ENVIRONMENTAL IMPACT ASSESSMENT

STUDY REPORT

FOR

THE PROPOSED RESIDENTIAL DEVELOPMENT (FLATS) ON L.R. NO. KIAMBAA/RUAKA/5070 OFF LIMURU ROAD IN RUAKA AREA, KIAMBU COUNTY.

A section of the proposed project site

Proponent:

OASIS DEVELOPMENT COMPANY LIMITED

P.O. BOX 4570 – 00200

NAIROBI.

The Environmental Impact Assessment (EIA) Study Report was conducted and report compiled by a team led by:

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OASIS DEVELOPMENT COMPANY LTD (PROPONENT),

Proponent's PIN No.: P051542001L

Disclaimer:

The proponent proposes to develop residential flats on L.R. No. Kiambaa/Ruaka/5070 measuring approximately 0.400 hectares situated off Limuru Road in Ruaka area, Kiambu County. The proposed plans have been submitted to the relevant departments of the CGK and approved including change of user. Copies of documents, details and information in the report were obtained from the proponent and on the ground. Portions of this report are based on documents, data and verbal information provided by third party sources and reports prepared by other professionals. The experts may not have independently verified all the information and accept no responsibility for the accuracy of information contained in such reports. Whilst this report and the opinions contained herein are accurate to the best of the experts' knowledge and belief, the experts cannot guarantee the completeness or accuracy of any description based on the supplied information.

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Table 1: Acronyms and Abbreviations Used in This Report

HA	Hectare
KM	Kilometre
°C	Degree Celsius
CGK	County Government of Kiambu
COX	carbon oxides
EIA	Environmental Impact Assessment
EMCA	Environmental management coordination act
EMP	Environmental Management Plan
ERPS	Emergency Response plans
NEMA	National Environmental Management Authority
NOX	Nitrogen Oxides
PPE	Personal Protective Equipment
PV	Permanent vent
SOX	Sulphur Oxides
DEC	District Environment Committee
DSQ	Domestic Servant Quarter
M	Metres
ASL	Above Sea Level

Attachments:

Sketch map showing location of the proposed site

Copy of Certificate of Incorporation

Copy of PIN number certificate

Copy of Title Deed

Copy of Change of user approval

Copy of architectural plans approval letter

Copy of proposed plans (approved)

Copy of minutes of the CPP meeting and attendance list for the public meeting

Wastewater treatment system/plant

EXECUTIVE SUMMARY

The whole purpose of EIA process is to achieve environmental sustainability directed at management and conservation of the natural resources to ensure the attainment and continued satisfaction of human needs for the present and future generations.

There has for a long time the world over a big gap between the demand and supply of standard housing which has unfortunately resulted in proliferation of shanties and slums all over the main urban centers and Kenya, particularly Nairobi and its environs are no exceptions. Housing, like food ranks very high in the hierarchy of needs and therefore the current situation is a serious social/human drawback. Environmental management refer to the management of mans activities that depend upon the resources of the environment and which have an effect upon the state of the environment. Environmental management and development problems require an integrated approach, as they are so integrated with social, demographic, economic and political elements.

The proponent ***(Oasis Development Company Ltd)*** *proposes* to develop residential flats on L.R. No. Kiambaa/Ruaka/5070 which is situated off Limuru Road in Ruaka area and measures approximately 0.400 hectares (1 acre). As at the time of the study, the land was vacant with shrubs, grass and dry maize crop at some sections but the large section was vacant and there was no evidence of any kind of previous development on the land. The land may however previously have been used for agriculture since it is basically with an area largely used for agriculture with suitable soils and climate but there is evidence of previous excavation probably for extraction of red soil for use elsewhere though not recently.

The proposed project is a gated community residential project and may be classified basically as a low-cost large scale residential development involving construction of 453No. residential flats in a mix of bedsitters, two and three bedroom flats. The proposed project shall have a total of 453No. residential flats comprising of 58No. two-bedroom flats; 156No. one-bedroom flats and 239No. bedsitters (studio apartments).

Since the development is fairly large, it is prudent to provide other commensurate facilities and services to cater for the various deserving needs for the proposed development and as such, various such facilities/services and infrastructure are provided for. Among the facilities include wastewater treatment system for treatment of wastewater from the project since the area has no sewer. The proposed project shall also entail construction of surface drainage systems for management and disposal of surface runoff. The proposed development shall entail construction of four (4No.) semi-detached blocks of flats all with two basement floors, ground, 1st – 11th floors. the two basement floors shall accommodate vehicle parking and in addition, basement 1 shall accommodate generator room. The ground floor shall accommodate a security office, 3No. two-bedroom flats, 13No. one-bedroom flats and 8No. bedsitters (studio apartments) and a lettable space. All the other floors from 1st -11th shall be typical each accommodating 5No. two-bedroom flats, 13No. one-bedroom flats and 21No. bedsitters (studio apartments). Each of the flats shall have a lounge/dining, two or one bedrooms, kitchen, and balcony/verandah while the bedsitter shall have the main room, kitchenette and balcony. The proposed plans have been submitted to the CGK and approved.

The proposed project shall also entail the provision of protected dustbin cubicles, common road (driveway), parking and the entire project site shall have a perimeter masonry with a single gate. Other features include storm water drains and a common guard house at the main entrance.

In general, the area is characterised by mixed development of commercial developments and blocks of flats. In the immediate neighbourhood also are land parcels similar to the proposed project site while others are even larger in area some of which were vacant. Other land parcels have been subdivided and land sold as individual plots for owners to develop individually. The proactive designs of the buildings has provided for adequate ventilation and natural lighting, parking, storm water drainage, water storage and waste water reticulation as well as open areas. Since the area has no sewer, the proposed project shall incorporate a wastewater

treatment system (for waste and soil water disposal). The proposed design has provided for sewerage and other plumbing articulation, and surface run-off drains. From the proposed designs, the essential set local standards (in terms of physical planning, minimum habitable rooms, basic facilities, health and safety) have been met. It is estimated that the on approval; the project will take approximately 36 calendar months to implement and it is estimated that it will cost Kshs **three hundred million (Kshs 300,000,000).**

The relevant legislation has been adhered to in the design (discussed in the body of the report). All waste water shall be discharged to the proposed wastewater treatment system and water supply shall also be from the local piped supply while power shall be from the KPLC supply. In addition to this, the development will include provision of key infrastructure including storm water drainage systems and sewerage and water reticulation to the local adoptive standards.

The major objective of the EIA study is to evaluate the effects/impacts of proposed development in relation to the entire environmental aspects aimed at influencing the protection and co-existence of the development with the surroundings as well as the compatibility of the proposed development to the area to ensure and enforce sustainable environmental management during site preparation (site clearance and foundations), construction, occupation and decommissioning phases. The scope of the assessment study covered the physical extent of the project site and its immediate environs, proposed construction works including installation of basic utilities/facilities and services as required by the residential development project; Characterization of the baseline information about the environmental, ecological, social and economic conditions around the proposed project area and the establishment of the potential environmental impacts or other environmental concerns of the proposed project.

The terms of reference were but not limited to a critical look into project objectives; suitability of the proposed location of the housing project site; generation of baseline information, national environmental legislative and regulatory framework, and any other relevant information related to the project; Description, evaluation and analysis of the foreseeable potential environmental effects of the project and to develop an environmental management plan proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment.

The methodology used involved environment screening and environmental scooping; Physical inspection of the site and its environs; Desk stop studies, consultations, questionnaires and extensive interviews with stakeholders (the local community, the neighbours, the proponent among others); and Reporting.

The proposed development was noted to have positive impacts to the society both at local and national level. The benefits will be experienced during the entire project cycle. They include the following:

- Provisions of a basic need (housing) and thus increase in the national/local housing stock and quality thus contributing to easing housing problems.
- Provision of deserving community facilities and infrastructure such as security boost, power supply, water supply and roads improvement among others
- The optimal use of the land
- Increase in land value of the subject plot and the nieghbouring plots
- The project will form a well-planned project and shall include key services and infrastructure
- The development is in line with the planning policy and therefore compatible for the area
- Increase in Government revenue and improvement of local and national standards of living of the society.
- Improvement of socio-economic services.
- Economic-investment hence increases in wealth.
- Improvement of social interaction with area residents.

- Creation of market for goods and services
- Provision of employment.
- Reduction of mosquitoes in the area which breed in the proposed site due to bushes
- Improvement of security
- Elimination of chances of illegal solid waste dumping on the site

Against the background of the above positive impacts, there are a few negative drawbacks that are anticipated mostly during the construction of the project. They include the following:

- Impact to soil (including soil erosion) especially when excavating (for basement floors) and laying the foundation and other earthworks.
- Increased noise and vibration mostly during construction phase
- Constraints to the existing infrastructure i.e. water, power, surface drains, roads among others.
- Clearing of the existing vegetation from the site; which can result to land degradation (i.e. soil erosion) if not well managed.
- Loss of agricultural land
- Increased storm water/ run off resulting from the roof catchments and as a result of decreased recharge areas after pavement of most areas thus hydrology and water quality degradation
- Air pollution as a result of dust particles emanating from excavation and construction activities. Exhausts from the involved machinery will lead to increased levels of noxious gases such as sulphur, carbon, and nitrogen oxides.
- The health and safety of workers and immediate residents and neighbours may be compromised due to accidents, pollution and disturbance
- Potential traffic accidents
- Increased waste generation (both solid and liquid) during construction and occupation.
- If the security measures are not fully heightened during occupational phase, the development may increase insecurity and other social crimes in the area due to sudden settlement by diverse people.
- Visual intrusion (views closed)

To minimize the occurrence and magnitude of the negative impacts, mitigation measures have been proposed against each of the anticipated impact. Other measures have been integrated in the project designs with a view to ensuring compliance with applicable environmental laws and guidelines.

The measures include the following:

- Careful sitting, planning and design of the development to ensure that it is compatible with the environment e.g. not out of scale
- Erection of warning / informative signs (bill boards) at the site during the construction phase, and traffic control along the connecting roads (the access Road)
- Soil compaction and watering of loose soils on all unpaved access roads, parking areas and staging areas and construction materials, at the construction sites to minimize air pollution and erosion by the agents of soil erosion i.e. water, animals and wind.
- To reduce noise pollution, portable barriers to shield compressors and other small stationary equipment generating noise should be installed; Sensitization of workers on the need to switch off engines whenever possible; ensuring that the machinery is well maintained to inhibit frictional noise; install silencers whenever possible and ensure that site works/operations is carried out between 8a.m. and 5p.m.

- Proper and prompt tuning and maintenance of construction plant and equipment to minimize emission of noxious fumes and noise emanating from friction of the rubbing metal parts. Vehicle/machinery idling time should be minimized. The maintenance will be conducted in appropriate and designated service bays to reduce chances of contamination of environment by resulting oils and greases. Any of such oils must be collected and disposed appropriately.
- Since large volumes of water may be required during the construction, the contractor may be required to source water elsewhere other than the local supply; such as portable water tankers, subject to seeking water abstraction approvals from the relevant government authorities. On the same note, roof catchments shall be provided with gutters to facilitate collection of the run-off. We recommend that this water be stored for general use i.e. cleaning, fire fighting, gardening etc. The developer should explore roof water collection systems to enhance harvesting of the run-off generated from the roof catchments. Standard gutters, down pipes and suitable water storage tanks should be provided for the run off generated within the project harvested and stored and used for general purposes.
- To ensure further conservation of water in the unit houses, the proponent shall install water-conserving taps that turn-off automatically when water is not in use.
- The vehicular access to the project site should be effectively provided and will be constructed to the satisfaction of the specialized engineer.
- To cater for storm water drainage, well-designed concrete inverted channel drains shall be provided to harmonize management of the resulting surface water within the site. The drains shall effectively channel storm water into the public drain systems. Storm water runoff will be greatly reduced through rainwater harvesting from the roof catchments. The drains will be regularly maintained.
- For health and safety, sewerage system will be properly designed (using approved materials), installed and regularly maintained to effectively drain effluent into the proposed wastewater treatment system. The design and capacity of the wastewater treatment system shall have taken all aspects into consideration such as the population estimates, gradient and the peak volumes among others. All the materials shall be of high quality and to the specifications. Regular monitoring shall be made during occupation phase to ensure timely remedial measures including de-sludging as may be appropriate.
- Workers shall be provided with full protective gear to beef up their health and safety standards and they should be sensitized on health, safety and environmental conservation aspects. The site should be fenced off during construction to keep off animals and the general public.
- To avoid constraining the existing energy infrastructure, the proponent shall liase with the sole power distributor KPLC to upgrade the power supply line and install transformers(s) to meet the anticipated increased demand. In addition, the proponent should also explore installation of solar equipment for energy conservation.
- During the construction phase, the contractor shall put in place effective and efficient waste disposal systems. Wastes such excavated soil and debris will be recycled or properly disposed of by backfilling or dumping in approved grounds.
- The management of the solid waste mostly during occupation will be by the use of an integrated solid waste management system will facilitate this. This will involve a hierarchy of options: source reduction, recycling, composting and reuse, and sanitary land filling. Solid waste management shall be enhanced further through segregation of waste at source and appointing a reputable garbage collector registered with NEMA.
- Comprehensive landscaping will follow on completion of the development to prevent soil erosion and upgrade the site to its appropriate environmental standard.
- Adapt Environmental Management and Monitoring Plans within the site involving all the residents.

