ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED MIXED DEVELOPMENT ON L.R NO 23399, NAIVASHA MUNICIPALITY, NAKURU COUNTY

EIA PROJECT REPORT NO. NEMA/PR/5/2/10825

Report submitted to the National Environment Management Authority (NEMA) in accordance with section 58 of Environmental Management and Coordination Act, 1999

CLIENT:
BUFFALO MALL DEVELOPMENT LTD
P.O BOX 10643 – 20100
NAIROBI

SUBMITTED TO:
THE NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY,
P.O BOX 67839 00200
NAIROBI

CONSULTANTS: PETER M. ITHAGU
LEAD EXPERT NO. 0644
P.O BOX 308-20100, NAKURU
Tel: 0721-543294 or 0202495410
E-Mail: ecolinkse@gmail.com

JUNE 2013
CERTIFICATION

I/We, the undersigned certify that to the best of my/our knowledge and belief, this report is correct and true reflection of the findings on the anticipated environmental impacts of the Proposed mixed development on LR No 23399 Naivasha Municipality.

For and on behalf of Ecolink Services
Name: Peter M. Ithagu, Msc (Lead Expert)
License No: 0644
Telephone: 0721-543294
Signature…………………….. Date: …………………….

For and on behalf of the Buffalo Mall Development Ltd
Name:…………………………………………….. Signature…………………………………………..
Designtation:……………………………………….. Date…………………………………………..
Telephone: …………………………………………..
# Table of Contents

CERTIFICATION ........................................................................................................ ii

ABBREVIATIONS ................................................................................................).. vii

CHAPTER ONE: ........................................................................................................... 1

1.0 INTRODUCTION ................................................................................................. 1

1.1 Purpose of the Environmental Impact Assessment Report ............................ 2

1.2 Objectives and Terms of Reference of the EIA .............................................. 3

1.3 Impact Assessment Method .............................................................................. 3

1.3.1 Site Visit Approach ...................................................................................... 3

1.3.2 Public Consultation approach .................................................................... 4

1.3.3 Observations and Data Collection ............................................................... 4

1.3.4 Photography ............................................................................................... 4

CHAPTER TWO .......................................................................................................... 5

2.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK .................... 5

2.1 Introduction .................................................................................................... 5

2.2 Environmental Management and Coordination Act No 8 of 1999 ............... 5

2.2.1 The Environment (Impact Assessment and Audit) Regulations, 2003 ........ 5

2.2.2 Environmental Management and Coordination (Waste Management Regulations), 2006 .......................................................... 6

2.3 Occupational Safety and Health Act, 2007 .................................................... 6

2.4 Energy Act, 2006 ............................................................................................ 7

2.5 Petroleum Rules ............................................................................................ 7

2.6 The Weights and Measures Act Cap 513....................................................... 8

2.7 Building Code 2000 ...................................................................................... 8

2.8 Public Health Act Cap 242 (Revised 1986) .................................................... 9

2.9 Physical Planning Act, (Rev 2009) ................................................................. 9

2.10 The Physical Planning (Building and Development) (Control) Rules, 1998 .. 10

2.11 The Naivasha Municipal Council By-Laws ................................................... 11

2.12 The Equator Principles.................................................................................. 11

CHAPTER THREE: .................................................................................................... 12
3.0 BASELINE INFORMATION ........................................................................................................ 12
  3.1 Administrative Background .................................................................................................. 12
  3.2 Population Statistics .............................................................................................................. 12
  3.3 Economic Activities ............................................................................................................... 13
    3.3.1 Floriculture and Horticulture ......................................................................................... 13
    3.3.2 Geothermal Power Generation ..................................................................................... 13
    3.3.3 Tourism and Recreation ............................................................................................... 14
    3.3.4 Commercial Fishing ...................................................................................................... 14
  3.4 Infrastructure ....................................................................................................................... 15
    3.4.1 Housing .......................................................................................................................... 15
    3.4.2 Waste Disposal .............................................................................................................. 15
    3.4.3 Roads and Drainage ....................................................................................................... 15
    3.4.4 Water ............................................................................................................................. 16

CHAPTER FOUR .......................................................................................................................... 17
4.0 PROJECT DESCRIPTION ........................................................................................................... 17
  4.1 Receiving Environment ......................................................................................................... 17
  4.2 Zoning Approval .................................................................................................................. 17
  4.3 Design of the proposed Project ............................................................................................ 17
  4.4 Project Activities ................................................................................................................ 18
    4.4.1 Planning Phase ............................................................................................................... 18
    4.4.2 Construction phase ...................................................................................................... 18
    4.4.3 Operational phase ....................................................................................................... 19
    4.4.4 Project’s decommissioning phase ................................................................................. 19
  4.5 Proximity to Off Site Infrastructure ...................................................................................... 20
  4.6 Project budget ..................................................................................................................... 20
  4.7 Consideration of Alternatives .............................................................................................. 20
    4.7.1 Alternative land uses: .................................................................................................... 20
    4.7.2 Site alternative: ............................................................................................................. 21
    4.7.3 No-project alternative: ................................................................................................. 21
    4.7.4 Project location ............................................................................................................. 21
5.0 ANTICIPATED ENVIRONMENTAL, HEALTH AND SAFETY IMPACTS AND PROPOSED MITIGATION MEASURES ................................................................. 22

5.1 Introduction .................................................................................................................. 22

5.2 Presentation and discussion of probable environmental and socio-economic impacts .................................................................................................................. 23

5.2.1 Positive impacts ........................................................................................................ 23

5.2.2 Negative impacts ....................................................................................................... 28

5.6 Impacts during Construction Phase .............................................................................. 28

5.6.1 Impact on site drainage ............................................................................................. 28

5.6.2 Air Pollution ............................................................................................................. 29

5.6.3 Soil Disturbance ....................................................................................................... 30

5.6.4 Noise and vibrations ............................................................................................... 30

5.6.5 Removal of vegetation ............................................................................................ 31

5.6.6 Occupation health and Safety .................................................................................. 31

5.6.7 Impacts on Traffic Flow ........................................................................................... 32

5.6.8 Waste management ................................................................................................. 32

5.6.9 Impacts on Infrastructure ....................................................................................... 33

5.6.10 Impact on local drainage and hydrology ................................................................. 34

5.6.11 Impact Matrix ........................................................................................................ 34

5.7 Operation Phase .......................................................................................................... 35

5.7.1 Fire risks .................................................................................................................. 36

5.7.2 Traffic congestion .................................................................................................... 40

5.7.3 Accidents ................................................................................................................. 41

5.7.4 Workers welfare ...................................................................................................... 41

5.7.5 Impacts on existing infrastructure ......................................................................... 42

5.7.6 Oil Spills .................................................................................................................. 43

5.7.7 Waste management ................................................................................................ 45

5.7.8 Regulatory compliance ............................................................................................ 45

5.7.9 Security ................................................................................................................... 45

5.8 Decommissioning ........................................................................................................ 46
5.9 Public consultations ........................................................................................................46

CHAPTER SIX: ..................................................................................................................48

6.0 ENVIRONMENT, HEALTH AND SAFETY (EHS) ...................................................48

6.1 EHS Management and Administration ......................................................................48

6.2 Policy, Administrative and Legislative Framework ....................................................48

6.3 Organization and implementation of the EHS Management Plan ...............................48

6.4 The Guiding Principles to be adopted by the contractor .............................................48

6.5 Safety Agenda for both the proponent and contractor .................................................49

CHAPTER SEVEN: ............................................................................................................50

7.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN .........................50

7.1 EMP for All Phases .....................................................................................................51

CONCLUSION ......................................................................................................................61

Appendices .........................................................................................................................62
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Audit</td>
</tr>
<tr>
<td>EHS</td>
<td>Environment Health and Safety</td>
</tr>
<tr>
<td>EIAR</td>
<td>Environmental Impact Assessment Report</td>
</tr>
<tr>
<td>EMCA</td>
<td>Environmental Management Co-ordination Act</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>ERC</td>
<td>Energy Regulatory Commission</td>
</tr>
<tr>
<td>IAP</td>
<td>Interested and Affected Parties</td>
</tr>
<tr>
<td>NARUWASCO</td>
<td>Nakuru Rural Water and Sanitation Company</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environmental Management Authority</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Participation Process</td>
</tr>
<tr>
<td>SEM</td>
<td>Sustainable Environmental Management</td>
</tr>
</tbody>
</table>
CHAPTER ONE:

1.0 INTRODUCTION

The proposed development will be on Plot L.R No. 23399 Naivasha Municipality leased from Thirty Six C Limited (Appendix 2-Lease agreement, Appendix 3-Title deed). Buffalo Mall is a large scale mixed use project being developed by Lloyd Capital Partners (a real estate investment and development company) and is to be undertaken in a number of phases on the North- West edge of Naivasha town adjacent to the Trans-African Highway connecting Nairobi and Nakuru. The first phase is underway and the proponent is thus getting ready to commence the other phases. Upon completion of all the phases, Buffalo Mall will cover a gross built area of 22,210 sq m on an 18 hectare site along with all the other complementary buildings and functions. The first phase included the development of stalls, shopping mall and restaurant, shops, parking areas, gate houses, perimeter fence, playground, garbage enclosure, waste water treatment facility and the drilling of a borehole. The later phases that will be developed will comprise further shopping malls, restaurant and leisure, offices, apartments, hotel complex, warehouse, and fuel stations.

Ecolink Services Ltd has been appointed by the proponent (Buffalo Mall Developments Ltd.) as independent environmental assessors to undertake a Scoping and Environmental Impact Assessment (EIA) for the development of a commercial development and associated facilities. The EIA conforms to the EIA Regulations as promulgated in terms of the Environmental Management and Co-ordination Act (1999), as amended. An EIA project report was submitted to the authority on 28th February 2013 after which the authority requested for an Full EIA study for the project. The terms of reference were then prepared and submitted to the authority for approval before preparation of this study report. The TORs have been annexed to this report (Appendix 4).
1.1 Purpose of the Environmental Impact Assessment Report

This report represents the Environmental Impact Assessment conducted and has been prepared in accordance with the EIA Regulations published in Legal Notice No. 101 of 2003 and associated guidelines promulgated of the Environmental Management and Co-ordination Act (1999). The Environmental Management and Co-ordination Act (1999) second schedule stipulates that “listed activities” (i.e. those activities that have been recognized as having a detrimental effect on the environment) require environmental authorization from the competent authority (National Environmental Management Authority, NEMA). To this end an application for authorization was lodged through the conduction of an environmental impact assessment.

