other persons exposed to danger.

Ring the nearest police station

Call for ambulance.

CHAPTER TEN: DECOMMISSIONING

10.1 Introduction

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and

associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. The following should be undertaken to restore the environment.

Remove all underground facilities from the site

The site should be well landscaped by flattening the mounds of soil and Planting indigenous trees and flowers

All the equipment should be removed from the site

Fence and signpost unsafe areas until natural stabilization occurs

Backfill surface openings if practical

The table below shows the proposed decommissioning plan:

Expected Negative Impacts	**Recommended Measures**	**Responsible Party**	Time Frame	Cost (KShs)
1. Construction Machinery/Structure & Wastes				
Scraps material and other debris	Use of an integrated solid waste management system i.e. through a hierarchy of options. Wastes generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures. The contractor will select disposal locations and the County council based on the properties of the particular waste generated.	Project Manager & Contractor	During decommissioning	3,000,000
All buildings, machinery, equipment, structures and partitions that will not be used for other purposes should be removed and reused or rather sold/given to scrap material dealers.	Project Manager & Contractor	During decommissioning	-	
Where recycling/reuse of the machinery, equipment, structures and other waste materials is not possible the materials should be taken to approved dumpsites.	Project Manager & Contractor	During decommissioning	-	
Rehabilitation of project site				
Vegetation disturbance Land deformation: soil erosion, drainage problems	-Implement an appropriate re-vegetation programme to restore the site to its original status. -During the vegetation period, appropriate surface water runoff controls will be taken to prevent surface erosion; -Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures	Project Manager & Contractor	During decommissioning	2,000,000

	taken to correct any occurrences; -Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;			
Social- Economic impacts				
-Loss of income -Loss of housing facilities	The safety of the workers should surpass all other objectives in the decommissioning project. -Adapt a project – completion policy; identifying key issues to be considered. -Compensate and suitably recommend the workers to help in seeking opportunities elsewhere.	Project Manager & Contractor	During decommissioning	3,000,000

CHAPTER ELEVEN: RECOMMENDATIONS AND CONCLUSION

The report provides an overview of potential impacts occasioned by implementation of the project. All identified impacts which are considered to range from medium-high has been provided with corresponding detailed mitigations measures. There are many benefits expected from the proposed development to Nakuru County, and the country at large. The proposed development will promote realization of country's big four agenda in stimulating affordable housings to Bondeni Estate and for the entire Nakuru County populace. The project is environmentally safe and does not interfere negatively with the natural environment and any spatial development of the area. Being introduced in an area that was once established with residential houses (single dwelling) its operation will least likely disrupt or interfere with general operations in the neighbourhood and the built natural environment.

This report established that the proposed project is a timely venture with positive and significant contribution to the government housing sector. It is with these considerations that we recommend this project for approval and issuance of NEMA license to facilitate commencement of works on site.

Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close following and implementation of the recommended Environmental Management and Monitoring Plans (EMPs). Annual audits shall also be executed to establish efficiency and adequacy of operational systems.

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