Loss of agricultural land is one of the negative impacts of the proposed project since 1 acres of land is suitable land for commercial agriculture. Agriculture is a major economic land use that earns the country foreign exchange in addition to feeding the population. The options available include that of the proponent investing elsewhere in agriculture assuming there is suitable land available elsewhere. On a policy level, the government should provide incentives for farmers elsewhere to produce more by providing an enabling environment, the right mechanisms, technology and inputs.

Consultation and Public participation was extensive and none of the respondents raised an objection to the project. Due to the ongoing guidelines on Covid-19 and particularly in the wake of the devastating 3rd wave, a large meeting was not possible so the target was representatives of the 'Nyumba kumi' representatives, opinion leaders and the business community which is a fair representation of the larger community and stakeholders. A meeting was held to that effect and matters discussed are represented in the minutes. Generally, the significant impacts of such developments are the respective pressure they exert on the infrastructure due to failure of the central and county governments upgrade the same accordingly through various respective agencies/departments/parastatals, using funds raised through various taxes and infrastructure development levy charged on developers/proponents. The implementation of these is long overdue and the buck stops at the government and or implementing agencies.

The EIA study a cost and benefit analysis indicates that the benefits far outweigh the associated costs and negative impacts. It is our recommendation that the project proponent be allowed to go ahead with the implementation provided that the outlined mitigation measures are adhered to. 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); which are strategically packaged with all environmental sustainability elements, tailored toward enhancing the adoption of Integrated Ecosystem Management (IEM). Various alternatives has been considered but the proposed alternative has been found the best available alternatives as it maximises the benefits to all beneficiaries and the potential negative impacts are not so significant and can further be mitigated by adherence to the proposed EMP.

In addition, the project proponent shall continue to work closely with the relevant professionals, NEMA, area residents, CGK, relevant agencies and all stakeholders to enhance environmental sustainability and in addressing any issues of concern as identified or as may arise during the project cycle. This will ensure that issues that the environmental concerns are well addressed and integrated into the project at every stage of successive implementation sectors. This way, the co-existence of the proposed project with the environment during entire project cycle will have been achieved.

While the proposed EMP may be considered adequate based on the potential anticipated impacts, the most important aspect is for all stakeholders to appreciate that that there can be no ideal/perfect policies or solutions. Therefore, our attention should focus on seeking formulation of policies and plans, which take into account all known and/or predictable aspects, yet remain flexible enough so that they can be adjusted in the light of actual experience and therefore the need for effective monitoring and evaluation systems.

INTRODUCTION

Background and rationale for the EIA

Most urban centres in the country are faced with an acute housing shortage and the Nairobi City and its environs is among the worst hit. The increase of city population has not matched with an increase of housing and thus a housing crisis has resulted. In an effort to stimulate development of houses to reduce the shortfall, the government formulated a Policy aimed at providing approximately 150,000 new houses annually; to meet the current high demand on housing facilities, over the next decade. Four hundred fifty-three (453) residential units together with the accompanying facilities and services are a great investment that should be encouraged. It is currently estimated that the annual house deficit is 200,000 in Kenya.

More recently the development, spurred on by regulators in Kenya and in deed globally, has recognized the need for change in order to safeguard the environment. In relation to this, Environmental concerns have now been integrated in the planning and implementation processes of any proposed project (in Kenya). The key objective is to mitigate conflicts with the environment at the vicinity; during implementation and operational phases.

Kenya's framework environmental law, entitled The Environmental Management and Coordination Act (EMCA), 1999 is a product of a new methodology for the development of environmental law in the history of the country. Views and aspirations of a wide range of stakeholders both at national as well as at local levels were solicited and incorporated in the Act. This is a major shift from the traditional centralised mode of policy formulation that did not involve the public. The Act is thus designed to promote greater public participation in the management of natural resources and the environment in general.

The objectives of an EIA are: -

- To determine environmental compatibility of the proposed project
- To evaluate and select the best project alternative from the options available
- To identify and evaluate the significant environmental impacts of the project
- To incorporate environmental management plans and monitoring mechanisms
- To assess the environmental costs and benefits of the project to the community

This EIA study report thus provides relevant information and environmental considerations on the project proponent's intention to seek approval from NEMA for the development of the proposed project.

The Environmental approval of the project is sought on the grounds that no major predictable environmental harm is likely to ensue from the implementation works or occupation of the project and if any, sufficient mitigation measures to counter them have been proposed and close monitoring is recommended to ensure that they have been implemented.

Scoping Process

The scoping exercise was conducted to evaluate the project in its entirety so as to identify areas of concern and the sources of potential environmental impacts that will be associated with the development.

The Environmental Impacts of the proposed project was carried out through the following process:

- Evaluation of the location, land ownership and use/planning
- Proposed design and construction materials and methodology

- ◈ Project site visits
- ◈ Discussion with neighbours/general public in the environs and the various stakeholders.

Terms of Reference (TOR)

This Environmental Impact Assessment considered the following aspects and others that proved of significance during the study.

- ※ Provision of background and baseline information
- ※ The effects of the development on biodiversity diversity both within and outside the project development site i.e. effects on flora and fauna, habitat quality and issue of habitat disruption.
- ※ Surface water run-off, containment and flood control
- ※ Sustainable use of resources and ecosystem maintenance and enhancement
- ※ Economic implications of the development, employment and livelihoods
- ※ Security – threats, risks and enhancement
- ※ Public health implications
- ※ Social cohesion, culture, emigration and communication
- ※ Demand and development of infrastructure and social amenities
- ※ Assessment of the effects on scenery modification
- ※ Analyzation of the compatibility of the development with the surrounding land uses.
- ※ Development of an environmental management plan with mechanisms for monitoring and evaluating the compliance and environmental performance.

Scope of EIA study

The EIA study includes an assessment of impacts of the construction, operations and decommissioning on the following: -

- Physical environment
- Biological environment
- Socio-economic environment

The study has assessed the impacts of the proposed project on the environment and has covered the following activities:

- A review of the policy, legal and administrative framework
- Description of the proposed project
- Baseline information
- Assessment of the potential environmental impacts on the project area
- Development of the Mitigation measures and future monitoring plans
- Social Impact Assessment

Methodology

Literature review pertaining to the project activities and salient features of the project area was done. This covered the review of the Environmental Management and Coordination Act, relevant studies and reports on the construction including design works and other related sources of information.

During the field investigations, a survey was conducted in order to collect information on biophysical and socio-economic environment of the project development site area and its environs. The following steps were involved environment screening; environmental scooping; physical inspection of the site and its environs; Desk stop studies, consultations, questionnaires and public participation and consultation; Reporting.

Stakeholder engagements (Consultation and Public participation) was achieved through a public meeting. The exercise generated primary data on the socio-economic impacts on the area; anticipated impacts and suitable solutions and recommendations. More details are given elsewhere in the report and as appendices in the *annex*

Objectives and scope of the proposed project

Whereas the main objective of the proposed project is residential development for some economic gains to the proponent, the main objective of this EIA study report was to establish the baseline conditions of the proposed site, evaluate the existing and the anticipated impacts and propose measures to enhance the positive impacts and measures to attenuate the effects of the significant negative impacts. The main objective of the proponent is to develop 453 residential flats and other relevant social facilities/infrastructure as described elsewhere in this report. The scope of the project is limited to the geographical location of L.R. No. Kiambaa/Ruaka/5070. All activities including construction material and construction waste storage shall be within the boundaries of the proposed site before unrecyclable wastes are disposed to approved dump sites. There may be minor disturbances or spillover effects to the neighbourhood due to such issues such as noise, dust, traffic etc especially during construction but they shall be reduced to the minimum possible as recommended in the mitigation measures.

Justification of the project

Due to the rapid urbanization and higher population growth the housing situation in the county (Kenya) has remained under tremendous pressure. The provision of shelter has not kept pace with the phenomenon and this has resulted in the deterioration of living conditions, increased health hazards, and rapid growth of slums and squatter settlements. The improvement of slums and squatter settlements, and provision of affordable housing to shelterless population will help alleviate the condition of urban and rural poverty as well as increase the productivity of the low-income population through improved public health.

Of late, there has been a marked change in the approach to residential development in the urban areas and mostly in/near the major Kenyan cities. Increasingly, there has been a strong tendency to develop integrated, low cost and secure housing infrastructure; within the confines of fenced boundaries with restricted and well-guarded entrances in the name of gated community.

The prevailing circumstances render this type of development popular in the cities. These types of development are a practical response to the growing insecurity in the urban areas. Such compounds with pooled security have relatively low incidences of robberies, break-ins or even attacks on people. The current practice in the old estates, to physically block some streets and to fix/erect-manned gates to curb insecurity is illustrative of the serious concerns of the urban society, its reformation and coping mechanisms.

The new developments are coming up with modern and efficient drainage and sewerage systems; with *high factors of safety* to handle the ever escalating volumes of waste materials. They are also installed following

guidelines from NEMA and other relevant agencies; which aim at improving the general environmental quality. This EIA in its widest sense is the means by which environmental concerns shall be taken into account throughout the life of the development from the initial concept through detailed design, construction and operation to eventual restoration and reuse of the land. Landscaping, ecology, and waste management are given first hand consideration to facilitate adoption of Integrated Ecosystem Management (IEM) and thus sustainable *use of the environment.*

In the near future, statistics have shown that nearly half of the world population will be living in urban areas. The government has realised this changing trend which helps in determining the overall requirement of housing units and ultimately provides a base for policy formation and future planning at macro and micro level in the country. These kinds of developments are therefore backing up the government's initiative and policy to providing 150,000 new houses per year. Though this may still be insufficient since the population growth is exponential plus the rise in rural – urban migration, it is a great initiative aimed at providing affordable housing to the urban society. The development therefore is a welcome idea that will go along in easing pressure to the existing housing infrastructure. The development will go along in increasing the national/local housing stock and quality.

Urbanization is increasing at a high rate. This brings in new classes of people with specialized demands for new and sophisticated lifestyles. People are considering living in houses with standard infrastructure i.e. water, power and modern house design. Again they desire living as a group to enjoy much security and socialism.

With the increased traffic congestion and especially during rush hours, people have opted to live in areas with good road networks and in areas where their time to get to work will not be compromised by traffic delays. The good thing about the proposed development is that it comes with basically all the other associated facilities/services such as recreational and commercial facilities; and infrastructure.

Lack of adequate and affordable housing is clearly exhibited in the entire city in slums and informal settlements.

RESETTLEMENT ACTION PLAN

The proposed project is not anticipated to displace any person or facility. The reason being, the proposed project is being implemented on a land parcel legally acquired in overt and arms-length transactions (through purchase on a willing buyer willing seller basis) by the proponent and is registered in the name of the proponent.

In the recent past, the area was sparsely populated largely due to large-scale land holdings by a few individuals. The land parcels acquired by the proponent had no developments and or settlements and thus even after the transfer, there arose no need at any one given time to move or resettle anyone.

Should the need arise in future for expansion of the proposed project (after implementation) where extra land may be needed, the proponent will at that time explore the options available in consultation with the people and property that may be affected by such proposal, the government and all the stakeholders subject to the prevailing law and rules of natural justice. In such a scenario, the proponent may opt to acquire or lease the land.