The EIA process is controlled through the Environmental Management Act, 1999 and its subsequent Regulations published under Legal Notice No. 101, 2003

Three phases in the EIA process are typically recognized:

- Screening Phase;
- Scoping Phase; and
- EIA Phase.

The first two phases of this process have been completed. This report represents the outcome of the third phase.

EIA Phase

The EIA phase determines the significance of the impact of the proposed activity on the surrounding environment. During the EIA phase, an Environmental Impact Assessment Report (EIAR) was produced by Ecolink Services and submitted to NEMA for approval. The EIA reports provides an assessment of all the identified key issues and associated impacts from the Scoping Phase as well as a description of appropriate mitigation measures. In this phase there is also a detailed public participation process that ensures all interested and affected parties (I&APs) are informed of the proposed activity and, provided an opportunity to comment. Views will be sought from the general public through advertisement in newspaper and the Kenya Gazette.
1.2 Objectives and Terms of Reference of the EIA

The aim of the EIA report is to document the outcome of the EIA Phase and includes the following:

- Detailed description of the proposed activity;
- Description of the property and the location of the proposed activity;
- Description and assessment of feasible and reasonable alternatives;
- Description of the receiving environment;
- Description of environmental issues and impacts associated with the project proposal;
- Assessment of each impact and a description of appropriate mitigation measures;
- Environmental Management Plan (EMP);
- Any other information required by the authorities.
- International principles and standards to be applied to the project (including Equator Principles)

The Environmental Impact Assessment Report was submitted to NEMA in accordance with section 58 of the Environmental Management and Coordination Act, 1999 for consideration and approval. The TORs for the project were submitted to NEMA and approved prior to preparation of this report (Appendix 4).

1.3 Impact Assessment Method

1.3.1 Site Visit Approach

During the site visit was undertaken and detailed examination of the ecological settings of the area was studied. The environmental conditions existing in the proposed project area were documented to provide the baseline data. The possible impacts of the proposed project activities were assessed against the documented baseline data.
1.3.2 Public Consultation approach

1.3.2.1 Consultation with Interested and Affected Parties

The consultation process included public consultation through placement of advertisements in newspaper and the Kenya Gazette. The proponent also will place signs/billboards on the site and on the roads near the site to communicate of the proposed project.

1.3.2.2 The results of the consultation

The result of the consultation is that most of the respondents were made aware of the proposed Development and welcomed this development indeed as evidenced by the attached filled up questionnaires. We note that the proponent has chosen to comply with the Legal Notice No. 101 of June 2003 that requires all development projects to undertake an Environmental Impact Assessment exercise. The proponent undertook this exercise in order to address any negative impacts that may be arising from the project development. Most of the respondents that were interviewed expressed their acceptance for the proposed development.

1.3.3 Observations and Data Collection

The site reconnaissance focused on observation of the ecological status of the site, the vegetative cover, the soils and the landscape condition as well as other environmental conditions. The anticipated impacts are depicted during the planning, construction and operation, and decommissioning phases. High impacts are associated with severe consequences within a short term while medium impacts relate to consequences sustained over a long duration exposure. Low impacts imply that the environment can recover from the resulting consequences as soon as the exposure is terminated.

1.3.4 Photography

Photos were taken to show the actual site of the proposed development, resources on site and neighboring development.
CHAPTER TWO

2.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

2.1 Introduction
According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), commercial developments and filling stations require an Environmental Impact Assessment project/study report prepared and submitted to the NEMA for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

2.2 Environmental Management and Coordination Act No 8 of 1999.
This EIA study has been undertaken in accordance with the Environmental (Impact Assessment and Audit) regulations 2003, which operationalize the Environmental Management and Coordination Act 1999. The report is prepared in conformity with the requirements stipulated in the environmental management and coordination act no 8 of 1999 (EMCA) and the Environmental Impact Assessment and Audit Regulations 2003 regulation 7 (1) and the second schedule. Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean environment for all, new projects listed under the second schedule of Section 58 of EMCA no 8 of 1999 shall undergo an environmental Impact Assessment. This includes development activities such as this construction project.

2.2.1 The Environment (Impact Assessment and Audit) Regulations, 2003
On June 13th 2003, the Minister of Environment, Natural Resources and Wildlife promulgated the Environment (Impact Assessment and Audit) regulations 2003 (EIA/EA Regulations) under section 147 of the EMCA. These regulations provide the framework for carrying out EIAs and EAs in Kenya.
2.2.2 Environmental Management and Coordination (Waste Management Regulations), 2006

Part II of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that: - 4. (1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. (2) A waste generator shall collect, segregate and dispose such waste in a manner provided for under these regulations 5. (1) A waste generator shall minimize the waste generated by adopting the following cleaner production methods

a) Improvement of production process through:-
   i. Conserving raw materials and energy;
   ii. Eliminating the use of toxic raw materials; and
   iii. Reducing toxic emissions and wastes

b) Monitoring the production cycle from beginning to end by: -
   i. Identifying and eliminating potential negative impacts of the product;
   ii. Enabling the recovery and re-use of the product where possible;
   iii. Reclamation and recycling

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

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

2.3 Occupational Safety and Health Act, 2007

Before any premises are occupied, or used a certificate of registration must be obtained from the chief inspector. The occupier must keep a general register. The Act covers provisions for health, safety and welfare of workers in any place of work.

Safety

Training and supervision of inexperienced workers should also be conducted. Floors, passages, gangways, stairs, and ladders must be soundly constructed and properly maintained and handrails must be provided for stairs. Adequate and suitable means for
extinguishing fire must be provided in addition to adequate means of escape in case of fire must be provided.

**Health**

The premise must be kept clean, daily removal of waste from the site, free from effluvia arising from any drain, sanitary convenience or nuisance and without prejudice to the generality of foregoing provision. The circulation of fresh air must secure adequate ventilation of the development. There must be sufficient and suitable lighting in every part of the workplace in which persons are working or passing.

### 2.4 Energy Act, 2006

The Energy Act was enacted in the year 2006. Section 4 of the Act establishes the Energy Regulatory Commission (ERC). The ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts. Section 80 (1) of the Act requires any person conducting business involving importation, refining, exportation, wholesale, retail, storage or transportation of petroleum to obtain a license before doing so. A petroleum permit is also required for vehicles transporting petroleum products. The designs of petroleum storage facilities must also meet the standards stipulated in the Act. In addition, section 98 of the Act is emphasizes on the obligation of any person dealing in petroleum products to comply with environmental, health and safety standards.

### 2.5 Petroleum Rules

These are subsidiary regulations contained in the repealed petroleum act, Cap 116. For the purposes of these Rules petroleum is divided into - Petroleum Class A, having a flashing point below 73°F.; and petroleum Class B, having a flashing point of 73°F. or above. Section 5 provides that every administrative officer in charge of a district shall be a licensing authority for the purposes of these rules. Part 11 of the rules gives provisions on the transport of petroleum products.
2.6 The Weights and Measures Act Cap 513
This is the principal Act dealing with weights and measures in Kenya, it defines the standards and units to be used and the regulations to be adhered to. Section 20 makes it an offence for any person to use or possess or control for use for trade a weighing or measuring instrument not constructed to indicate in terms of weight or measure as authorized by the Act. The next section (section 21) prohibits use for trade any weight, measure, weighing or measuring instrument which is false or unjust. It further requires that the weights, measures, weighing or measuring instrument used for trade be examined, verified, stamped or re-stamped at least once in every year - section 27(1) and a certificate of verification be issued - section 27(7). It is under the provisions of this Act that the dispensing pumps at filling stations must be examined and verified for their accuracy at least once in a year. Failure to do so is an offence under the Act.

Section 153 of the Act requires that every dispensing pump be marked with the identity or grade of the product that it is meant to deliver, and if it be the price-computing type shall display the ‘price per litre’ on every display panel. Under section 173(1) the pump shall be provided with one or more plugs, seals or sealing material to protect all stops or other adjustable parts affecting the quantity delivered.

2.7 Building Code 2000
This by-law recognizes the Local authorities as the leading planning agencies. It compels the potential developer to submit development application for the approval. The local authorities are hence empowered to approve or disapprove any plans if they do or don’t comply with the law respectively.

Any developer who intends to erect a building as herein proposed must give the respective local authority a notice of inspection before the erection of the structure. On completion of the structure, a notice of completion shall be issued by the local authority to facilitate final inspection and approval. No person therefore shall occupy a building whose certificate of completion has not been issued by the local authority.
Section 214 of the by law requires that any public building where the floor is more than 20 feet above the ground level should be provided with firefighting equipment that may include one or more of the following hydrants, hose reels and fire appliances, external conations portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.

2.8 Public Health Act Cap 242 (Revised 1986)

Part IX section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health section 116 requires that local authorities take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health. Nuisances under this Act include any noxious matter or waste water, flowing or discharged from any premises wherever situated, into any public street, or into the gutter or side channel of any street or watercourse, or any accumulation or deposit of refuse or other offensive matter. Every municipal council and every urban area council may make by-laws as to buildings and sanitation.

2.9 Physical Planning Act, (Rev 2009)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used.

Section 29 of the physical Planning Act gives county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the
proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.

*The drawings (plans) of the proposed project will be submitted to the Naivasha Municipal Council for approval before commencing any construction activities. The proposed project is in the correct zoning.*

2.10 The Physical Planning (Building and Development) (Control) Rules, 1998

PART II of the rules address on the sitings, amenities density and use zoning rules

3. Vetting of building plans.

(1) Any person intending to erect a new building or re-erect an existing building shall comply with the provisions of the existing building code, local authority by-laws and the physical planning requirements and such conditions as may be imposed by the approving authority regarding the siting, size, height, shape and appearance of such building in order to safeguard, maintain or impose the dignity or preserve the amenity
and general appearance of street, square, or public place or have effect on the complemented appearance of such street, square or public place.

15. Access to dwelling and other buildings.

(1) Every domestic building, every part of a building which in the opinion of the Local Authority may be from a separate tenancy or occupancy shall have independent access to a street, such street not being a sanitary lane or passage:

Provided that—

(a) Dwellings contained in a special block of flats or a block of flats; or
(b) Separate offices within a building may have a common access to a street.

(2) Within every plot or sub-plot upon which it is intended to erect a domestic building there shall be laid out and constructed sufficient and suitably made footpaths of not less than 3 ft. (1m.) in width and where applicable, such vehicular ways as to provide adequate means of passage between the building and the nearest or most convenient road to which the plot or sub-plot has a frontage.

2.11 The Naivasha Municipal Council By-Laws

Project will operate within the Naivasha Municipality and is thus under jurisdiction of Naivasha Municipal Council. The council operates by laws to govern all aspects of management and is also at liberty to use the various pieces of legislation to enforce conservation and pollution control measures at the Council. Council by laws relevant to conservation, the general nuisance by laws are quite pertinent.

2.12 The Equator Principles

This is a credit risk management framework used for determination, assessment and management of environmental and social risks in project financing. The Equator principles are based on the International Finance Corporation Performance standards on social and environmental sustainability and on the World Bank Group Environmental, Health and Safety Guidelines. The EPs stipulates the environmental and socio-economic aspects to be considered and complied with by all the projects before they can be financed by financial institutions.
CHAPTER THREE:

3.0 BASELINE INFORMATION

3.1 Administrative Background

The proposed site of development is located in Naivasha about 2 km from the centre along the Nakuru-Nairobi Highway. Naivasha is a small cosmopolitan town in the bottom of the Rift valley. It is one of the four constituencies forming Nakuru County part of the former great Rift Valley Province. Naivasha Constituency consists of two Districts i.e. Naivasha and Gilgil. The constituency is lying northwest of Nairobi with Naivasha town being located on the shores of Lake Naivasha and along Nairobi- Nakuru highway and Uganda Railway. It has an area of 1,707 square kilometers. The dominant life style is a sub urban one with people mingling and mixing, however there remain distinct ethnic identities and cultures markedly Maasai pastoralist who live largely on the outskirts of the urban settlement around the lake in town and also the Agikuyu due to their large population and closeness to Kiambu & Nyandarua Counties who also maintain a visible ethnic identity dominating both the urban and peri-urban environment including large, medium and small scale farming and other economic activities. The constituency was greatly affected by Post Election Violence in the year 2008 which led to mass displacement and exodus of other communities from the region. However there is still large number of communities thus remains cosmopolitan in nature.

3.2 Population Statistics

The table below gives the breakdown of the population statistics in relation to the proposed project area as per the Kenya National Bureau of Statistics Census Report (2009)

<table>
<thead>
<tr>
<th></th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
<th>HOUSEHOLD</th>
<th>AREA (KM²)</th>
<th>DENSITY (KM²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nakuru County</td>
<td>804,869</td>
<td>798,456</td>
<td>1,603,325</td>
<td>409,856</td>
<td>7496.5</td>
<td>213.9</td>
</tr>
<tr>
<td>Naivasha District</td>
<td>190,082</td>
<td>186,161</td>
<td>376,243</td>
<td>105,318</td>
<td>3,034.6</td>
<td>124</td>
</tr>
<tr>
<td>Naivasha Division</td>
<td>90,510</td>
<td>89,502</td>
<td>180,012</td>
<td>56,538</td>
<td>949.5</td>
<td>190</td>
</tr>
<tr>
<td>Naivasha town</td>
<td>22,317</td>
<td>23,226</td>
<td>45,543</td>
<td>15,657</td>
<td>105.8</td>
<td>430</td>
</tr>
</tbody>
</table>
3.3 Economic Activities
The proposed development will be a mixed use facility expected to attract a wide range of clientele. The economic activities within the district will directly and indirectly impact on the operations of the proposed development. Below is a brief description of various economic activities found in the project area.

3.3.1 Floriculture and Horticulture
Since the 1980s, there has been a tremendous growth of commercial horticulture and floriculture farms in Kenya, a centered for the most part in the Lake Naivasha region. Naivasha accounts for about 70% of cut flowers that find their way to the European market. The industry is the single largest exporter of flowers to the European Union, accounting for over 35 percent of total sales. There are more than 30 flower farms in the Lake Naivasha region that attracts a huge manpower which in the end puts serious strain on the Naivasha and its surrounding eco-system as well as the infrastructure.

Apart from commercial horticulture and floriculture, there are hundreds of small scale farmers within the municipality. They mainly grow fruits and vegetables for consumption and the local market.

3.3.2 Geothermal Power Generation
In 1981, the first geothermal plant for Lake Naivasha was commissioned and by 1985, a total of 45MW of electricity was being generated in the area. Currently the plant is generating. A large volume of water is pumped from the lake by the KenGen and used in drilling new wells and in condensing steam in the existing over 60MW geothermal power plant. The plant provides roughly about 15% of national electric power requirement. KenGen is in the process of constructing a third geothermal power plant, which will yield and additional 64MW. Being a relatively cheap and ecological source of energy for Kenya, power from geothermal resources is planned to increase for at least about 28% of the country’s demand.
3.3.3 **Tourism and Recreation**

The natural eco-system with the municipality allows for both domestic and international tourism. The natural habitats that include the Hell’s Gate National Park and Mt Longonot make Naivasha an attractive destination. Tourism is an important sector in Naivasha. The lake offers outstanding aesthetic scenery and recreational facilities. The latter include boating, water skiing, sport fishing, game viewing and bird watching. Some 350-bird species, including 75 waterfowl species have been recorded, either as resident or migratory. The hotel industry and the infrastructure is adequately developed to take care of a growing number of international tourists who board or pass through Naivasha. There are many tourist hotels, campsites, hostels and marines around the lake. There are also several magnificent lodges around Lake Naivasha, popular among tourists for water sports, birds and game viewing in private ranches and walks along Crescent Island, Crater Lake, and Mt. Longonot. This is the single vital most economic activity that supports the desirability of the proposed development in the area.

3.3.4 **Commercial Fishing**

Fishing in the lake is also another source of employment and income for the local population. The lake varies in level greatly and almost dried up entirely in the 1890s. Having refilled, water levels are now dropping again. The lake supports a thriving commercial fishing, which started in 1959. The fish species exploited are large black bass, tilapia species, common cap and crayfish. All are introduced species. Crayfish is exploited both for export and local consumption. Ranching and Game Farming Naivasha and white highlands in the rift valley attracted a great deal of white settlers. The Lord Delamere, was the most prominent among them. However the history of game farming ranching is well documented in this town. Lake Naivasha attracts wildlife such as giraffes, buffalos, zebras, antelopes, waterbucks and hippopotamus. This has led to development of ranches and sanctuaries around Lake Naivasha.
With all the economic sectors, Naivasha has become a trading centre for the town and villages. The proposed development will thus have all the required driving forces to ensure its sustainability and optimal operation.

3.4 Infrastructure

3.4.1 Housing

Commercial and residential housing facilities are in short supply in the township. The town's rapid growth has attracted a high influx of people coming into the town in search for employment opportunities. This has led to an increase in the housing, building and construction sector. The ability of people to develop plots allocated to them within the town has increased. There are no classified estates in the town but Lake View area can be classified as high class. Site and Services, kabati areas can be classified as medium zone housing estates. The low class housing zones include Karagita development scheme Kamere, Kasarani and Kihoto farm areas. These areas have poor sanitation, heavily congested houses, no adequate water supply, lighting etc.

3.4.2 Waste Disposal

There is inadequate capacity for the council to collect and dispose of all the waste in the town. However the council is currently working in partnership with the Green Towns Initiative in developing a waste management system. The council has identified and purchased 10 acres of land for waste disposal. In additional the resident community will be facilitated to participate in waste management within the estates. This will involve formulation and capacity building of Environmental Health Committees who create awareness among the residents and coordinate waste collection

3.4.3 Roads and Drainage

Important Roads passing through Naivasha are the Trans-African Highway from Nairobi to Western Kenya and the old Naivasha-Longonot-Nairobi road, which is mainly used by heavy commercial vehicles. The main rail line also passes through the town. Naivasha Town’s road network is limited to some tarmac roads through the town centre.
The gravel roads to the residential areas and other roads are unpaved. The paved roads within the Town centre are converted to an open storm water drainage system. This storm water drainage needs to be rehabilitated. The total length of Roads within the townships is 11.7 km. The length of the unclassified roads especially in the residential area is not yet determined. The council has given high priority to developing roads and storm water drainage during the current planning period.

3.4.4 Water

Naivasha town and its environs depend upon the water from Nakuru Rural Water and Sanitation Company Limited (NARUWASCO) and boreholes for most of the domestic water supply. There are a number of horticultural irrigation farms around the lake whose only source of water is from Lake Naivasha. The lake is fed mainly by River Malewa that originates from Aberdares forests. The lake also receives significant amount of water from surface runoff during the rainy seasons due to its central location as a catchment area from both the eastern and western escarpments of the central rift valley. River Malewa has water throughout the year but some of its tributaries dry up during the dry seasons due to increased land use and deforestation.
CHAPTER FOUR

4.0 PROJECT DESCRIPTION

4.1 Receiving Environment
The site is located along the Nakuru - Nairobi Highway on Plot L.R No 233399 and falls under the administration of the Municipal Council of Naivasha. The site is approximately 1902m above sea level, and has geographic co-ordinates of: 0°42’11.67” S; 36°25’46.21” E. The proposed piece of land measures approximately 6 acres. Part of the land is already being developed with the first phase of the project already underway.

4.2 Zoning Approval
The planning regulations allow for commercial developments as the area is zoned as commercial being just a few metres from the town’s CBD. The proposed development takes up close to the full plot ratio allowances and this will result in optimal development. All the necessary Physical Planning regulations such as zoning, plot ratio and plot coverage’s were taken into account during the design of the proposed development. The neighborhood depicts similar developments in nature and magnitude hence a lot of compatibility in character and nature has also been observed. The development proposals and drawings will be submitted for approval by the relevant departments (Municipal Council of Naivasha) with the following condition in mind.

That the proponent shall adhere to the design specifications once approved.