DESCRIPTION OF THE PROPOSED PROJECT

NATURE, DESIGN AND DESCRIPTION OF THE PROPOSED PROJECT

The proposed project involves the development of residential flats and the auxiliary facilities on L.R. No. Kiambaa/Ruaka/5070 which measures approximately 0.400 hectares. The proposed project is basically residential targeting to build 453No. residential units and basic amenities to support the residents for convenience and well-being. The proposed project has provided for all the basic infrastructural needs including roads, water supply including water storage, power distribution. The total number of residential units from the proposed project shall be four hundred fifty-three (453No.) comprising of 239No. bedsitters, 156No. one-bedroom flats and 58No. two-bedroom flats.

The development shall entail construction of four (4) semi-detached blocks of flats each with two basement floors, ground, 1st, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th and 11th floors. the two basement floors shall be used for vehicle parking.

Basement two (2) shall accommodate vehicle parking while basement one (1) shall accommodate more vehicle parking and a generator room. The ground floor shall accommodate security office, 3No. two-bedroom flats, 13No. one-bedroom flats and 8No. bedsitters (studio apartments) and a lettable space. All the other floors from 1st -11th shall be typical each accommodating 5No. two-bedroom flats, 13No. one-bedroom flats and 21No. bedsitters (studio apartments). A summary is as presented below:

Floor / **Unit**	Basement 1	Basement 2	Ground	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	**Total**
Two (2) bedroom flats	0	0	3	5	5	5	5	5	5	5	5	5	5	5	**58**
One (1) bedroom flats	0	0	13	13	13	13	13	13	13	13	13	13	13	13	**156**
Bedsitters	0	0	8	21	21	21	21	21	21	21	21	21	21	21	**239**
Grand Total number of residential units															**453**

Block 1:

Floor:	**Accommodation:**
Basement 2	Vehicle parking
Basement 1	Vehicle parking and generator room
Ground	3No. two-bedroom flats and Security office
1st – 11th	5No. two-bedroom flats
Total units	**58**

Block 2:

Floor:	**Accommodation:**
Basement 2	Vehicle parking
Basement 1	Vehicle parking
Ground	2No. bedsitters, 4No. one-bedroom and lettable space
1st – 11th	8No. bedsitters and 4No. one-bedroom flats
Total units	**138**

Block 3:

Floor:	Accommodation:
Basement 2	Vehicle parking
Basement 1	Vehicle parking
Ground	4No. one-bedroom flats and lettable space
1st – 11th	4No. one-bedroom flats and 7No. bedsitters
Total units	**125**

Block 4:

Floor:	Accommodation:
Basement 2	Vehicle parking
Basement 1	Vehicle parking
Ground	6No. bedsitters and 5No. one-bedroom
1st – 11th	6No. bedsitters and 5No. one-bedroom flats
Total units	**132**

The one-bedroom flats shall have a lounge cum dining, bedroom, kitchen and balcony while the two-bedroom flat shall have a lounge cum dining, two bedrooms, kitchen and balcony. The bedsitter shall have the main room, kitchenette and balcony.

From the foregoing, block 1, 2, 3 & 4 shall accommodate 58, 138,125 & 132 residential units respectively and thus the proposed project shall have a total of 453No. residential flats comprising of 58No. two-bedroom flats; 156No. one-bedroom flats and 239No. bedsitters (studio apartments).

The proposed project shall also entail the construction of a wastewater treatment system for wastewater management and disposal since the area has no sewer. There shall be protected dustbin cubicles, common road (driveway), parking and the entire development shall have a perimeter fence with a gate opening to the common driveway. Other features include storm water drains and a common guard house at the main entrance. In addition, the development will include provision of key infrastructure to the local adoptive standards.

As at the time of the study, the proposed project site was vacant with no economic activity but had some shrubs, grass and maize crops on some sections though the larger section was vacant having evidence of soil excavation in the past though not very recently and the soil carted off-site. There were no trees on site but there were some trees in the immediate neigbouring plot. The suitability of this kind of development can therefore be justified on diverse of use. This include the demand based on nature and trend of developments in most areas, planning policy focus, plot area and zoning regulation, land-use and infrastructural compatibility, socio-economic impacts and environmental impact assessment among others.

LOCATION OF THE PROJECT

The proposed project site is L.R No. Kiambaa/Ruaka/5070 situated off Limuru Road in Ruaka area, Kiambu County. GPS readings on a section of the site are S 01^0 12' 27.40104'' and E 036^0 46' 39.55656'' (37M 0252748 & UTM 9866419) and the site is at an elevation of approximately 1774m ASL. The site is approximately 300m from Limuru Road. See sketch plan of the proposed project location *(not to scale) attached in the annexe*

SITE OWNERSHIP, ZONING AND LAND USE

The proposed site L. R. No. Kiambaa/Ruaka/5070 is registered in the name of the proponent (Oasis Development Company Ltd). The land measures approximately 0.400 hectares (1 acre). The immediate

neighbourhood area is generally not fully developed but the plots moving towards and along the road are developed and other developments were ongoing. The proposed site is within an area zoned for flats which are the most common kind of development in the immediate neighbouhood. Other developments include include commercial. The proposed plans have been submitted to the CGK and approved. Land use in the area also include agriculture but mainly for subsistence.

Construction Inputs and Activities

Construction inputs (materials)

The project inputs include but not limited to the following:

- Construction raw materials i.e. sand, cement, stones, crushed rock gravel, murram, ceramic and glazed tiles, clay tiles, glass, steel metals and metal products, plastic and PVC pipes and materials, ceiling materials (soft board panels), steel pipes, timber and timber products, precast and insitu concrete products, iron sheets and iron products, electric cables and conduits, painting materials among others. Other inputs shall include necessary fittings and fixtures such as electrical gadgets (switches, sockets, lamps etc), water closet sets and other bathroom accessories, water taps, sinks and kitchen equipment and furniture and general household furniture among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies. It is worthwhile noting that most of the construction materials are locally available.
- Construction machines including machinery such as excavators, graders, mixers, and bulldozers and other tools and equipment. These will be used for the transportation of materials, clearing of the vegetation and debris, excavation and in the construction of the project. Such machinery will use petroleum products to provide energy.
- A construction labour force of both skilled and non-skilled workers. These will require services such as energy, water supply and sanitation facilities.
- Large volumes of water for construction purposes. It will be supplied from the area's mains water supply.
- Power from the mains grid or provided by generator.

Construction activities include the following: -

- Construction of temporary construction office(s) and store
- Procurement of construction materials from approved dealers.
- Transportation of construction materials using heavy and light machinery.
- Storage of the construction materials.
- Site clearing, excavation and filling, laying of foundation, building works, disposal of the resulting construction wastes.
- Disposal of the existing debris/ materials. All debris and excavated materials will be dumped on approved sites.
- Electrical, civil, and water engineering works. These will be done by registered expertise
- Landscaping works and earth works.
- Completion of the development and occupation.

Construction products, by-products and wastes

Construction products is the final usable premises in the case of the proposed project is residential flats. The residential units and all other facilities/infrastructure/services shall have all the basic facilities to the local

standards including a standard wastewater treatment systems for waste water disposal. The final product shall have all necessary accommodation details as described elsewhere in this report and in the architectural drawings. Construction process does not produce and by-products. Wastes from construction activities are diverse. They include excavated soils, vegetative materials extirpated from the site, wastes (pieces) from iron sheets, timber, glass, plastic and PVC materials, steel metals, broken stones; tiles and debris not to mention packaging materials. Wastes during occupation is mainly in the form of general house refuse, municipal waste from the potential commercial establishments and other facilities and the waste water. All wastes shall be disposed off appropriately as discussed in mitigation measures else where in this report.

PROJECT BUDGET AND PROJECT DURATION

The construction is estimated to cost approximately Kenyan shillings **three hundred million (Kshs 300, 000,000)** and is estimated to take approximately thirty-six calendar months to complete.

INFRASTRUCTURE AND SERVICES

Roads and Accessibility

The project site has an access road which is improved with murram and well connected with other tar surfaced roads. The site is therefore accessible and within close proximity to the Nairobi CBD, Ruaka commercial centre, UNEP and other commercial centres.

Water supply

The proposed project site shall be connected to the area's piped water supply network. It is proposed that the proposed development will have cold-water storage tanks to the specifications of the mechanical engineer. It is recommended that the proponent explore harnessing rainwater for general use to minimize pressure on the existing water supply. It is recommended that appropriate and preventive measures be taken at the design stage to provide for rain water harvesting system and storage which shall otherwise reduce the full dependency on the piped supply network.

Sewerage system

The area is not served by the main sewer and therefore a suitable wastewater treatment system shall be constructed to handle the soil and wastewater for the entire project. The sewer system reticulation has been effectively designed in the approved plans and will be connected to each generation point and to the proposed wastewater treatment system as appropriate.

Surface Drainage

The area is generally drained by the existing public drainage system. The proposed design has provided for internal drains to collect the surface run-off and safely dispose to the existing drainage system. Some investment may be required to suitably drain the runoff which shall be significantly reduced by harvesting from roof catchment.

Solid waste Management

Wastes from the project will be many and especially during construction (clearing of the existing debris) and occupation phase. The area is within the jurisdiction of the County Government of Kiambu, which has the responsibility of disposal of waste. However, the proponent/contractor has an option of contracting a private garbage collecting company. The proposed project has included dustbin cubicles (protected from rain and animals) but this cannot handle construction solid waste - arising from the construction debris, vegetation materials to be cleared, and construction material wastes (wooden, glass, plastics, sanitary litter e.t.c.). This calls for sound waste management system especially during construction. All solid wastes should be dumped in approved dumpsites and in accordance with the regulations.

Energy supply and use

Mains electricity is available on the ground and very easily accessible and shall thus be connected to each of the units. The proponent shall apply for upgrading of the power supply from KPLC to accommodate the anticipated demand such that transformer(s) shall have to be installed within the project but this shall be determined in liason with the KPLC. A power substation has been provided for in the proposed project. During occupation/operation phase, the use of renewable energy sources such as solar should be encouraged and thus such provisions must be made at design level.

Communication

The area is well covered by communication facilities such all mobile and fixed telephony service providers. All these will facilitate communication during the implementation and on occupation/operation of the project.

Security

There will be a single gate to the development, which will be fully manned 24 hours. The entire area of the project will also be banded with a masonry perimeter wall. Outdoor lighting will as well be installed sufficiently within the project area. The property management is anticipated to engage security firms to beef-up security.

ENVIRONMENTAL SETTING OF THE PROJECT AREA AND ITS ENVIRONS

PHYSICAL ENVIRONMENT

Climate

Kiambu county is an area with temperatures varying with altitude between 30° C maximum and 14° minimum. The climate of the area is generally cool throughout the year. The coolest period is between July and August while the hottest months are from November to April. Rainfall in the district is bi-modal, generally occurring in the months of March to May and October to December. The area receives unreliable rains with a mean annual rainfall of 1100mm. the evaporation/evapo-transpiration is estimated to be between 1,450 and 2,200mm per annum.

Geology and Soils

It has an underlying rock of tuff and trachytes and soils vary in depth, red soils. The soils in the area classified as luvisol and are developed on undifferentiated tertiary volcanic and basic igneous rocks. They are well drained, shallow, dark reddish brown from ashes, pumice from volcanoes, and sediments mainly from crystalline basement rocks. The soils depth varies at various different points in the area with some areas being deep and others shallow though soils on the proposed site are fairly deep.

Topography and elevation

The general area is characterized by a topography both with steep and gentle slopes, valleys and flat topography. The proposed project site is fairly gentle. The elevation of the at the site is around 1774m ASL.

The subject proposed site has moderate to steep gradient at various points and the general area in the environs is in some places characterized by both steep and gentle gradients and level in others.

Hydrogeology

The hydrogeological features of the entire County, consist of an almost closed basin with internal drainage situated on the eastern rim of the main escarpment of the East Africa Rift Valley. There are some rivers and streams flowing within the county most of which are seasonal and there are also some low lying areas with depressions which are sometimes swampy. The proposed project site and its environs has gentle slopes which would help greatly in surface drainage. There are no rivers or water bodies in the immediate neighbopurhood.

BIOLOGICAL ENVIRONMENT

Flora

The general area is planted with vegetation (trees) mostly along the roads, plot boundaries and in designated gardens within the respective plot boundaries. The proposed site had bushes but no trees as at the time of the study. Even for trees within other plots in the neighbourhood, none of which were not of any ecological or economic significance. The immediate neighbouring plot is planted with mature eucalyptus trees. The soils and climate are favourable for vegetation growth and may be rain-fed agriculture to an extent but most suitably irrigation agriculture due to unreliable rainfall patterns largely due to climate change.