4.3 Design of the proposed Project
The design of the proposed Project has been executed with due consideration of the existing topography of the proposed Project site. In general, the design of the proposed Project will tend to essentially optimize the use of best available technology to prevent or minimize potentially significant environmental impacts associated with the Project and to incorporate efficient operational controls together with trained staff.
The proposed Project will involve the development of a multiple mixed use ostentatious developments and will consist of Offices, warehouse, hotel complex and car parking, shopping centre, fuel station and fast food restaurant. The other components will include, storm water drainage system, electricity, water supply and sewer systems.

Full details of the proposed design can be obtained from the building plans appended (Appendix 7).

4.4 Project Activities

4.4.1 Planning Phase

The planning phase has the following activities

- Environmental Impact Assessment
- Design/plan approval
- Quantity surveying and Bill of quantity development
- Contractor’s Identification

At this stage the project proponent obtains all necessary permits, licenses, approvals and other relevant documents from the respective authorities. The proponent also contacted an architect who designed the project plan and Ecolink Services Ltd environmental experts to carry out an EIA study and compile this EIA study report. A competent contractor to undertake the construction exercise will be identified and budgetary allocations will also be made in this phase to ensure all activities regarding this project run uninterrupted.

4.4.2 Construction phase

The construction phase has the following activities:

- Excavation of ground for foundation laying
- Actual construction work (mechanical, Civil, Plumbing, Electrical, roofing and other related works)
- Site hand over
- Defects liability period
• Opening for operational use
This phase shall be monitored to comply with the architects' design and standards. Wastes generated during construction include solid waste such as excavated solid waste which will be disposed under the supervision of the project contractor.

4.4.3 Operational phase
The proponent may contact an authorized inspector upon completion of the project to inspect the building so as to ensure it complies with the architectural design and the set occupational standards. Upon approval the proponent will commence the use of the facilities. The first phase included the construction of a refuse enclosure where all solid waste will be held temporarily awaiting proper disposal by contracted refuse collectors at specified times so as to ensure a clean environment is maintained within the project premises. All liquid waste will be directed to a waste water treatment facility. The proponent shall also ensure hygiene of the facilities and common areas used for parking and other landscapes are maintained always by appointing workers to be responsible for that. The proponent shall also ensure there is regular maintenance work at the building. Solid wastes, waste water, human wastes generated and accidental fire incidents comprise the main environmental challenges at the operational phase and effective mitigation measures have been spelt out for the same.

4.4.4 Project's decommissioning phase
In the event that the facilities will be decommissioned, activities in this phase shall involve demolitions, destruction of all structures on site and clearing the debris. Electrical installations and pipings shall also be removed. The activities in this phase shall be done carefully so as to cause minimal hazardous environmental conditions to the neighbouring buildings. Excavations shall also be done to restore the original landscape and this will be short term.
4.5 Proximity to Off Site Infrastructure
The site is within an existing commercial setting. This is a new growth area of the municipality of Naivasha. Public utilities e.g. clean piped water from the municipal council of Naivasha, though unreliable and mains electricity are present in the area. The proponent has drilled a borehole on site for use within the development. The parcel of land is served by well maintained tarmac roads (Mai-Mahiu - Naivasha road and the Nakuru-Nairobi Highway) that pass along the boundary. The proposed site area lacks a sewerage system, which is a major drawback. The proponent intends to put up a waste water treatment facility on site (Phase 1) with sufficient capacity to accommodate the envisioned demand (see the Architectural designs attached in the Annex).

4.6 Project budget
According to the prepared bills of quantity, the proposed project will cost Ksh 285,885,000 (the Bills of quantities attached-Appendix 5). The EIA license fee is 0.05% of the project cost, thus for the proposed development Kshs 142,500 has already been paid to NEMA during the submission of the EIA project report in accordance with Environmental Impact and Audit Regulations Amendment of 2009 as license fee (Appendix 6-Receipt).

4.7 Consideration of Alternatives
The following alternatives have been considered and addressed in the EIA process:

4.7.1 Alternative land uses:
For the site including, residential homes or community open spaces (sports field) could be considered for the site. However, given the strategic location of the site near all required infrastructure and the ability to mitigate negative impacts, no justification for not erecting commercial developments and service station could be found during the EIA process;
4.7.2 Site alternative:
The proponent has leased the property and for this cause no other sites have been considered. Moreover the first phase of the same development is currently underway on the same site having acquired all necessary approval.

4.7.3 No-project alternative:
The site would remain in its current state, which is highly disturbed, degraded and fenced-off from the local community thereby providing no immediate or indirect social benefit.

4.7.4 Project location
5.0 ANTICIPATED ENVIRONMENTAL, HEALTH AND SAFETY IMPACTS AND PROPOSED MITIGATION MEASURES

5.1 Introduction
The proposed mixed development will involve construction of commercial and residential facilities on the said parcel of land as well as establishment of two petrol stations. The proposed development projects will be implemented in phases and hence the actual building plans have not been prepared. The layout of the various proposed facilities and the area to be covered by each are provided in the drawings appended to this report. This report identifies the possible impacts that are likely to arise from the establishment of the proposed facilities at the said parcel of land. Without prejudice, any major changes in the type of facilities to be established will thus call for a separate EIA study report. The purpose of this EIA is to ensure that decision makers consider the ensuing environmental impacts when deciding whether to proceed with a project. The International Association for Impact Assessment (IAIA) defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made. The preparation of “piece-meal” proposals on various facilities at each successive phase may fail to capture the potential impacts of the entire project comprising of the various individual components. The preparation of a study for the whole project including anticipated project components (spanning a period of upto 10 years) is critical in the analysis of the cumulative environmental and socio-economic impacts of the entire development. However, the main challenge of such an approach is the lack of specific details on the proposed facilities. The possible changes in technology over the next ten (10) years may call for significant alterations of the current plans. The developer shall ensure that NEMA is informed of any significant variations in the project during its implementation. The first
phase of the development has received an approval from NEMA and includes construction of a shopping mall, lettable stalls, parking areas, motel and sinking of a borehole. The other facilities as indicated in the master plan shall include:

- Shopping centre and car park
- Office block
- Residential apartments
- 2 fuel stations
- Tyre change centre
- Drive through fast food
- Hotel complex
- Warehouse

This chapter discusses the anticipated impacts of the proposed development on the environment during the various implementation phases.

5.2 Presentation and discussion of probable environmental and socio-economic impacts

This section focuses on the impacts of the proposed development on the environment and socio-economic conditions at local and regional level as may be necessary. The impacts will mainly result from construction activities and the activities during operation. As noted earlier, the decommissioning of the project is not anticipated in the foreseeable future.

5.2.1 Positive impacts

Construction phase

Employment creation

With the implementation of the project, there will be employment opportunities especially for casual workers from the local community. The exact number of the workers to be hired will depend on the magnitude of construction activities during the construction. Besides the casual labourers, the implementation of the project will also require the services of architects, health and safety advisors, environmental
consultants, engineers, landscapers, among others thus creating temporary job opportunities. Unskilled employees will also gain some skills that may help them in the future. The net effect of job creation is the improvement of the livelihoods and living standards of the beneficiaries and poverty reduction. It is estimated that during the implementation of the project an estimated 500 persons will be hired.

Land utilization
The land for the proposed project has been idle for a long time despite its prime location. This under-utilisation of the land is uneconomical due to the fact that the land owner continues to pay land rates and rent to the government despite the fact that the land generates no income. By investing in the proposed project, the land will be optimally utilised to the benefit of the land owner and the nation at large.

Increased value of land
The proposed development is bound to increase the value of the land as a result of the infrastructural development and the demand for the proposed facilities. The development will not only increase the value of the project site but also the value of land in the neighbourhood due to increased demand.

Aesthetic value
The proposed development will enhance the site aesthetic value. The designs of the proposed facilities will ensure visual attractiveness which will thus add beauty to the site. The structures will be well maintained and services to sustain the aesthetic value over time.

Impact on local economy
The project will require supply of large quantities of building gravel and other materials to be extracted from the local quarries. This will thus provide ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials. In addition, the development will promote small businesses e.g food
vendors. Furthermore, the investment will significantly impact on the local economy through the fees and loyalties paid to the government besides the enormous funds that will be used in the purchase of construction of materials from the local community and the wages and fees paid to workers and various professionals.

**Infrastructural development**

The project will improve the infrastructure at the site due construction of paved access roads, installation of electricity, water development, establishment of waste management facilities, enhanced site security, establishment of varied commercial facilities e.t.c. Due to the location of the proposed development along the busy Nairobi-Nakuru highway, this facility may become a stopover for motorists and tourists using the said highway. The spill over effect is the growth of the town.

**Operation phase**

**Creation of employment opportunities**

Job opportunities will comprise of direct employment in the commercial facilities to be established and self employment through establishment of various businesses in the lettable shops and stalls or indirect employment through creation of demand for various goods and services. The suppliers of goods and services related to shops, filling stations and hotels will be required. The facility will also require security guards and maintenance staff.