Fauna

The site is situated within an area zoned for residential, commercial and agricultural land use where human activities have altered the natural habitat for wildlife over the years. Consequently, there are no major animals in the environs except may be birds, insects, and small rodents. Therefore, there is no fauna threatened by the proposed project. The area has some chunks of land undeveloped and bushy some with young trees while others has old mature and large trees.

Water Resources

The area has piped water and there are seasonal streams whose water may not be used for human consumption without treatment. Water supply is adequate mainly supplied from groundwater through boreholes, the piped network, rivers and streams and shallow wells. Data from boreholes drilled within the area indicate that there are sufficient volumes of underground water.

Sensitive ecosystems or places of cultural importance

There are no sensitive ecosystems or places of cultural importance in the immediate environs.

SOCIO-ECONOMIC ENVIRONMENT

The main economic activity is commercial activities and investment projects, subsistence and large-scale farming, livestock and small scale bee keeping so their main source of income is sale of the farm produce including coffee, livestock, milk and honey. Social amenities such as hospitals and schools are easily available in the locality mainly found in surrounding market centres and towns. The main road serving the area is Limuru Road which is tar surfaced but the immediate access is earth but improved with quarry chips.

Others social infrastructure like schools, religious places, shopping areas etc.) are within reasonable reach and conveniently available for all. Water is not yet connected to the site from the piped network. There is mains electricity in the neighbourhood.
There are no surface runoff drainage structures in the area but surface runoff drains naturally in line with the prevailing topography. As at the time of the study, the area was covered by the mobile service providers.

The proposed project site is within an area predominantly agricultural, residential and commercial and therefore almost every other plot in the neighbourhood is utilized for agriculture, residential or agricultural/residential related activities. The location is well accessible via good roads from several routes and in close proximity to the Nairobi City Center, Ruaka commercial centre, the general area has several pockets of commercial centres primarily to serve the residents. All social amenities (hospitals, schools, religious places, shopping areas etc.) are within easy reach. Major urban infrastructures (water, electricity, roads, and landline telephony) are available and shall be connected to the proposed project site though the area has no sewer. All emergency facilities (fire brigade, ambulances etc) are within easy reach from the various providers. The area is currently a high density residential area. There are no sites of cultural, historic or traditional significance in the immediate neighbourhood. The area is within the County Government of Kiambu's jurisdiction and therefore served by the CGK's infrastructure and is also bound by the CGK's by-laws.

Photos taken on proposed project site

Photos of immediate neighbourhood

Source: Field survey

RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

The Environment Management and Coordination Act, 1999

The Act entitles every person in Kenya to a clean and healthy environment and aims to safeguard and enhance the environment. Though there are other sectoral laws on environmental conservation, this is the supreme legislation. It provides guidelines on issues of environment, stipulates offences and penalties and establishes NEMA. The Act also lists the type of projects, which must be subjected to the EIA process and establishes NEMA. *In compliance, the proponent appointed experts to conduct the EIA study report to seek approval of the proposed project.*

The Environment (Impact Assessment and Audit) Regulations, 2003

The Regulations are entrenched under section 147 of the EMCA, Cap 387 of the laws of Kenya. The regulations provide the framework for carrying out EIAs and EAs in Kenya. The Regulation provide for fees, guidelines, rules, standards and administration procedures in the EIA/EA process. The Regulations' latest amendment of 19th August 2016 (The Environmental Impact Assessment and Audit) (Amendment) Regulations 2016 made significant changes regarding fees payable, various timings and modified the Second Schedule of EMCA, Cap 387. The amendments revised the fees payable and categorised the projects (under) Second Schedule) into low risk, medium risk and high risk. Currently, there are no fees payable to NEMA. *This EIA project report is conducted in conformity with these regulations and EMCA, 1999.*

The Environmental Management and Co-ordination (Water Quality) Regulations, 2006

These regulations set the standards of domestic water and waste water. The regulations are meant for pollution control and prevention and provides for protection of water sources. *The proposed project will connect to the area water supply network. Waste water shall be to a proposed wastewater treatment system; and the proponent shall take appropriate measures as provided in the regulations. The sewerage system in particular must be sound to prevent leaks and blockages.*

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

These regulations define the responsibilities of waste generators and define the duties and requirements for transportation and disposal of waste. It provides for mitigation of pollution and provides for hazardous and toxic wastes. The regulations require a waste generator to dispose waste only to a designated waste receptacle. *The proponent shall adhere to the regulations and proposes to contract a NEMA registered waste transporter.*

Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations, 2009.

The noise and excessive vibrations regulations require that noise and excessive vibrations should be minimized to the largest extent possible ant that this should not exceed particular decibels.

To minimize the impacts of noise and vibrations from the proposed activities, the activities will be limited to working hours between, 8.00 am and 5.00 pm. All possible care will be undertaken to ensure that the machinery are properly greased and oiled to reduce friction and possible noise emission. *The proponent shall strictly adhere to the provisions and requirements of these Regulations.*

National Environmental Action Plan (NEAP)

According to NEAP, 1994 the Government recognized the negative impacts on ecosystems emanating from development programmes that disregarded environmental sustainability. Established in 1990, the plan's effort was to integrate environmental considerations into the country's economic and social development. Under the NEAP process EIA was introduced.

The world commission on environment and development–the brundtland Commission of (1987)

The Brundtland Commission addresses the environmental aspects of development. It has emphasized on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is the economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resource. *The proponent is committed to adhere to the proposed EMP to ensure environmental enhancement and this would first be monitored through the initial environmental audit.*

National Policy on Water Resources Management and Development

It enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress, and also recognizes the by-products of these processes as wastewater. It calls for development of appropriate sanitation systems to protect people's health and water resources from pollution. *The proponent has provided for sewer articulation in the design and will construct an adequate and standard wastewater treatment system for connection of the entire project.*

Occupational Safety and Health Act, 2007

The Act is a repeal of the Factories and Other Places of Work Act. The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provisions require that all practicable measures be taken to protect persons in places of work from dust, fumes or impurities originating from any process within the workplace. The provisions of the Act are also relevant to the management of hazardous and non-hazardous wastes, which may arise at a project site. The Act provides for all necessary safety precautions to ensure the health and safety of workers. *The proponent will appoint a reputable contractor who will be responsible in enforcing the requirements during construction and subsequent repairs and maintenance after project completion.*

The Physical Planning Act of 1996

This is the principle Act governing land planning and the project proponent is required to acquire a Certifiate of Compliance or approval letter from the relevant institutions as set out in the Act. The sole objective of the Act is to harmonize deveolopment. The proposed project siet is zoned for flats and thus compliant. *The drawings (plans) of the proposed project has been submitted to the CGK and appproved including change of user.*

County Government Act No. 17 of 2012

The Act was a repeal of The Local Government Act in conformity with the new constitutional dispensation. The Act empowers County Governments to make by-laws in respect of suppression of nuisances, imposing fees for any license or permit issued in respect of trade or charges for any services. County Governments are given power to control or prohibit all developments 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 the conditions subject to which such developments shall be carried on. *In compliance, EIA project report has proposed potential mitigation measures (in the EMP and monitoring plan; and the environmental management Framework in the report.*

Building code 2000

This provides the basic rules, guidelines and standards for construction. It is a comprehensive document, which every developer/proponent/ contractor should have. *All approvals will be sought before commencement of the work and regular monitoring will follow to ensure compliance with set standards and conditions.*

Public Health Act- (Revised 1986)

The Act demands the adoption of practicable measures to prevent injurious and unhealthy conditions in the site. The Act requires the proponent to enhance effective management of Nuisances i.e. noxious matter or wastewater as will be discharged from the proposed project through out the project cycle. To achieve this, systems on the management of both solid and liquid waste (effluent) will be adopted as proposed in the report. *For instance, the effluent will be discharged into the proposed wastewater treatment system. The solid waste shall be handled by a professional garbage collector on regular basis and disposed appropriately as per the waste regulations. Sanitary facilities shall be in conformity with MOH standards and installation of standard fittings.*

National shelter Strategy to the Year 2000

This strategy was formulated to advocate a change in policy in order to allow investors to come in and give the government a hand in providing housing. The government's role was to simply facilitate. *This is the role the proponent wishes to contribute to by investing and reaping some economic returns in the process.*

The Water Act, 2002

Part II, section 18, of the Water Act, 2002 provides for national monitoring and information systems on water resources. Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee (CGK in this case) 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. *The proponent shall connect to the local area water supply network while the wastewater shall be discharged to the two proposed wastewater treatment system.*

STAKEHOLDER ENGAGEMENT / CONSULTATION AND PUBLIC PARTICIPATION

Consultation and public participation is an integral part of the EIA process and is a legal requirement. It is important that the general area residents be made aware of the proposed housing project and submits their opinions at the initiation stage. The public awakening was facilitated through Consultations and discussions

(more participatory, interactive and intensive processes of stakeholder engagements) undertaken in the neighbourhood of the proposed development site.

Consultation and public participation is very important and thus all parties must be heard. In the event that objections are raised, the reasons must be stated and a decision reached based on the weight of the reasons, their nature and if they are mitigatable or not among other factors.

The objectives of the public consultation were to inform the stakeholders (within proximity of the proposed project site) in the area about the project; gaining their views, concerns and values, taking account of neighbours and general public inputs in decision making; obtaining local knowledge, reducing conflict, improving transparency and accountability in decision making, and increasing public confidence and awareness. The consultation and public participation was facilitated through a public meeting and administration and interviews. The key target respondents included among others the neighbours and individuals who would directly or indirectly be affected by the implementation of the proposed project. The geographical scope targeted stakeholders within potential impact and approximately 1km radius. The target groups include persons working and living in the vicinity of the proposed project area, those sharing same infrastructure and services, various relevant public offices, administration, opinion leaders, business community, community based organizations and the local individuals. Printed and signed Notice of public meeting for the proposed project were distributed and conspicuously displayed widely to all Project affected Persons and stakeholders inviting them to the meeting for their comments/opinions/views regarding the proposed project. The public meeting notice had a project brief of the proposed project and specified the venue, date and time of the public meeting.

The meeting was held in the midst of the ravaging third wave of the Covid-19. As such and as per guidelines and restrictions issued by the government, a very large meeting was not feasible as it would not only break the guidelines but could also potentially aid in spreading the pandemic which would be careless and selfish and thus not acceptable for all reasons. For fair representation, the meeting targeted 'Nyumba kumi' representatives, village elders, opinion leaders, business community, community organization representatives and administration. The attendants fairly represented the community and all stakeholders. The meeting had to be short due to the above challenges and further tension due to the death of the area MP with many aspirants vying for the seat and political gatherings prohibited. Information about the meeting reached those higher in administration who misconstrued it for political campaign and ordered that the gathering should be discontinued just at the time it was ending.

In principle, those who turned up for the public meeting and responded had no objection to the proposed housing scheme. However, more emphasis (by residents) was put towards ensuring that the proposed development would facilitate sustainable use of environment and also revitalization of the current environmental situations in the area; as regards public amenities. Major concern was the need to expand the infrastructure particularly water, power and surface drainage. The respondent also indicated on the need for prevention and control of dust, noise and noise any other form of pollution during construction. The issue of potential security threats was also mentioned. The respondents also welcomed the project in that it will help in boosting the area security. They hailed the proposed project in that it shall create employment and improve security in the long run. They were very concerned with wastewater management which has become a real menace to the environment and public health from many of the already existing projects.

In summary, the main issues raised was wastewater management, potential security threats posed by construction workers and what chances do the locals have in employment opportunities. On wastewater management and disposal, the proponent shall install a wastewater treatment plant that shall take all factors into consideration at design stage to avoid operational challenges. On matters of security, the workers should not be housed on site. Invariably, the majority of the workers on site shall be from the neighbourhood thus

potential importation is significantly reduced. As stated, most of the construction workers shall be sourced from the neighbourhood so long as they are willing and able to work thus employment opportunities and livelihoods.

We appreciate that every new project of whatever nature and wherever it may be definitely exerts pressure on infrastructure and existing facilities/amenities and the proposed project cannot be an exception. All the issues to do with infrastructure can be amicably managed by the area residents including the proponent coming together and liase up with the various service providers such as KPLC for power upgrading; the CGK for road improvement, water supply, wastewater disposal and surface drainage. To mitigate the potential destruction of trees/vegetation (greenery), the proponent shall landscape and plant trees after the construction. Trees not within areas to be built shall also be preserved. The proponent proposes to construct a wastewater treatment system for the entire project which shall be adequately designed to deal with wastewater since there is no sewer in the area.