**Waste management**

The amount and type of wastes to be generated from the proposed facility will mainly depend on the type of businesses carried out. The anticipated wastes are as follows:
<table>
<thead>
<tr>
<th>Source</th>
<th>Type of wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol filling stations and tyre centre</td>
<td>Waste/used oil and lubricants</td>
</tr>
<tr>
<td></td>
<td>Used motor vehicle parts</td>
</tr>
<tr>
<td></td>
<td>Lubricant containers, oil and air filters</td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
</tr>
<tr>
<td></td>
<td>Old tyres</td>
</tr>
<tr>
<td></td>
<td>Papers and office wastes</td>
</tr>
<tr>
<td></td>
<td>Food remains from restaurant</td>
</tr>
<tr>
<td></td>
<td>Sewerage wastes</td>
</tr>
<tr>
<td>Shopping centre and car park</td>
<td>Wrapping and packaging materials</td>
</tr>
<tr>
<td></td>
<td>Sweepings</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous wastes</td>
</tr>
<tr>
<td></td>
<td>Spills from merchandize</td>
</tr>
<tr>
<td></td>
<td>Electronic wastes</td>
</tr>
<tr>
<td>Offices</td>
<td>Paper</td>
</tr>
<tr>
<td></td>
<td>Electronic wastes (e.g cartridges, printers, computers, e.t.c.)</td>
</tr>
<tr>
<td></td>
<td>Sanitary pads and sewerage wastes</td>
</tr>
<tr>
<td></td>
<td>Wash waters</td>
</tr>
<tr>
<td>Hotel and residential blocks</td>
<td>Used cooking oil</td>
</tr>
<tr>
<td></td>
<td>Food remains</td>
</tr>
<tr>
<td></td>
<td>Old linen</td>
</tr>
<tr>
<td></td>
<td>Sewerage wastes</td>
</tr>
<tr>
<td></td>
<td>Wrapping and packaging materials</td>
</tr>
<tr>
<td></td>
<td>Paper and sweepings</td>
</tr>
<tr>
<td>Warehouse/logistics</td>
<td>Spilt merchandize</td>
</tr>
<tr>
<td></td>
<td>Wrapping and packaging materials</td>
</tr>
<tr>
<td></td>
<td>Sweepings</td>
</tr>
<tr>
<td></td>
<td>Office wastes</td>
</tr>
<tr>
<td></td>
<td>Electronic wastes</td>
</tr>
</tbody>
</table>
The impact of the wastes generated from the facility to the environment will depend on the type of wastes and the disposal system applied. It is anticipated that within the next ten years (anticipated for the development), waste management technologies will have improved greatly. The need for the developer to adopt and utilize new environmental friendly waste management technologies can therefore not be overemphasized. The developer has expressed desire to use the most appropriate waste management technologies to reduce the possible impacts of the proposed complex.

**Convenience shopping**

The provision of modern standard facilities near a busy highway is likely to make Buffalo Mall facility to act as a stopover for motorists and travellers using the Nakuru-Nairobi highway. Already, the Delamare shop and restaurant which is about 1.5Km from the proposed site is an important stopover for motorists and travellers. It provides services such as food, drinks and toilets. The proposed complex will offer more services and goods than those offered at the existing facilities in Naivasha and is thus likely to have more visitors and customers. Apart from the wide choice of goods and services at the complex, the proposed project has provision for adequate car park, filling stations and motor vehicle service facilities.

**Local and national economy**

Local and national economy will also benefit from the proposed development. The hundreds of business facilities to be established will be required to pay for the operational permits and other levies to the local and national government. The proposed complex will thus be an important source of revenue for Naivasha municipal council and the national government. The increased land value and business activities will also in a way positively impact on the local economy.
Market for local goods and services
The establishment of the project will require supply of goods and services. The hotels will need farm produce e.g milk, eggs, meat, vegetables e.t.c. These will be sourced from the local farmers. In addition, the locals will provide various services.

5.2.2 Negative impacts
5.6 Impacts during Construction Phase
5.6.1 Impact on site drainage
The loose soils during the construction phase may find its way into the storm drainage along the road if not well managed. The excavation of the site will alter the natural drainage of the site thus creating pools during rainy season. The high porosity of the soil at the site will however significantly reduce water accumulation through infiltration and percolation into the ground. It is however necessary that the issue of site drainage be considered during construction to minimize stagnant water pools that could act as breeding grounds for mosquitoes. The contract must also ensure that no soil gets into the stormwater drainage system as this could impede the flow of water.

Measures
- Ensure that storm drainage system remains clear during construction clear
- Any excess soil from the construction site should be dumped at an approved site if it has to be disposed away from the site.
- The contractor should re-use the soil excavated from the site to minimize massive movement of soil into or out of the project site.
- Design clear drainage system to ensure that the site is properly drained even during the construction period. This will be critical given that the project will be implemented in phases. Poor drainage of the site could to creation of habitats for disease vectors such as mosquitoes and bilharzia.
5.6.2 Air Pollution

Dust and particles emanating from the whole of the construction process may cause significant impacts on environment, health and safety. The diesel fumes emitted by the trucks, earth moving machines, concrete mixer and generator pumps will also pollute the local environment. The anticipated sources of air pollution include:

- Engine emissions
- Construction dust (soil particles)
- Cement dust
- Paint odours/smell

Although most of the impacts will be localized, there is need for adequate measures to minimize these impacts. For instance, if dust generated from the site gets to the adjacent road, this may reduce visibility and could lead to accidents. In addition, since the project will be implemented in phases, it means that some of the facilities will be operational while others will be under construction. Furthermore, there will be more people in the complex and this will call for more stringent measures to safeguard the members of the public using the operational facilities. The measures below are hereby recommended.

Measures

- Sprinkle water on dusty surfaces.
- Place the concrete mixer in well ventilated area
- Ensure the workers wear proper PPEs (including dust masks)
- Enclose construction sites to minimize off-site transmission of dust and emissions
- Ensure that all fuel-propelled construction machines are well maintained and serviced
- Formulate a site Health and safety plan to guide site operations with the aim of minimizing exposure to air-borne pollutants
5.6.3 Soil Disturbance
Due to excavation, the soil structure may be disturbed. Levelling of the ground, grading of access roads, digging of foundations and related activities will lead to disturbance of the soil at the site. While the site gradient is gentle and will thus not require significant movement of soil during levelling, the movement of soil into the site during landscaping and laying of the foundations may be necessary. The net effect of this will be change in site characteristics and destruction of soil micro-organisms and habitats. Site characteristics such as soil porosity, erodibility, gradient, water retention e.t.c will be altered. The alteration of the soil characteristics will not have significant impact on the general use of the land due to the fact that the proposed project will not be dependent on soil fertility which will be greatly influenced by construction activities. Construction of buildings is more affected by soil chemistry and physical stability rather than its fertility. However, the disturbance of the fertile topsoil at the site may necessitate the developer to import soil for greenbelts and flowerbeds.

Mitigation
- Stripping of topsoil for re-use in greenbelts
- Excavation should be limited to necessary sites to minimize impact on the soil

5.6.4 Noise and vibrations
The construction process will also produce some level of noise and may cause public and health nuisance. Noise will be generated from the machines being used (e.g trucks, earth movers e.t.c) and general construction work. In addition, the construction activities will generate vibrations. The developer must ensure strict adherence to the Noise and Vibrations Pollution (control) Regulation of 1999. The guideline values under these regulations have presented earlier in the report.

Measures
- Construction activities must be carried between 0800hrs and 1700hrs.
- Use light vibrators
- Regular servicing of machines and equipment
- Lubrication of machines
- Compliance with Noise and Vibration regulations

5.6.5 Removal of vegetation
The proposed project site is an open grassland. Some of the species of flora present at the proposed project site include; *Caesalpinia spinosa*, *Solanum incanum*, *Cynodon dactylon*, *Lantana camara*, *Lantana trifolia*, *Cactus*, *Cida cuneifolia*, *Aloe sp*, *Hypoestes vetricularis* and *Conyza bonariensis* among others. These species are common in the area and easy to re-establish after disturbance. Based on the extent of the area that would be affected by the development, we opine that the impact will be localized and insignificant.

5.6.6 Occupation health and Safety

**Construction workers**: Construction process will expose to them occupational hazards including dust, noise, electric shocks, risk of falling, injuries during normal operations etc. The health of workers can be jeopardized if toilets and drinking worker are not provided to them.

**General Public**: Unlimited access to the site by members of the public may expose the same to hazards and risks associated with construction sites.

**Measures**
- Provision of PPE/C to worker during construction time. The PPE should include Overalls/Aprons, helmet, dust masks, wielding shield/goggles, ear muffs or plugs (where necessary), and appropriate footwear.
- Provide first Aid facilities emergency plan at the site
- Fencing off construction sites to minimize avoid risks to the general public
- Supervision of the project should be done throughout the project implementation period.
• Construct toilet for the workers at the site and provision of clean drinking water.
• Full compliance with the requirements of OSHA, 2007 or any other law prevailing at the time of project implementation
• Provision of accommodation for clothing and welfare facilities
• Formulation of health and safety plan
• Training of workers on construction safety
• Supervision of inexperienced workers
• Proper maintenance of machines, equipment, e.t.c
• Use of approved scaffolds, chains, hoists and ladders in accordance with the law

5.6.7 Impacts on Traffic Flow
The proposed project site is along the busy Nakuru-Nairobi highway. The transportation of materials to the site may affect traffic flow along the road. The impact will however not be significant due to the fact that there are adequate deceleration and acceleration lanes to allow for smooth access to the project site. In addition, the site is spacious to accommodate storage of construction materials and hence use of road reserve for storage of materials is not anticipated.

Measures
• Delivery of materials should be done during off-peak hours
• Ensure proper storage of materials to avoid obstruction of the road and public foot paths
• Proper site planning to allow for safe and convenient storage of materials and movement of persons and vehicles

5.6.8 Waste management
The anticipated wastes include packaging materials, metal and timber cuttings, paint containers, broken glasses, excavated soil and stone chips.
Measures

- Waste should be disposed at the designated municipal site
- Contract a licenced waste collector.

5.6.9 Impacts on Infrastructure
Currently the proposed project site has no water connection but a borehole has been proposed and an EIA conducted for the same. The project site also lacks sewerage system and the developer has the option of either establishing a waste treatment facility or connect to the municipal sewerage system which serves the town. Based on the magnitude of the proposed project, the demand for basic infrastructure such as water, sewerage services, garbage collection and electricity will increase significantly. Furthermore, increased traffic flow in and out of the Bufullo complex may cause some inconveniences to the flow of traffic along the highway. This impact will however be reduced by the presence of ample space for exiting of entrance to the highway. It is however recommended that all necessary measures be incorporated in the project design to minimize strain on existing infrastructure. For instance, the use of modern waste treatment facilities can reduce the burden on the existing sewerage treatment works, use of solar energy for water heating and lighting, wind energy for pumping water from the boreholes can all help ease pressure on the existing infrastructure in the face of the increased demand from the project.

Mitigation measures

- Contact relevant authorities before connecting water/ electricity for advice before connection.
- Construction should not interfere with way leaves
- Explore use of modern technologies e.g use of solar and wind energy to reduce pressure on existing infrastructure
- Proper design of access roads in and out of the proposed complex
- Liaise with the Kenya Highway Authority to obtain necessary approvals for any works on the road reserve
● Provision of adequate water storage facilities to serve the facility

5.6.10 Impact on local drainage and hydrology

The implementation of the project will alter the natural drainage and hydrology of the site. The introduction of impervious layer will reduce water infiltration into the soil resulting in increased surface run-off. The increased surface run-off can cause havoc downstream if not well managed. In addition, the reduced infiltration and percolation of water into the ground will reduce ground water recharge.