For amicable and long term solutions, there is urgent need for cooperation of the area residents, all stakeholders, all relevant government agencies the CGK and other service providers. We need to appreciate that environmental problems are accumulative and contributory by every actor and therefore everyone has responsibility for environmental enhancement. The biggest environmental challenge is population explosion with the world population now estimated at over seven billion and with the same fixed resources, we have to look for sustainable solutions which are wholistic and involving. The most important thing is to appreciate that the population is growing at an exponential rate and the new population need housing and the land is fixed thus the need for multi-dwellings. We need to appreciate that even if the proposed project is not implemented at the proposed project site, it will be moved to an alternative site and the same impacts are anticipated since it is a response to the existing housing shortage (demand for residential houses) and therefore what is important is to mitigate the potential impacts for sustainability. Various mitigation measures have been given herein this section and elsewhere in the report to reduce the significance of the potential negative impacts.

It is important to remember that the stakeholder engagement does not end at the point of the meeting. As per the legal provisions, the public is given another opportunity through mass media (Kenya Gazette, two daily newspapers and radio) which shall call upon any stakeholder to submit to the Authority any comments or opinion thus the window is still open for anyone who missed the initial phase. Further, any unforeseen or unanticipated matters arising may also be addressed as the project progress.

Some of the photos taken during the public meeting


Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera


HANDLE WITH CARE
STORE IN A COOL DRY PLACE
Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L


KALONA
Samsung Triple Camera
Shot with my S.E.C.L


KALONA DINERS
Samsung Triple Camera
Shot with my S.E.C.L


KALONA DINERS
Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L


Samsung Triple Camera
Shot with my S.E.C.L

Source: Field survey

POTENTIAL ENVIRONMENTAL IMPACTS

Construction activities involve a series of defined physical operations which include site preparation; excavation works, building works etc. All are potentially significant sources of particular impacts both significant and insignificant. On completion, the activities during the operational phase also have potential impacts. The following are foreseen to comprise potential impacts:

Positive Impacts (Economic and social benefits)

Provision of standard housing and income generation

Housing is a basic need and a major contributor to productivity. Supply of standard and affordable housing has always lagged behind demand for the same and the proposed project has a contribution towards reduction of the deficit. The proposed project shall also increase cash flows to the proponent whether by renting or sale of the units. This is in line with the government policy of providing standard and affordable housing infrastructure to the society to the tune of 150,000 houses per year. The proposed development will give an opportunity to the proponent to acquire shelter easing housing problems. The project will form a well-planned project and shall include key services, infrastructure and amenities. The project will also include provision of infrastructure to local authority's adoptive standards. Though the proposed project shall add a significant number of residential units to the national housing stock, the increment is a boost since it is an addition.

Income generation and livelihoods

The proposed project shall bring in people to do business due to the anticipated population increase during both construction and occupational phases. Those doing business thus growing the commerce and generating income and value addition which is the requirements of economic development. In a nut shell, livelihoods shall be created through profits and employment opportunities. The proposed project shall trigger expansion and establishment of various businesses.

Promotion of healthy competition, convenience and uniformity in land use

The area has been previously agricultural based with some few people owning large chunks of land but most of the land has been subdivided for use as residential. This has led to the majority of the plots being developed and the process is ongoing in others. The proposed project shall blend well with the rest. It shall also promote healthy competition in housing market which has an effect on improved service and fair prices. It shall also bring in people who would have otherwise been locked out of the area.

Optimal utilization of the land

The proposed site was vacant at the time of study undeveloped but the proposed project shall accommodate many individuals and households thus raising the utility of the land. The proposed use also conforms to the area's planning policy and is not unique in the neighbourhood.

Land Values

The opening up of the area and the rush for the plots by developers has led to a sharp increase in land values in the area and in the neighborhood due to the potential high returns after development. This has also led to attraction of high and middle income groups with improved economic status.

Employment

The proposed project will provide direct and indirect job opportunities to a significant number of the population during construction, occupational and decommissioning phases thus reducing the unemployment and in the process provide livelihood.

Promotion of development

The proposed project has the potential to influence the commercial trends in the area in various ways and in the long run the multiplier effect will lead to development and reduction of poverty. The proposed project shall contribute in overcoming the challenges of today's life including strategies for alleviating poverty and promoting sustainable development.

Increase government revenue

The proposed project shall generate tax revenue for the government directly and indirectly.

Creation of market for goods and services and secondary businesses

The proposed project shall consume various materials during construction such as stones, cement, sand, glass, steel products, wood products, PVC products, ceramic products e.t.c. Various professionals have and shall continue giving their services during both the construction and operational phases and thus making livelihoods. Those doing commercial activities in the neighbourhood shall also have their market widened by the occupants and workers.

Economic returns and promotion of secondary business

Economic-investment by the proponent shall increase wealth. The property owner will enjoy increased cash flow by saving on rent or income generated through the sale/rental of the units. The project shall also create market for goods and services and especially construction inputs which include raw materials, construction machinery and labour. Many secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers. Other businesses will also come up in the proposed commercial properties when the project is complete that will be serving the estate residents

Promotion of social cohesion

The development will bring together people with diverse traditions and culture. It will lead to promotion of cultural interaction.

Promotion of good neighbourliness and saving on costs

The proposed project shall bring many individuals and households to live and/or do business on the same plot. This may help the individuals and households in saving some of the overheads such as security, waste disposal etc since if they were to live on individual plot, some of these costs would have to be borne individually without any economies of scale which are otherwise shared.

PREDICTED NEGATIVE IMPACTS AND POTENTIAL MITIGATING MEASURES.

This part includes impacts during implementation/construction phase, operation phase and decommissioning phases of the project.

Soil Erosion

This is loss of the top-most soft material on the earth surface (soil) down - slope or transportation by the use of machinery or other equipment including animals. Soil movement is common in construction activities. This mostly happens during the laying of foundations for the projects and site clearing. The top loose material is excavated and transported elsewhere. This also exposes the underlying material to more dangers of degeneration by erosion agents.

In this case soil erosion will not be a major environmental impact especially when the project is over since open areas will be landscaped. However, during site clearing and construction phases, there will be massive movement of soil materials from the site. Most of the vegetation on site will be cleared (and in fact much of it has been extirpated) paving way for soil degradation.

Potential Mitigation Measures

- ※ Avoid unnecessary movement of soil materials from the site.
- ※ Provide soil conservation structures on the areas prone to soil erosion.
- ※ Control construction activities during rainy / wet conditions to mitigate erosion effects to the soil.
- ※ Resurface (pavement) open areas after the completion of the project
- ※ Introduce suitable and well-managed vegetation to generate surface covers on the open areas; to control soil movement by erosion agents i.e. water, animals and wind.
- ※ Provide storm water drainage channel to discharge water to safe areas. Such channels need to be regularly maintained and repaired to avoid point discharges in case of breakages or blockages. Point water discharges usually have pronounced effect to soil erosion.

Water resources; supply and use

Water will be sourced from the approved sources i.e. the local area supply. The development will cause strain to the existing water supply since construction activities are known to be heavy water consumers. The project occupation will also bring in some population which will have direct impact to the water supply (hence high water demand). However, to take care of potential problems similar to those being experienced in Nairobi, the following is recommended:

Potential Mitigation Measures

- ※ Avoid excessive use of the water. Water supply and use should follow approvals by the service provider and as per the extraction permits.
- ※ Roof catchments should be provided with gutters to facilitate collection of the run-off. This water should be stored for general use i.e. cleaning, fire fighting etc. In fact, the water can be consumed after suitable treatments and approvals by relevant department.
- ※ Sufficient Storage water tanks should be provided.
- ※ The local water supplier should ensure long lasting and reliable water supply within its jurisdiction.

- ※ Provide notices and information signs to the involved stakeholders on means and needs to conserve water resource i.e. 'KEEP/LEAVE THE TAP CLOSED', 'WATER IS LIFE. SAVE IT' etc. this will awaken the civic consciousness of the community with regard to usage and management of the water resources.
- ※ Install water conserving taps that turn-off automatically when water is not in use.
- ※ Encourage water reuse/recycling mostly during construction and occupation phases.

Waste water

Sewage is the used water or liquid waste of a community, which includes human and household wastes together with street-washings, industrial wastes such as ground and storm-water as may be mixed with it.

Effluent/sewage resulting from sanitary facilities and wastewater from washrooms is of significant importance to the environment. It must never come into contact with the surrounding i.e. water, soil, air etc. It must always drain effectively into the existing sewer systems via well designed and laid pipe networks.

Sound sanitation should be ensured to influence prevention of the sporadic outbreak of diseases dangerous for the general health of the community (within the projected area), workers and the general public. Either controlling or eliminating such environmental factors that contribute in some form or the other to the transmission of the diseases can achieve this.

Potential Mitigation Measures

- ※ The system (sewer) should be made of hard, strong, durable, smooth, impervious, and non-corrodible materials. The sewerage lines require to be upgraded in order to adequately service the increased levels of sewage discharge due to rising levels of development.
- ※ Sanitary facilities must be kept clean always.
- ※ The design of the proposed wastewater treatment systems should consider the estimate discharges from individual sources and the cumulative discharge of the entire project even during peak volumes. The gradient should be sufficient to ensure and maintain maximum depth of flow. Branches should be streamlined in the direction of flow. The wastewater treatment system should be constructed to the relevant standards and appropriate quality materials.
- ※ Monitoring of the sewage system for any remedial and emergency action
- ※ Branches should be streamlined in the direction of flow and there should be no right-angled junctions that would affect the flow of the effluent
- ※ All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround
- ※ All waste pipes must have cleaning roding eyes accessible from outside. i.e. free to every part of the system for inspection, cleaning and repair
- ※ All manholes on drive ways and parking areas must have heavy-duty covers set and double sealed airtight; as approved by specialists.

Surface drainage

As rain falls on a certain area, part of the rainwater is lost through evaporation in the air or percolation into the ground while the remaining overflows the surface as storm water. The run off from catchments is largely influenced by the size of the catchments, topography, the imperviousness of the surface (i.e. roof, road surface etc) and open surface.

In this particular project some of the surface water/run-off will mainly be absorbed within the property i.e. open areas. However, these (open) areas are limited since much land will be covered by house structures, roads and pavements. Therefore, as rain falls much water is anticipated to overflow the surface as storm water. In connection to this, the amount of water reaching storm water drain system will be large.

The surface drainage system has been considered to manage storm water such as may be derived from the paved areas (street-wash), courtyards and roof catchments of the houses. Open (concrete drainage-inverted concrete drains) channels will be use to drain the site off the excess surface water/storm. The channels shall take the influence of the site's gradient and will effectively drain water in to drain channels.

The aim of a good surface drainage is to prevent land and human settlement from being saturated with water. Poor drainage causes dampness to building structures as well as water stagnation. Damp is very bad from every point of view. Apart from the annoyance it causes by unpleasant smell, foul air and mildew, which makes it impossible to store supplies of house-hold goods, it is positively dangerous to health and also to the building structure. Damp (as influenced by poor drainage), in the presence of warmth and darkness, breeds germs and mosquitoes and may cause acute and Chronic Rheumatism.

The drainage of the storm water will be greatly compromised especially if it rains, since storm water drain channels will not be present during construction. In addition, it should be realized that a given area of land can only absorb a certain quantity of rain water/surface water. Therefore in and around the projected area where houses are built close together, the space of land (left open) which is useful in absorbing the surface water is very small. The drainage of the general property comes in handy to enhance the flow of the much-anticipated surface run-off emanating from the roof catchments and other areas within the site, into the watercourses.

Potential Mitigation Measures

- During construction, the designs should ensure that surface flow is drained suitably into the public drains provided and water courses. There should be no flooding within the site at all.
- Drainage channels should be provided within the site and should be covered with gratings or other suitable and approved materials. They must be installed as provided for in the approved plans and designs.
- The channels should be designed with regards to the peak volumes i.e. periods or seasons when there is high intensity of rainfall. They should never at any time be full; say due to the resulting heavy downpours
- The drainage channels must ensure the safe final disposal of run-off surface water and must be self-cleaning i.e. should have suitable gradient.
- Storm water generated from roof catchments should be harvested, stored and made use in various household activities i.e. general cleaning. This will minimize resultant soil erosion and other associated impacts. It will reduce strain on the existing water supply systems. In this connection, it would be better if gutters are incorporated in the designs as well as down pipes to enhance water collection in to the storage tanks say of individual households.

Noise and vibration

Noise is unwanted sound that can affect job performance, safety, and health. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.

Construction activities will be generating noise and hence affecting the immediate environment; i.e. other operations in the nearby. Such noise will emanate from the construction machinery and equipment i.e. concrete mixers, excavators, workers, trucks and other vehicles accessing the site. It will also affect small animals and bird life.

During occupation noise will come from vehicles, and other operations within the site. Production machines generate/ produce a lot of noise. Hearing protection is thus essential when noise exposures cannot be controlled at their source.

Potential Mitigation Measures

- ※ Use suppressors or silencers on equipment or noise shields for instance corrugated iron sheet structures.
- ※ Construction works should be carried out only during the specified time i.e. from 0800 hrs to 1700 hrs; when most of the neighbours will be at work
- ※ Machineries should be maintained regularly to reduce noise resulting from friction.
- ※ There should be no unnecessary horning of the involved machinery and vehicles.
- ※ Provision of bill boards at the construction site gates notifying of the construction activity and timings.
- ※ Workers should be provided with relevant personal protective equipment/ materials such as earmuffs and earplugs when operating noisy machinery and when in noisy environment. These provide a physical barrier that reduces inner ear noise levels and prevent hearing loss from occurring.

Air Quality

The construction activities on the site will result to increased dust and gas emissions. Construction machinery and trucks (including small vehicles) generate hazardous exhaust fumes such as Carbon Oxides (CO_x), Sulphur Oxides (SO_x) and Nitrogen Oxides (NO_x). Dust particles caused by vibrations of machines and vehicle movement suspends in the air mostly during dry spells.

Potential Mitigation Measures

- ※ Provide Personal protective Equipment (PPE) such as nose masks to the workers on site.
- ※ Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of noxious gases and other suspended particulate matter.
- ※ Control over areas generating dust particles. Such areas should be regularly cleaned or sprinkled with water to reduce dust. The areas can be enclosed to mitigate effects of wind on them.
- ※ Workers should be trained to understand the hazards that may be generated in such work environments.
- ※ Workers should be encouraged to go for regular health check-ups to ascertain their health standards.
- ※ Enclose the site with suitable dust screens during the construction

Potential Oil Leaks and Spills

It is important to note that oil/grease spills are prevalent in construction sites and in most areas that make use of petroleum products. Such products contain detrimental elements to the environment. They contain such heavy metals as mercury, lead, and sulphur among others. Though this may not be common at the site, it is wise to control and observe the little that could occur especially during maintenance of the involved machinery.

Potential Mitigation Measures

- ※ All machinery must be keenly observed not to leak oils on the ground. This can be affected through regular maintenance of the machinery.
- ※ Maintenance must be carried out in a designated area (protected service bays) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away oils into the soil or water systems. Waste water/ wash water from these areas should be properly disposed.
- ※ All oil products and materials should be stored in site stores or in the contractor's yard. They should be handled appropriately to avoid spills and leaks.
- ※ Car wash areas and other places handling oil activities within the site must be well managed and the drains from these areas controlled. Oil interceptors must be installed along the drainage channels leading from such areas.

Solid Waste

Construction activities results to increased solid wastes within the sites. Such waste materials include excavated soil, stones, construction debris, wood, broken glasses, containers and other packaging materials, rods of metal, pieces of iron sheets, extirpated vegetation on the site, kitchen materials and other house refuse especially during the occupation of the project etc.

On completion, the site will be generating waste products from various operations and activities- *house refuse.* Removal and disposal of house refuse comes under public cleaning and is very important and costly item on the CGK budget. If it is not removed promptly away from the generation points (flats), it accumulates in large heaps harbouring rats, flies and vermin which disseminate germs of disease. A good deal depends upon the mutual cooperation between the local authorities and the public. Proper maintenance and use of dustbins is the key to the satisfactory solution of the problem of sanitary storage and collection of refuse without causing nuisance.

Waste management involves *storage, collection, transportation and disposal*. Therefore, bins come in handy during storage and collection; both in the house and on foot paths for the disposal of whatever rubbish such as paper wrappings, cigarette ends etc., into them instead of scattering them all over. Transportation of the collected waste need be simplified and finally, the use of sound method of waste disposal. The proponent shall set aside dust bin cubicles to facilitate solid waste management.

Potential Mitigation Measures

- ※ The contractor or proponent should work hand in hand with private refuse handlers and the CGK to facilitate sound waste handling, and disposal from the site. All wastes must be taken to the approved dumpsites.
- ※ During construction, the wastes should be properly segregated and separated to encourage recycling of some useful waste materials; i.e. some excavated soils, broken stone materials shall be used as backfills. (Use of an integrated solid waste management system; through a hierarchy of options as here below: source reduction,

recycling, composting and reuse, and sanitary land filling). Vegetative waste shall be used to make humus for use in the gardens.

- ※ On completion, the project management should adapt effective waste management system to handle solid materials that will be generated from various operations. (Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse, and sanitary land filling)
- ※ There should be several bins - The bins should have a close fitting cover, lest stray animals might scatter the refuse. The receptacle(s) must be kept in a good condition, and sanitarily clean by frequent washing and disinfecting. The first action should be reduction of waste at source. All recyclable waste should be recycled or efforts should be made to facilitate segregation and recycle. Any unrecyclable waste should be disposed to approved dump sites and as per the Waste Regulations
- ※ In addition to the bin to be provided, the proponent should provide a number of dustbins strategically on the walkways for the pedestrians to dispose whatever rubbish instead of scattering them on the road surface or compound. These bins should better be fixed to posts one or two feet above the ground so as not to be within reach of dogs and other scavengers etc.
- ※ The collection should be made at least once in 24 hours, and it should be done in such a way as to minimize nuisance of smell and dust during filling into carts or vans or any employed (suitable) collection method. All the refuse collected from house to house must be carried away from the storage site to a safe place where it can be suitably disposed. Lastly, suitable and most effective method of disposal should be applied.
- ※ Train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during operation.
- ※ The contractor or proponent should work hand in hand with private refuse handlers, NEMA and the CGK to facilitate sound waste management as per the prevailing regulatory provisions.

Ecological Impacts: Flora and Fauna

Vegetation has a great effect on the general and localized environment and normally can modify microclimate. Usually, the flora creates a good environment for habitats thus the two may go together more often than not. In consequence, de-vegetation may result to negative effects on the fauna. Singly, the proposed project may appear of no significant impact but the cumulative effect in concert with other current and future projects are capable of significant and serious effects including but not limited to soil erosion, decreases in air purifiers (carbon sinks) and thus contribution to global warming etc.

There will be some temporary and permanent disturbances to small animals / bird life especially those that inhabit the vegetation.

Mitigation

- Avoid unnecessary clearing of vegetation by conserving vegetation not in the sections being built up
- Landscape and plant vegetation in all open areas after the completion of the project and manage the introduced vegetation on completion of the development to restore or improve the site.

Construction materials

They include stones, sand, cement, ballast, reinforcing steel rods etc. They should be of the appropriate quality.

Potential Mitigation Measures

- ※ Should be sourced from licensed dealers and suppliers.
- ※ Quality should be thoroughly controlled through regular tests.
- ※ Procurement of the materials should follow specifications by the structural and architectural engineers

Visual Intrusion

Visual impacts occur during earthworks for the foundation of projects and on completion due to closure of some views. However, the proposed project will not by far be out of scale with the existing projects or developments (within the area). The visual impact will not be significant and will have very little affects neighbouring activities and the general public. There are already completed similar projects in the immediate neighbourhood, which is thought to have psychologically prepared the general environment.

Potential Mitigation Measures

- ※ On completing the earthworks, the worked area should be restored through backfilling, levelling and planting of vegetation.
- ※ All solid waste and debris from construction site must be cleared on completion.
- ※ The scheme should be blended in a way to merge with existing environment. It should in fact upgrade the quality of the surroundings. Landscaping and planting of vegetation especially trees shall go a long way in mitigating the visual intrusion.

Public safety, traffic, Occupational Safety and Health (OSHA)

During construction, there will be increased dust, air and noise pollution. These are considered as negative impacts as they significantly lower the quality of environment. The residents and workforce involved would be more subjected to these environmental hazards.

Food for the construction workers is provided by mobile individuals most of which operates without licenses. This can compromise health of the workers especially if such foodstuffs are prepared unhygienically. Road entry and exit may also be a risk if not properly designed and controlled and more so the heavy trucks during construction. Traffic congestion is also a problem during occupation because the proposed project will definitely add very many cars.

Mitigation measures

- ※ Provide properly fitting personal protective equipment (PPE) depending on tasks being performed to avoid injuries and illness including working boots, overalls, helmets, goggles, earmuffs, masks, gloves etc. The proposed site shall be fenced off with a perimeter fence to keep off intruders, animals and general public and the site shall be secured 24hrs. Any authorised visitor to the site shall be provided with suitable PPEs
- ※ OSHA abstract should be posted at a strategic point on site. The requirements of the **OSHA** should be strictly adhered to, the **Building Code** and other relevant regulations. Only specialised machine operators should operate machinery and specialised equipment and all moving parts should be provided with appropriate guards. A first aid kit should be provided within the site. This should be fully equipped at all times and should be managed by qualified persons.
- ※ Properly design to allow for deceleration and acceleration to the site. Clearly indicate direction of traffic throughout the project cycle. Internal driveways should also be erected with bumps to control speed and

thus reduce potential accidents. There should be careful design and layout of the site entrance, providing adequate visibility. Visible boards shall be erected to notify of the construction works

- ※ Adapt effective emergency response plans especially during construction phase.
- ※ Safety awareness shall be gained through regular safety meetings, occupational health and safety training, first aid training and personal interest in safety and health. This awareness will increase ability to respond if, some day in future, one is a bystander in an emergency.
- ※ The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as other ordinances, Regulations and union Agreements.
- ※ Sanitary facilities should be provided (for each sex where conditions warrant). Standard cleanliness of the facilities should be maintained.
- ※ Local individuals preparing food for the workers at the site should be controlled to ensure that food is hygienically prepared.
- ※ Workers during construction phase should always be sensitized on social issues such as drugs, alcohol, diseases etc. There should be training programs to facilitate this.
- ※ Proper waste management of domestic waste to prevent vectoral diseases.
- ※ Proper management and disposal of medical waste to prevent contagious diseases.
- ※ Public awareness campaigns on the prevention and management of prevalent diseases such as malaria, STDs and HIV AIDS.
- ※ Ensure (consistently) good water quality through regular water analysis to ascertain compliance to public health standards.
- ※ Ensure structural components are constructed to the specifications and supervision of a registered structural engineer

Security

Security is a prerequisite for any development. During construction, security is very important in any site. This ensures that materials are in order. It also controls movement within the site especially for the intruders who might be injured by the materials and other hazardous features available within the site.

The area is well covered with communication facilities, which facilitate security to large extents. After the project is over, security guards and facilities should be provided. The issue has been catered for in the design of the project.

Potential Mitigation Measures

- ※ The project should be enclosed using suitable walls to beef-up security and to control movement within the site.
- ※ Security guards must always guard the gate to the facility to keep away the intruders and to control movement within the site.
- ※ Lighting as well as security alarms should be installed in strategic positions all over the site after the completion of the project.
- ※ Contractor should provide adequate security during the construction period when there are no works on the site.
- ※ The guards stationed at the gates should document movements in and out of the site/ property.

Fire preparedness

Fire outbreaks are common in Kenya and they usually subject detrimental effects to the environment. Fire causes both economic and social drawbacks. There are operations that are prone to such outbreaks at construction sites. It is therefore always important to consider the issue of fire.

Potential Mitigation Measures

Recommended Fire fighting equipment:
Potential causes of fire are many and varied electrical faults, smoking, gas leaks, carelessness etc. Fire incidences result to economic and social drawbacks. It is therefore always important to consider the issue of fire by bringing in the element of preparedness. In this regard, the design should provide and recommend implementation of fundamental fire-fighting measures and control facilities.