Mitigation

● Construction of an elaborate drainage system
● Rainwater harvesting from roof catchment
● All drainage channels should be lined with impervious surface to minimize soil erosion
● Covering of drainage channels with an appropriate cover e.g metal grills or concrete slabs to enhance safety.

5.6.11 Impact Matrix

The table below is a summary of environmental impacts matrix of the proposed project. A score of between 1 and 5 is assigned for each impact depending on its significance. The significance is evaluated in terms of extent, magnitude and temporal considerations. A positive sign indicates beneficial impact while negative sign indicates adverse impact.
### Impacts

<table>
<thead>
<tr>
<th>Issue</th>
<th>Planning and design</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use change.</td>
<td>0</td>
<td>-2</td>
<td>+3</td>
<td>-2</td>
</tr>
<tr>
<td>Surface water quality.</td>
<td>0</td>
<td>-2</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>Ground water quality.</td>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Air quantity.</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>Scenic beauty.</td>
<td>0</td>
<td>-2</td>
<td>+3</td>
<td>-2</td>
</tr>
<tr>
<td>Disturbance and modification of landscape</td>
<td>0</td>
<td>-2</td>
<td>+2</td>
<td>-2</td>
</tr>
<tr>
<td>Infiltration and percolation.</td>
<td>0</td>
<td>-2</td>
<td>-3</td>
<td>+3</td>
</tr>
<tr>
<td>Alteration of storms drains patterns and recharge of ground water aquifers.</td>
<td>0</td>
<td>-1</td>
<td>+2</td>
<td>+1</td>
</tr>
<tr>
<td>Pollution (land, water and air).</td>
<td>0</td>
<td>-2</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>Risk of gas leakages and oils spills gaining access to the public lower and discharge into nearby rivers.</td>
<td>0</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>Generation of employment opportunities.</td>
<td>1</td>
<td>+2</td>
<td>+4</td>
<td>-3</td>
</tr>
<tr>
<td>Local economy and inter linkages.</td>
<td>0</td>
<td>+2</td>
<td>+3</td>
<td>-2</td>
</tr>
<tr>
<td>Enhancement of communication and transfer of cargo.</td>
<td>0</td>
<td>0</td>
<td>+3</td>
<td>-2</td>
</tr>
<tr>
<td>Change in land values.</td>
<td>0</td>
<td>+2</td>
<td>+3</td>
<td>+1</td>
</tr>
<tr>
<td>High potential for increased risk to workers and general public</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>Strain on existing infrastructure.</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Increased risk of explosives and fires.</td>
<td>0</td>
<td>-1</td>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>Social amenities.</td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>-2</td>
</tr>
<tr>
<td>Disruption of traffic flow.</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Noise pollution.</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>Solid waste disposal.</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
<td>-4</td>
</tr>
<tr>
<td>Occupational risks.</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>Conflicts with local communities.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Impact on public health and safety.</td>
<td>0</td>
<td>-2</td>
<td>-1</td>
<td>-1</td>
</tr>
</tbody>
</table>

#### 5.7 Operation Phase

Once operational, the facility will provide space for various business ventures. There will be high number of persons visiting or operating in the facility and thus the need to enhance security, public health, safety and environmental hygiene. Some of the issues that could arise from the project include:-
5.7.1 Fire risks

The proposed facility will see the storage of highly flammable petroleum products in the two petrol stations. Although fire incidents from petrol stations are not common, it is important that the developer adheres to the stringent health and safety standards as outlined in the Energy Act, 2006 and its subsidiary legislations. The storage tanks must be installed underground and must meet the KEBS standards. They must also be inspected before commissioning. In addition, the restaurants and hotels at the complex will mainly use Liquefied Petroleum Gas (LPG) for heating. Poor handling and storage of the gas can present significant fire risk to the facility. It is also possible that the petrol stations will stock cooking gas in approved cylinders. It is there imperative that all necessary measures be undertaken to ensure fire safety. The regulations gazetted under section 14(5) of the now repealed Petroleum Act Cap 116 have standards and guidelines for safety at petrol stations. The regulations require safety precautions to be taken in cases where petroleum is stored in a premise to prevent fire. Apart from prohibiting smoking within storage area, it also requires posting of a notice in a conspicuous place at the entrance to every installations or storage shed to the effect that smoking and possession of matches are prohibited. No petroleum shall be allowed to escape into any drain, sewer, harbour, river or water course- Rule 19(6).

The section below presents a number of petroleum rules as provided for in subsidiary legislation under the Petroleum Act:
13.(1) Save as provided in paragraph (2) of this rule, no person shall store petroleum except in accordance with a license issued by the Licensing Authority in one of the forms set out in the Schedule to these Rules.

14.(1) Petroleum in bulk shall be kept in an installation or in an underground kerbside tank.

(2) Petroleum not in bulk shall, save as otherwise provided in rule 13 hereof and in this rule, shall be kept in a storage shed.

17.(1) Every application for the grant of a license shall be accompanied by specifications and plans in duplicate indicating

(i) the premises to be licensed, giving particulars of the materials and construction of each building;

(ii) the position of the premises in relation to adjoining property including the distances from neighbouring buildings;

(iii) in the case of an installation, the position and capacity of all tanks, storage sheds and filling stations, the position of all buildings, structures or other works within the installation, and the manner in which the petroleum is to be stored;

(iv) all lighting arrangements including the position of electric cables, switches and fuse boxes, drainage system, water connections, fire hydrants and firefighting appliances;

(v) all information reasonably necessary to show that the premises and the proposed method of storage comply with the provisions of these Rules.

(4) No alterations in the licensed premises or in the method of storing petroleum therein as shown in the license or in the specifications and plans attached thereto shall be made without the authority of the licensing officer, and if such alterations are approved, the license and documents attached thereto shall be amended by the Licensing Authority accordingly.

18. (2) No license to store petroleum within a municipality or a township shall be granted unless the local authority has approved of the site.
19. (1) No person shall, in or near any storage shed or installation, do any act which is likely to cause fire.

(2) No person shall smoke within a storage shed or installation, or have in his possession therein any matches or other articles of a highly inflammable or explosive nature except as permitted by these Rules:

Provided that this provision shall not apply to—

(i) smoking in offices and living quarters if so situated as to preclude danger from fire;

(3) There shall be posted in a conspicuous place at the entrance to every installation or storage shed a notice in English, Gujarati and Swahili to the effect that smoking and the possession of matches are prohibited.

(5) An adequate supply of dry sand or dry earth shall always be kept ready for immediate use in an installation and in or near a storage shed for the purpose of extinguishing fire.

(6) No petroleum shall be allowed to escape into any drain, sewer, harbour, river or watercourse.

20. (6) An efficient fire service shall be provided in every installation and the employees shall be instructed periodically in the use of the various fire appliances.

30. (1) In the case of kerbside tanks the petroleum shall be stored in one or more gastight metal tanks, specially designed and treated on the outside surfaces to prevent corrosion, of a total capacity not exceeding five thousand gallons, sunk completely underground in the position shown on the plan submitted. Where flooding of the foundations is, in the opinion of the Licensing Authority, likely to occur, the tanks shall be placed in a pit lined with concrete or brick in cement, the tank being packed round with sand, earth or clay so that no air space is left below ground-level except for such space as may be necessarily so left in order to obtain access to the fittings on the tank. The pit shall be covered with a cement concrete slab or other suitable cover, access to fittings being obtained by means of a metal manhole cover.
(3) A pump or pumps shall be placed in the position shown on the plan, the pipe connection between the tank and the pump or pumps shall be placed underground and all joints, valves and cocks shall be installed and maintained in a gas-tight condition.

(4) For the purpose of fuelling motor vehicles the petroleum shall be pumped through approved measuring vessels, fixed in approved positions, through sound hose electrically bonded and fitted with an approved quick-acting leak-proof cock or with an approved nozzle, into the tanks of motor vehicles.

(5) All tanks, pumps, pipes and fittings shall be strongly constructed of approved materials.

(6) All tanks shall be fitted with a vent pipe leading into the open air, the open end being covered with strong wire gauze having a mesh of not less than four hundred openings to the square inch and fitted with a hood, or with an inlet valve and an exhaust valve. All such vents shall be maintained in serviceable condition.

(7) The tank shall be filled in such manner that no gas can escape except through the vent pipe during filling operations.

(8) The space over a buried tank shall only be used for purposes authorized by the Licensing Authority.

Besides these regulations, the safety regulations and guidelines in other pieces of legislation, including OSHA, 2007, Public Health Act, Fire Risk Reduction Rules, 2007 and Physical Planning Guidelines for Petrol stations shall be complied with at all stages of the development. In addition, all the other facilities shall ensure full compliance with Fire Risk Reduction Rules, 2007. These rules requires installation of fire fighting appliances, provision of escape routes, specifies the type of fire fighting appliances for various types of fires, requires that such facility to store adequate water for firefighting connected to a working hydrant system, formation of fire fighting teams among other requirements. The management shall ensure that there are internal systems for monitoring compliance with the law on regular basis. Besides internal systems for
monitoring compliance, there shall be mechanism for monitoring by an external agent. The measures below are therefore recommended:

**Measure**

- Install fire extinguisher at the petrol station, hotels, warehouses, residential houses e.t.c
- Mark fire point and fire assembly areas clearly
- Provide sand buckets at strategic locations
- Formation of a disaster response team
- Fire drills should be conducted at least once a year
- Warning and informational signs be displayed appropriately
- Conduct fire audit once a year
- Formulate and bring to the notice of all workers and clients fire safety policy and rules
- Regular testing and servicing of fire-fighting equipment and appliances.
- Full compliance with the Fire Risk reduction Rules, 2007
- Provision of fire hydrant system
- Provision of adequate water storage for fire fighting
- Establish and clearly mark the fire exits and escape routes
- Ensure that the designs provide fire exits from all the working areas. The exits shall open outwards and shall remain open during working hours

**5.7.2 Traffic congestion**

The proposed project is along a busy road and vehicles entering the facility may cause obstruction to other motorists. This may affect the traffic flow and result in accidents and inconveniences. To address this we recommend the following:

**Measures**

- Exit and entry points should be clearly marked.
- Deceleration and acceleration lanes of at least 30m or diversions to be provided
• Observe speed limits within the facility
• Provide ample parking space within the complex

5.7.3 Accidents
Considering how busy the road along which the proposed project is, care should be taken to prevent possible accidents around the site.

Measures
• Exit and entry points should be clearly marked
• Signboards should be placed about 100 metres on both sides.
• Bumps should be installed on both side of the road if necessary- Kenya Highway Authority should be consulted on this
• Shall provide one car park for every 4m² floor space of shops/restaurant
• Display road safety signs within the complex
• Provision of first aid facilities to handle minor accidents and injuries that may arise at the complex
• Formation of Emergency Response Team

5.7.4 Workers welfare
The welfare of staff should be safeguarded during operation phase. The workers in the various business premises within the complex will be exposed to health and safety risks while at the workplace depending on the nature of activities carried out. Since the business facilities will be rented to willing business operators, the responsibility of the working conditions in various business premises will be on the operators and not the developer. It is however recommended that the developer shall play a proactive role in ensuring that the rights of the workers within the facility are not infringed. To achieve this, the developer shall ensure that only legitimate businesses are carried out in the complex, that the business operators maintain their premises as per the design (shall ensure that alterations to the premises don’t lead to obstruction of fire exits and safety equipments e.t.c) among other measures. Welfare facilities such as changing rooms,
toilets, clean water, ramps for persons with disabilities, e.t.c shall be incorporated in the designs to ensure that these are accessible to the tenants and customers.

Measures

- Shall take all necessary measures to ensure access to convenience facilities, clean drinking water supply, changing rooms (where necessary e.g hotels), first safety e.t.c
- Tenancy agreement should include requirement that all tenants shall operate legitimate businesses, compliance with local authority by-laws, respect for labour laws and maintenance of all the workplaces in safe conditions for the workers
- Conduct periodic audits of all the business premises to monitor compliance with environment, health, safety and welfare standards
- Training of workers
- Insurance cover as required by law

5.7.5 Impacts on existing infrastructure

The project will create an additional demand for services and infrastructure. Demand for water, electricity, sewerage and garbage services will rise. Consequently, the project may put pressure on the existing infrastructure if necessary measures are not taken. The developer intends to sink a borehole at the site to augment public water supply, this will ease the pressure on the public water supply. In addition, other measures such as installation of solar water heaters, use of wind energy, waste water treatment and recycling could go a long way in minimizing pressure on the existing infrastructural facilities and services.

Measure

- Necessary approvals should be obtained before connecting to sewer line,
- Explore use of alternative energy and waste management technologies.
5.7.6 Oil Spills

These may be generated at the petrol stations, service bays, parking lots, kitchen and generator room. Oil and fuel if left to flow to drainage system can have adverse effect on the environment. Oil spills may arise from carwash, vehicle servicing, leakage of the dispensing pumps or underground tanks or when filling the vehicles, cooking oils and fats from the restaurants. Adequate measures will therefore be necessary to prevent any contamination or pollution of the environment from oils and greases. Furthermore, any water released into the environment must the standards as stipulated in the *Water Quality Regulations, 2006*. The standards under these regulations are as tabulated below.

**STANDARDS FOR EFFLUENT DISCHARGE INTO THE ENVIRONMENT**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum allowable (Limits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1-trichloroethane (mg/l)</td>
<td>3</td>
</tr>
<tr>
<td>1,1,2-trichloethane (mg/l)</td>
<td>0.06</td>
</tr>
<tr>
<td>1,1-dichloroethylene</td>
<td>0.2</td>
</tr>
<tr>
<td>1,2-dichloroethane</td>
<td>0.04</td>
</tr>
<tr>
<td>1,3-dichloropropene (mg/l)</td>
<td>0.02</td>
</tr>
<tr>
<td>Alkyl Mercury compounds</td>
<td>Nd</td>
</tr>
<tr>
<td>Ammonia, ammonium compounds, NO3 compounds and NO2 compounds (Sum total of ammonia-N times 4 plus nitrate-N and Nitrite-N) (mg/l)</td>
<td>100</td>
</tr>
<tr>
<td>Arsenic (mg/l)</td>
<td>0.02</td>
</tr>
<tr>
<td>Arsenic and its compounds (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Benzene (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD 5days at 20 oC) (mg/l)</td>
<td>30</td>
</tr>
<tr>
<td>Boron (mg/l)</td>
<td>1.0</td>
</tr>
<tr>
<td>Boron and its compounds – non marine (mg/l)</td>
<td>10</td>
</tr>
<tr>
<td>Boron and its compounds –marine (mg/l)</td>
<td>30</td>
</tr>
<tr>
<td>Cadmium (mg/l)</td>
<td>0.01</td>
</tr>
<tr>
<td>Cadmium and its compounds (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
<td>0.02</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD (mg/l)</td>
<td>50</td>
</tr>
<tr>
<td>Chromium VI (mg/l)</td>
<td>0.05</td>
</tr>
<tr>
<td>Chloride (mg/l)</td>
<td>250</td>
</tr>
<tr>
<td>Chlorine free residue</td>
<td>0.10</td>
</tr>
<tr>
<td>Chromium total</td>
<td>2</td>
</tr>
<tr>
<td>cis -1,2-dichloroethylene</td>
<td>0.4</td>
</tr>
<tr>
<td>Copper (mg/l)</td>
<td>1.0</td>
</tr>
<tr>
<td>Dichloromethane (mg/l)</td>
<td>0.2</td>
</tr>
<tr>
<td>Dissolved iron (mg/l)</td>
<td>10</td>
</tr>
<tr>
<td>Dissolved Manganese(mg/l)</td>
<td>10</td>
</tr>
<tr>
<td>E.coli (Counts / 100 ml)</td>
<td>Nil</td>
</tr>
<tr>
<td>Fluoride (mg/l)</td>
<td>1.5</td>
</tr>
<tr>
<td>Fluoride and its compounds (marine and non-marine) (mg/l)</td>
<td>8</td>
</tr>
<tr>
<td>Lead (mg/l)</td>
<td>0.01</td>
</tr>
<tr>
<td>Lead and its compounds (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>n-Hexane extracts (animal and vegetable fats) (mg/l)</td>
<td>30</td>
</tr>
<tr>
<td>n-Hexane extracts (mineral oil) (mg/l)</td>
<td>5</td>
</tr>
<tr>
<td>Oil and grease</td>
<td>Nil</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value (mg/l)</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Organo-Phosphorus compounds (parathion, methyl parathion, methyl demeton and Ethyl paranto phenylphenylphosphorothioate, EPN only)</td>
<td>1.0</td>
</tr>
<tr>
<td>Polychlorinated biphenyls, PCBs</td>
<td>0.003</td>
</tr>
<tr>
<td>pH (Hydrogen ion activity—marine)</td>
<td>5.0-9.0</td>
</tr>
<tr>
<td>pH (Hydrogen ion activity—non marine)</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Phenols</td>
<td>0.001</td>
</tr>
<tr>
<td>Selenium (mg/l)</td>
<td>0.01</td>
</tr>
<tr>
<td>Selenium and its compounds (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Hexavalent Chromium VI compounds (mg/l)</td>
<td>0.5</td>
</tr>
<tr>
<td>Sulphide (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Simazine (mg/l)</td>
<td>0.03</td>
</tr>
<tr>
<td>Total Suspended Solids (mg/l)</td>
<td>30</td>
</tr>
<tr>
<td>Tetrachloroethylene (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Thiobencarb (mg/l)</td>
<td>0.1</td>
</tr>
<tr>
<td>Temperature (in degrees celious) based on ambient temperature</td>
<td>±3</td>
</tr>
<tr>
<td>Thiram (mg/l)</td>
<td>0.06</td>
</tr>
<tr>
<td>Total coliforms (counts /100 ml)</td>
<td>30</td>
</tr>
<tr>
<td>Total Cyanogen (mg/l)</td>
<td>Nd</td>
</tr>
<tr>
<td>Total Nickel (mg/l)</td>
<td>0.3</td>
</tr>
<tr>
<td>Total Dissolved solids (mg/l)</td>
<td>1200</td>
</tr>
<tr>
<td>Colour in Hazen Units (H.U)</td>
<td>15</td>
</tr>
<tr>
<td>Detergents (mg/l)</td>
<td>Nil</td>
</tr>
<tr>
<td>Total mercury (mg/l)</td>
<td>0.005</td>
</tr>
<tr>
<td>Trichloroethylene (mg/l)</td>
<td>0.3</td>
</tr>
<tr>
<td>Zinc (mg/l)</td>
<td>0.5</td>
</tr>
<tr>
<td>Whole effluent toxicity</td>
<td></td>
</tr>
<tr>
<td>Total Phosphorus (mg/l)</td>
<td>2 Guideline value</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>2 Guideline value</td>
</tr>
</tbody>
</table>

**Remarks**  
Standard values are daily/monthly average discharge values. Not detectable (nd) means that the pollution status is below the detectable level by the measurement methods established by the Authority.

**Measures**

- Pumps should be inspected and serviced regularly
- Pump valves should be well fitted
- Dispenser pipes and underground tanks should be of approved quality standard
- Regular monitoring to detect leakages from tanks and pipes
- Install an oil interceptor in the drainage system at the petrol stations and restaurants
- Recovery of waste oil for proper disposal by authorized agent
- Use oil absorbent material to clean oil spills especially at the service bay
- The surface should be paved and properly drained.
- Ensure that the underground tanks comply with Kenya standards (KS 200:2002)
5.7.7 Waste management
The anticipated wastes include food remains, vegetative matter, wrapping and packaging materials, waste water, office wastes, broken glasses, used oil, greases and scrap metal.