- Install an automatic fire alarm system for the entire project mostly on occupation, provide hose reels and portable fire extinguishers as where and advised by the fire department for each house/facility and provide for adequate fire reserve water storage tanks with an automatic booster pump for hose reel.
- Install sprinkler system in parking floors and in addition, provide powder or carbon dioxide extinguishers where there is parking
- Provide 1No. 30m hose reels per floor of every block and provide for adequate fire reserve water storage tanks with an automatic booster pump for hose reel and 2No. 9kgs water or powder fire extinguisher for every floor.
- Provide appropriate Fire Hydrant Ring main with suitable outlet points.
- Install heat and smoke detectors
- Install manual electric break-glass fire alarm system with secondary power
- All installation to follow CGK Fire Masters requirements approval.
- Conduct regular fire fighting drills/simulations to sensitize workers/residents and adapt an emergency response plan for the entire project during occupational phase.
- Ensure that all firefighting equipment are strategically positioned, regularly maintained and serviced.
- Provide fire hazard signs such as 'Direction to exit incase of any fire incidence and emergence contact numbers should be provided as well as the assembly points.
- Conduct regular fire fighting drills within the site and adapt an emergency response plan for the project (during construction and implementation stages)

Accident prevention and Emergency Response Plan (ERP)

The proponent and the contractor shall take all necessary steps to prevent accidents in the entire project cycle. All construction safety procedures shall be followed as discussed elsewhere in this report while measures to prevent and manage fires shall be taken as discussed elsewhere in this report. For further management of any foreseeable accidents, the proponent shall develop an ERP which shall be documented and all the residents shall be provided with the requisite training and annual drills conducted.
The ERP shall typically contain all information on all likely types of emergencies likely to be encountered mainly accidents and fires. The ERP shall include actions to be taken in case of emergencies and shall display emergency contacts (ambulance, doctors, police and fire engines) telephone list; simple instructions on do and don'ts in various emergencies such as fires, LPG incidents etc. On traffic safety, the road shall be constructed to adoptive standards and all entry and exit points provided with clear views. Since the road is gently sloping, bumps shall be erected to control speed. The ERP shall also provide for basic First aid training to some of the potential residents. The ERP shall also promote good neighbouriness which shall go a long way in emergency response.

Enhanced Social crime risks

Due to the influx of construction workers on site, there are chances of introduction of individuals with potentially anti-social behaviours such as thieves/thugs, drug users and traffickers and may pose a risk to the community both during the implementation and occupational/operational phases.

Mitigation

Adopt strict hiring guidelines to lock out the bad elements and limit movement outside the site. The contractor has a responsibly of sensitising the workers on social issues such as HIV/AIDS, drugs and other social issues through regular training and social gatherings and strict monitoring. Workers should not be housed on site. It is encouraged that workers on the site be sourced from the neighbourhood.

Construction safety

Construction work can be particularly hazardous. Personal protective equipment, fire safety, electrical safety, and other precautions are essential for safe construction work. Follow these guidelines when visiting or working at construction sites:

- ❖ Do not walk, stand, or work under suspended loads. If you raise a load, be sure to crib, block, or otherwise secure the load as soon as possible.
- ❖ Avoid placing unusual strain on equipment or materials.
- ❖ Be prepared for unexpected hazards. BE ALERT!

- Proper personal protective equipment, (i.e. safety shoes, hardhat, goggles, Respiratory Equipment and gloves) must be used at all times on the site or as conditions warrant. Jewelry should be avoided.
- Prior to the start of construction, all areas should be inspected for the presence of potentially hazardous energy in the area should be located and precautions taken.
- Workers should be trained on the proper use of tools and protective equipment.
- Great care must be given to excavations and the safety of the machinery, tools and other equipment such as scaffolding, ramp or ladder must be guaranteed. Accident prevention should be the overriding safety precaution. A qualified person should always be on site to oversee the working.
- Any area that poses a physical threat to workers and/or pedestrians requires barriers or guards.

Contractors and project managers should use barriers and guards as necessary to protect employees, and visitors from physical hazards. Areas that typically require permanent or temporary protection include the following:

Stairways, Open Manholes, Elevated platforms, Areas with moving machinery, Excavation sites, Construction sites, Temporary wall or floor openings, Doors opening into construction.

Community Facilities and Social Infrastructure Services

In most cases, more often than not the increased population accommodated in similar proposed housing developments do not been adequately provided with a commensurate increase in the community facilities and services. These include recreation facilities (such as public open spaces, playgrounds and sports facilities), education and health facilities, social and community halls, religious facilities, homes for special needs, police stations, post offices, administration facilities and roads, water supply, etc. The inadequacy of these facilities invariably lead to unplanned and spontaneous change of use of other properties to accommodate these deserving community facilities and services.

Mitigation
The CGK and other government agencies together with all stakeholders (including developers) should discuss for a solution and come up with a comprehensive development plan.

Potential proliferation of business centres and kiosks
Due to the business opportunities presented by such developments, there is a likelihood of erection of kiosks along road reserves and other commercial centres beyond areas designated as commercial zones.

Mitigation
The CGK and other government agencies together with all stakeholders (including developers) should discuss for a solution and come up with a comprehensive development plan to avoid flouting of Building development regulations and zoning guidelines with impunity. The CGK should strictly enforce the planning policy

Project Completion

On approval, the first phase of the project (implementation) which will pave way for the second phase (occupation) which will in turn pave way for the last phase, decommissioning. At the end of the 1st phase, the contractor will leave the site after officially handing over the completed project to the proponent. Before leaving the site, the proponent should ensure that the contractor does or causes to be done the following:

- ※ Comprehensive landscaping of open areas should be done.
- ※ All waste materials must be cleared and removed from the site. However, these should be disposed appropriately and to the approved dump sites in accordance to the laid down regulations.
- ※ The structures should be cleared, cleaned and rubbed of any dust particles before occupation.

DECOMMISSIONING PHASE
Decommissioning is an important phase in the project cycle and comes as the last to wind up the operations/activities of a particular project. The main purpose of decommissioning is to restore/rehabilitate the site to acceptable standards.
Quality and standard housing projects of this nature have a lifespan of between 50 and 100 years which is much dependent on the maintenance quality. This is long period of time and there may be many changes which may not be foreseeable including the technological and legal aspects. The decommissioning may also come earlier than the lifespan of the buildings again due to various reasons like change in physical planning policy or the discovery/realization of a more optimal use of the land. It is therefore recommended that an EIA be conducted when the time for decommissioning comes so that all aspects will be looked at against the prevailing conditions and requirements. However, the purpose of decommissioning is mainly to rehabilitate the project site to an acceptable standard and all efforts should be geared to making the site as close as possible to its original state before the project was implemented. The decommissioning will in brief involve demolitions of the structures, removal of debris and landscaping. The other social implications involve the laying off workers who may be employed thus will loose their income, issues of safety and health etc. due to the fact that no body knows the future, it is highly recommended that an EIA be prepared when the time comes since quit may come earlier or later due to the vagaries of weather, human behavior and policy changes among other factors and quantification and accurate prediction of the likely potential impacts is quite difficult.

In view of the foregoing and in line with the principles of sound environmental management, it is paramount that the appropriate controls and procedures be put in place at the design, implementation and operational phases of the proposed project to control environmental degradation as this is the only way of simplifying the decommissioning. These measures are recommended elsewhere in the report and in the EMP.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

The proposed Alternative

The EIA study report has been prepared for submission to NEMA; facts, findings and recommendations/proposals of which are based on the proposed site, design, materials and proposed technologies. This helps in evaluating and examining the foreseeable effects of the project on the environment and therefore assisting in addressing how the proposed development has to ensure that all environmental measures are complied with during the premises preparation and during operational phase.

The alternative consists of the proponent's/applicant's final proposal with the inclusion of the legal guidelines, regulations and procedures as stipulated in the EMCA, Cap 387 which aims at reducing environmental impacts to the maximum extent practicable. Appropriate Environmental Management Plans have been prepared as per the proposed project.

Relocation alternative

Relocation option to a different site is an option for the project implementation. At the moment, the proponent has no alternative sites for relocation. Finding and acquiring land to accommodate the scale, type and size of the project and completing official transaction on it may take a long period. Besides, there is no guarantee that such land would be available and suitability is another very important factor, which cannot be ignored.

While we appreciate that monetary costs should not be used to justify a wrong project, this would also call extra costs in terms of money and time for example whatever has been done and paid to date would be a direct loss to the proponent. This may also lead to a No Action Alternative situation. The other consequence is that it would discourage both foreign and local investors especially in the housing sector that has been shunned by many public and private investors hence aggravating the housing short fall. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. The problem is further aggravated by the fixed characteristics of land and the bottlenecks of the planning policy.

The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. The anticipated insignificant environmental impacts resulting from construction, and occupation/operation activities would not occur.

This option will however, involve several losses to both the project proponent/land owner and other stakeholders; society and Government. The landowner will continue to pay high taxes on the unutilized property. The No Project Option is the least preferred with reasons such that there will be no incremental housing stock, forfeiture of economic benefits that would accrue to the proponent, the public and the government, and it could also discourage potential investors wishing to invest in such ventures. From the analysis, it becomes apparent that the No Project Alternative is not the appropriate alternative.

Alternative materials, design, layout and technology

Various alternative designs and technology has been evaluated by the proponent and various professionals involved particularly the architect. After extensive discussions and relevant considerations, the various options

were assessed and the most optimal design and technology were agreed as per the proposed plans, materials and technology. There is the alternative design as to accommodation details, the size of the usable areas and the number of units/facilities. These alternatives however shall call for little re-designing and could be worth further exploration. The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipments that save energy and water will be given first priority without compromising on quality or availability factors.

Alternative landuse

The proponent has an option to use the land for other purposes other than the proposed residential development. The proponent can use the land for one single use such as agricultural, residential, commercial, industrial, recreational, religious etc. This option however calls for change of use (except for agriculture), and whatever the type of project, it will still have its potential impacts some even worse than the proposed project depending on their nature for example industrial activity.

Domestic Waste Water Management Alternatives

Alternative one: **Connection to Municipal sewer system**
Connection to the main sewer line will solve the waste water management issue at a very minimal cost and in an environmental efficient manner. However, there is no municipal sewer in the area.

Alternative two: **Use of septic tanks**
This involves the construction of a septic tank for every unit or combined units/facilities for disposal of wastewater which is more expensive and time consuming. It also calls for regular monitoring and record keeping to ensure timely exhaustion in order to avoid leaks and spills. However, in the absence of a sewer line (as is the case with the area), this remains one of the options for the proponent. The disadvantage of this system is that construction of a standard septic tank and a soak pit requires exhaustion after a short period since the wastewater generated within the flats is much and therefore management becomes difficult. One advantage of then area is that it has red soil which is suitable for disposal of the wastewater via the soak pit. Septic and soak pit are suitable for single-dwelling houses where each has its own since wastewater generated may not as much but may be a challenge for flats since the daily volume is more. It is unsuitable where a septic tank is used by various houses or facilities since the cost of operation may increase and may also fail to handle the potentially high volumes of wastewater generated. The cost of construction of a septic tank for each of the unit or facility would also be very high as compared to a common wastewater treatment system. Septic tanks systems also reduces chances of immediate water recycling since most of the times the water is finally disposed to underground soak pits. From the foregoing, the option for septic tanks is not viable in comparison with other available options.

Alternative three: **Lagoons Wastewater treatment system**
This involves the construction of a series of lagoons for digestion of microorganisms and subsequent treatment of the waste water. This alternative comes with one main advantage in that the treated water could be used for irrigation either in farmland or the compounds. However, it comes with one disadvantage in that it requires a bigger area of land and requires a lot of monitoring so as to ensure that the waste water is treated to the standards before being released to the environment. Underground concrete-made tanks to store the sludge points like the proposed project is also expensive and time consuming. However, in the absence of a sewer line(as is the case with the area), this remains the most appropriate option for the proponent and developers. Fortunately, since the proposed project has not started, the proponent has an opportunity to provide for such wastewater treatment system in the design and layout and thus land for the same can be provided for though it

will call for reduction in units since it takes a bit more space.in such urban environments, it is not preferred since many people 'imagine' living with a 'sewer treatment' in the neighbourhood.

Alternative four: **Closed Wastewater treatment system/plant**
This involves the construction of a closed wastewater treatment system/plant for digestion of microorganisms and subsequent treatment of the waste water. This may come in as biodigester or a closed-series of a system. This alternative also comes with one main advantage in that the treated water could be used for irrigation either in farmland or the compounds. This kind of a system has one great advantage in that it requires a much smaller area of land as compared to lagoon system but also requires monitoring so as to ensure that the waste water is treated to the standards before being released to the environment. In the system, wastewater enters the system at one end, goes through various stages and is discharged at the other for disposal to the environment. Underground concrete-made tanks to store the sludge are provided. In the absence of a sewer line(as is the case with the area), this remains one of the most appropriate option for the proponent and developers. Such system/plant is the one proposed for the proposed project and has been provided for in the design and layout and thus space for the same has been provided for. Where such systems are working efficiently, one may not even notice their presence in the neighbouhoods and thus are preferred.

The comparison of alternatives

Under the proposed Development Alternative, the project would create more and standard housing stock and facilities/infrastructure and services among others and would provide employment directly and indirectly to the public. It would provide jobs for the workers during construction. After completion more jobs would be generated during occupation/operation. Under the No Action Alternative, there would be no development at all. There would be no benefits from the site and neither would there be the insignificant environmental Impacts. Layout redesign may perhaps give an optimal design and should be explored for optimization of the benefits and environmental enhancement.

Provided the Environmental Impact mitigation measures are implemented as well as adoption of sound construction management practices, negative impacts will be avoided/minimized. However, commitments related to development alternative would ensure that potential impacts are minimized to levels of insignificance as envisaged in the EMP.

Mitigation for the proposed Action

Mitigation measures for the proposed action are included in herein after in this report and the EMP.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Environmental/ Social Impact	Project phase	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Estimated Cost (Kshs)	Monitoring means	Recommended frequency of monitoring and indicators
Soil disturbance	Construction and maintenance	• Control earthworks & compact loose soils • Install drainage structures properly • Landscaping on project completion • Control and manage excavation activities • Provide soil erosion control and conservation structures/means where necessary. • Ensure standard appropriate practices • Efficient drainage structures by proper design, construction & maintenance	Contractor	Contractor / Proponent	200,000	Inspection/observation	Daily
Increased use of resources	Construction and occupation	• Conservation of resources; use of renewable resources & rain water harvesting • Sourcing materials from environmentally compliant suppliers/sources • Use of recyclable materials	Contractor/Proponent	Proponent	2,000,000	Inspection/observation/records	Daily
Constraints to infrastructure & services	Construction and occupation	• Liason with respective service providers • Installation of internal infrastructure (drainage, roads, parking, rain water harvesting and storage etc) to best standards • Conservation	Contractor	Proponent/property manager	2,500,000	Inspection	During construction and on completion
Air pollution	Construction and occupation	• Enclose the site & buildings under construction with suitable dust screens • Sprinkle water to dry soils in excavated areas & earth roads to suppress dust. • Covering friable material loads during transportation	Contractor	Proponent/property manager	3,000,000	Inspection/observation	Daily

		• Strict adherence to Air quality Regulations, 2014					
Noise Pollution	Construction and occupation	• Maintain machinery, plant equipment • Construction activities to be restricted between 8 am – 5pm • Workers exposed to high-level noise to wear safety & protective gear. • Adherence to Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Contractor	Contractor	1,000,000	Inspection/observation	Daily
Water resources	Construction and occupation	• Construct water reservoirs and rainwater harvesting systems • Installation of water conserving taps ; waste water recycling and reuse	Contractor	Proponent/property manager	5,000,000	Inspection/observation	Random
Public health & safety; Occupational Health & safety	Construction and occupation	• Train staff/workers on occupational health and safety and provide appropriate protective gear; Provide workmen's compensation cover in addition to the right tools and operational instructions & manuals • Design and disseminate appropriate emergency response plans • Installation and maintenance of fire prevention, control and management measures • Ensure machinery and equipment servicing and maintenance as per schedules & legal requirements • Provide fully equipped First Aid kits & train staff on its use • Adoption of standard construction materials, specifications, technologies and procedures • Installation and maintenance of fire prevention, control and management measures • Provide bill boards notifying and warning motorists and public on road safety; 24hours site security • Ensure adherence OSHA , 2007.	Contractor	Proponent/property manager	500,000	Observation and records	Daily
Solid Waste management	Construction and occupation	• Waste minimization by ordering right/accurate quantities and sizes rather than cutting to sizes leaving wastes or ordering excess	Contractor	Proponent/property manager	50,000 monthly	Observation	Daily

		quantities leaving residuals • Waste recycling and reuse e.g. excavated soil used in landscaping the site and rehabilitation of quarry pits off-site • Proper storage, handling and disposal of new & used oil • Incorporate suitable facilities for collection, segregation and safe disposal of solid wastes to support recycling & reuse. • Engage the services of NEMA registered waste collector for disposal • Adherence to Waste Management Regulations, 2006					
Liquid waste management	Construction and occupation	• Construct suitable wastewater treatment system/plant taking into account adequacy, gradient, materials and standards during design • Regular monitoring of the treatment system • Installation of sanitary systems that use less water • Treatment & Recycling of wastewater	Contractor	Proponent/property manager	3,000,000	Observation an laboratory tests	Daily

ENVIRONMENTAL MANAGEMENT/MONITORING PLAN FOR THE DECOMMISSIONING PHASE

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility Party	Time Frame	Cost (ksh)
1. Construction machinery/structures & wastes				
• Scraps and other debris on site	• 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. Disposal locations will be selected by the contractor based on the properties of the particular waste stream. • All buildings, machinery, equipment, structures and tools that will not be used for other purposes should be removed and recycled/ reused say in other projects • Where recycling/reuse of the machinery, equipment, implements, structures, tools and other waste is not possible, the materials should be disposed to approved dumpsites. • Donate reusable demolition waste to charitable organizations, individual and institutions	Contractor, Proponent/property manager	One-off	2, 500,000
• Potential Pollution	• procedures for finding contaminated material during excavations will be established • covering and damping of excavated materials • appropriate storage of contaminated material if found. Ground contamination and storm water contamination will be limited on site by proper handling and storage of materials and equipment.	Contractor, Proponent/property manager	One-off	1,250,000
2. Rehabilitation of project site				
• Vegetation disturbance • Land deformation: soil erosion,	• Implement an appropriate re-vegetation programme to restore the site to its original status	Contractor, Proponent/property manager	One-off	1, 500,000

drainage problems • Restoration of site	• During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; • Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; • Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas; • Carry out soil tests for contaminants & if need be scoop out any contaminated soils and replace with uncontaminated soil from another source. • Comprehensive Landscaping	Contractor, Proponent/property manager	One-off	900,000
3. Safety of the project				
Occupational hazards	• Ensure that safety measures have been effectively integrated and positioned in respective areas of the project to control and manage fire outbreaks • Staircases and other hazardous areas shall be suitably protected say using strong rails to avoid occurrence of incidences	Contractor, Proponent/property manager	One- off	500,000
4. Safety and Social-Economic impacts				
• Loss of income • Reduced ability to support dependants • Loss of quality of life • Loss of benefits i.e. medical, insurance cover etc	• The safety of the workers should surpass as a priority of all other objectives in the decommissioning project • Adapt a project – completion policy: identifying key issues to be considered. • Assist with re-employment and job seeking of the involved workforce. • Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. • Offer advice and counseling on issues such as financial matters. • Encourage workers to register with retirement benefits scheme of their choice	Contractor, Proponent/property manager	One- off	3,500,000

CONCLUSION AND RECOMMENDATIONS

The necessity for housing can never be overemphasized. Unfortunately, its supply has since time immemorial lagged behind the supply of the supply of the same and the gap seems to widen. Due to higher growth of population, the gap between needs and actual availability of housing and services like water supply and sanitation/drainage, etc, continues to widen. This requires joint efforts both by the public and private sector. Also, the increased rural urban migration due to the pull and push factors, is putting tremendous pressure on the civic amenities in urban areas.

The major objective of the EIA study is to evaluate the effects/impacts of proposed project in relation to the entire environmental aspects aimed at influencing the protection and co-existence of the proposed project with the surroundings as well as the compatibility of the proposed project to the area to ensure and enforce sustainable environmental management during the installation, operation and decommissioning phases.

Environmental Impact assessment (EIA) critically examines the effects of the project on the environment. An EIA identifies both negative and positive impacts of any development activity or project, how it affects people, their property and environment. EIA also identifies measures to mitigate the negative impacts, while maximizing on the positive ones. EIA is basically a preventive process. It seeks to minimize adverse impacts on the environment and reduce risks. If a proper EIA is carried out then safety of the environment can be properly managed at all stages of a project planning, design, operation, monitoring and evaluation as well as decommissioning. The assessment is required at all stages of projects' development with a view of ensuring environmentally sustainable development for both existing public and private sector development ventures.

The Kenyan government has with great concern realized the above phenomenon and has come up with a policy that aims at providing approximately 150,000 new house units per annum. It has in addition recognized the input of private developers in providing (mostly) integrated housing scheme to bridge the gap in the housing sector. In line with this, *the proponent is* determined to contribute towards alleviation of the housing short fall by developing the proposed housing units (flats) on the proposed site.

The analysis of the EIA study has evidenced that the construction and occupation/operation of the proposed development will have both positive and negative impacts to the society but the positive impacts outweigh the negative.

The main impacts that are anticipated to arise are largely environmental and socio-economic which are highly inter-related and integrated. The impacts are both positive and negative with the positive impacts to include employment opportunities, improved security in the area, increase in national housing stock, improved living standards, increase in business and economic opportunities among others.
Regarding construction phase, the potential negative impacts mainly include dust, noise, water demand, energy demand, oil/grease pollution, health and safety hazards, traffic hazards and solid waste generation among others.

During the operation phase, the potential negative impacts mainly include increased energy demand, increased water demand, liquid waste generation, solid waste generation, traffic hazards and surface runoff among others. Compared to the current state of the site, the proposed project shall be high-rise and thus shall change the area's skyline and visual intrusion. In respect to proposed project and its siting, the area has really transformed into high-rise residential and commercial land uses with large developments that include high-rise developments and the proposed project is not unique or out of character.

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures as well as the legislation and regulatory framework that govern environmental

management. To this effect, the proposed project shall be built to the required planning/architectural/structural standards of the CGK, ministries of land & housing. During project implementation and occupation, *sustainable environmental management (SEM)* shall be ensured; avoiding inadequate/improper use of natural resources, conserving nature sensitively to guarantee respectful and fair treatment of all people working on the project, general public at the vicinity as well as the inhabitants of the project.

In relation to the proposed mitigation measures that will be incorporated during construction and occupation /operation phases; the development's input to the society; and cognation that *proponent* is economically and environmentally sound**,** the proposed project is considered beneficial and important. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment.

Finally, the project proponent shall work closely with the Environmental Experts and NEMA, residents and CGK to enhance the facilitation of all issues of concern. This will ensure that environmental concerns are integrated into the project at every stage of successive implementation phases and the co-existence of the proposed project with the environment during and after-occupation.

Diligence on the part of the contractor, and proper supervision by the (supervising) Foreman during construction and the property manager during occupancy is a fundamental for mitigation. Wastes should be reduced to the minimum as this will save on costs and at the same time preventing environmental pollution. The operators during both the construction and operational phases should exercise diligence in all activities to ensure environmental sustainability.

It is recommended that appropriate systems to be put in place to ensure that there is waste segregation to encourage reuse and recycling and facilitation of appropriate disposal and in the process control disposal of waste. The proposed project should be geared towards the achievement of an environmentally low impact development with pollution prevention measures; Energy efficiency; Sustainable materials; Design and orientation taking into account of all relevant factors; Waste management; Water conservation and on-site management of storm water.

Conservation of resources such as energy and water within the project during construction and occupation phases should be encouraged. Sound construction practices aimed at environmental conservation should also be adopted and special attention should be paid to the extended sources of raw materials such as water, sand, stones, and energy. Some construction 'waste' materials can be re-used in other areas and forms.

Wastes should be reduced to the minimum as this will save on costs and at the same time preventing environmental pollution. The operators during both the construction and operational phases should exercise diligence in all activities to ensure environmental sustainability.

The purpose of the EIA is to ensure that development options under consideration are environmentally sound and sustainable and that any environmental consequences are recognized early and taken into account in project design. In addition, the ultimate success of the EIA depends upon development of environmental capability and understanding in the agencies and stakeholders concerned.

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ANNEX: Attachments

Sketch map showing location of the proposed site

Copy of Certificate of Incorporation

Copy of PIN number certificate

Copy of Title Deed

Copy of Change of user approval

Copy of architectural plans approval letter

Copy of proposed plans (approved)

Copy of minutes of the CPP meeting and attendance list for the public meeting

Wastewater treatment system/plant