Measures
- Provision of garbage bins
- Establishment of a central refuse chamber
- Segregation of wastes at source
- Waste should be disposed at the designed municipal site
- Contract a licensed waste handler

5.7.8 Regulatory compliance
For the station to operate all regulatory requirements must be met. The developer shall ensure that the following are obtained:-
- Obtain an EIA license
- Approval of building plans by relevant authorities
- Apply for extension of land user to include petrol stations
- Obtain any other relevant permit or license as may be required
- Conduct environmental audits on annual basis

5.7.9 Security
The establishment of businesses at the proposed complex and the large number of people visiting the facility every day could make the facility ease target for robbers and terrorists. Conversely, security has become a major consideration due to the increase of criminal activities in the country. For the project to be profitable, it must be perceived as safe and secure by the potential visitors and business operators. All necessary measures should thus be formulated to ensure security. These measures include:-

Recommendations
• Security checks at the entrance
• Installation of surveillance cameras where necessary
• Controlled traffic flow
• Hiring of security guards
• Fencing off the perimeter of the project area
• Liaise with local security agents to provide security when necessary

5.8 Decommissioning

Project may be terminated by:

• Change of use—necessitating demolition
• Change of ownership on expiry of lease—demolition not necessary

The following should be observed during this phase:

Scenario 1 (demolition)

• Use of proper equipment and tools
• Supervision by competent engineers
• Provision of adequate PPE/C to all demolition workers
• Recovery of materials, equipment and appliances for re-use or recycle
• Proper handling and disposal of debris in accordance with environmental and other laws in force at the time of demolition
• Full compliance with Occupational Health and Safety Act of 2007 or any other law applicable at the time of demolition
• Rehabilitation of the site to original state or conversion to alternative use.

Scenario 2 (Change of ownership)

• Commitment by new owner to implement EMP and subsequent revisions

5.9 Public consultations

Views were obtained from the members of the public residing or carrying out businesses close to the site and the neighbours. No objections were raised against the
proposed development. It was viewed as likely to have positive socio-economic impacts. The benefits cited include:

- Employment creation
- Market for local goods and services
- Boost local economy

In addition, two newspaper advertisements shall be placed with the aim of soliciting views from the general public. Furthermore, advertisements shall also be placed in the Kenya Gazette as required under the law.
CHAPTER SIX:

6.0 ENVIRONMENT, HEALTH AND SAFETY (EHS)

6.1 EHS Management and Administration
The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools / equipments and the biotic environment. It is an essential tool in determining the EIA study. The objective of the EHS on the proposed project would be to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:

i) Avoidance of injuries

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

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

iv) Enhance environmental sustainability through developing sound conservation measures.

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

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

6.4 The Guiding Principles to be adopted by the contractor
The company should be guided by the following principle:
i) It should be a conscious organization committed to the promotion and maintenance of high standards of health and safety for its employees, the neighbor during population and the public at large.

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

iii) Management should demonstrate commitment and exercise constant vigilance in order to provide employees, neighbours of the project and the environment, with the greatest safeguards relating to EHS.

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

6.5 Safety Agenda for both the proponent and contractor

There should be a permanent EHS agenda during construction.

i) Contractors: - The EHS management plan code of practice should be applicable to the contractors working in the premises, and should be read and signed. It should be incorporated into the contract to perform work.

This should also remind the contractor of his/her;

- Legal requirements
- Statutory obligations
- Obligation to lay-down a system for reporting accidents
- Responsibility to ensure that his employees are supplied with personal protective equipment and where applicable as per the EHS management plan for the whole project.
- Responsibilities as it relates to contracting an EHS consultant in liaison with the proponent
- Obligation to ensure that he obtains detail of jobs and areas where permit-to-work must be issued.

ii) All workers’ responsibility: - Know the location of all safety equipment, and learn to use them efficiently
CHAPTER SEVEN:

7.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

The environmental management plan involves risk management strategies that should be undertaken by the project proponent and the project manager to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment back to its appropriate state. EMPs for projects thus provide logical frameworks within which the identified issues of environmental concern can be mitigated, monitored and evaluated.

Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality. The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the Environmental Impact Assessment of the project in mention, recommending necessary mitigation actions, defining roles, monitor able indicators and the estimated cost.

The EMPs outlined in tables hereafter address the potential negative impacts and mitigation measures as well as roles, costs and monitor able indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered construction, occupation and decommissioning phases.
### 7.1 EMP for All Phases

<table>
<thead>
<tr>
<th>Environmental Parameter</th>
<th>Proposed Mitigation Measures</th>
<th>Responsibility</th>
<th>Time Frame</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Site Drainage           | • Ensure that storm drainage system remains clear during construction clear  
                         | • Any excess soil from the construction site should be dumped at an approved site if it has to be disposed away from the site.  
                         | • The contractor should re-use the soil excavated from the site to minimize massive movement of soil into or out of the project site.  
                         | • Design clear drainage system to ensure that the site is properly drained even during the construction period. This will be critical given that the project will be implemented in phases. Poor drainage of the site could lead to creation of habitats for disease vectors such as mosquitoes and bilharzia. | Contractor      | Construction Period | 50,000         |
| Air Pollution           | • Sprinkle water on dusty surfaces.  
<pre><code>                     | • Place the concrete mixer in well ventilated area                                                                                                                                                                      | Contractor      | Construction | 100,000        |
</code></pre>
<table>
<thead>
<tr>
<th>Period</th>
<th>Soil Disturbance</th>
<th>Noise and Vibrations</th>
<th>Occupation Health and Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● Ensure the workers wear proper PPEs (including dust masks)</td>
<td>● Construction activities must be carried between 0800hrs and 1700hrs.</td>
<td>● Provision of PPE/C to worker during construction time. The PPE should include Overalls/Aprons, helmet, dust masks, wielding shield/goggles, ear muffs or plugs (where necessary), and appropriate</td>
</tr>
<tr>
<td></td>
<td>● Enclose construction sites to minimize off-site transmission of dust and emissions</td>
<td>● Use light vibrators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Ensure that all fuel-propelled construction machines are well maintained and serviced</td>
<td>● Regular servicing of machines and equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Formulate a site Health and safety plan to guide site operations with the aim of minimizing exposure to air-borne pollutants</td>
<td>● Lubrication of machines</td>
<td></td>
</tr>
<tr>
<td>Contractor</td>
<td>Site Preparation</td>
<td>Contractor</td>
<td>Contractor</td>
</tr>
<tr>
<td>Site Preparation</td>
<td></td>
<td>Construction Period</td>
<td>Construction Period</td>
</tr>
<tr>
<td>50,000</td>
<td></td>
<td>350,000</td>
<td></td>
</tr>
</tbody>
</table>
### Safety

- Provide first aid facilities emergency plan at the site
- Fencing off construction sites to minimize avoid risks to the general public
- Supervision of the project should be done throughout the project implementation period.
- Construct toilet for the workers at the site and provision of clean drinking water.
- Full compliance with the requirements of OSHA, 2007 or any other law prevailing at the time of project implementation.
- Provision of accommodation for clothing and welfare facilities.
- Formulation of health and safety plan.
- Training of workers on construction safety.
- Supervision of inexperienced workers.
- Proper maintenance of machines, equipment, etc.
- Use of approved scaffolds, chains, hoists and ladders in accordance with the law.

### Traffic Flow

- Delivery of materials should be done during off-peak hours.
- Ensure proper storage of materials to avoid

<table>
<thead>
<tr>
<th>Contract</th>
<th>During material delivery</th>
<th>30,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
obstruction of the road and public foot paths
- Proper site planning to allow for safe and convenient storage of materials and movement of persons and vehicles

| Waste Management | Waste should be disposed at the designated municipal site  
|                  | Contract a licenced waste collector.  
|                  | Contractor | Construction Period | 50,000 |

| Infrastructure   | Contact relevant authorities before connecting water/ electricity for advice before connection.  
|                  | Construction should not interfere with way leaves  
|                  | Explore use of modern technologies e.g use of solar and wind energy to reduce pressure on existing infrastructure  
|                  | Proper design of access roads in and out of the proposed complex  
|                  | Liaise with the Kenya Highway Authority to obtain necessary approvals for any works on the road reserve  
|                  | Provision of adequate water storage facilities to serve the facility  
|                  | Contractor | Construction Period | 250,000 |

| Local Drainage   | Construction of an elaborate drainage system  
|                  | Rainwater harvesting from roof catchment  
|                  | Contractor | Construction | 150,000 |
and hydrology

- All drainage channels should be lined with impervious surface to minimize soil erosion
- Covering of drainage channels with an appropriate cover e.g metal grills or concrete slabs to enhance safety.

### Operation Phase

<table>
<thead>
<tr>
<th>Fire Risks</th>
<th>Management</th>
<th>Operation Period</th>
<th>150,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Install fire extinguisher at the petrol station, hotels, warehouses,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>residential houses e.t.c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mark fire point and fire assembly areas clearly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Provide sand buckets at strategic locations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Formation of a disaster response team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fire drills should be conducted at least once a year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Warning and informational signs be displayed appropriately</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Conduct fire audit once a year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Formulate and bring to the notice of all workers and clients fire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>safety policy and rules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regular testing and servicing of fire-fighting equipment and appliances.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Full compliance with the Fire Risk reduction Rules, 2007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Congestion</td>
<td>Management</td>
<td>Operation Period</td>
<td>30,000</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
<td>------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Traffic Congestion</td>
<td>Management</td>
<td>Operation Period</td>
<td>30,000</td>
</tr>
<tr>
<td>Exit and entry points should be clearly marked.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deceleration and acceleration lanes of at least 30m or diversions to be provided</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe speed limits within the facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide ample parking space within the complex</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accidents</th>
<th>Management</th>
<th>Operation Period</th>
<th>250,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents</td>
<td>Management</td>
<td>Operation Period</td>
<td>250,000</td>
</tr>
<tr>
<td>Exit and entry points should be clearly marked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signboards should be placed about 100 metres on both sides.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bumps should be installed on both side of the road if necessary- Kenya Highway Authority should be consulted on this</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shall provide one car park for every 4m² floor space of shops/restaurant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display road safety signs within the complex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisions of first aid facilities to handle minor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers Welfare</td>
<td>Management</td>
<td>Operation Period</td>
<td>75,000</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>--------</td>
</tr>
<tr>
<td>• Shall take all necessary measures to ensure access to convenience facilities, clean drinking water supply, changing rooms (where necessary e.g hotels), fire safety e.t.c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tenancy agreement should include requirement that all tenants shall operate legitimate businesses, compliance with local authority by-laws, respect for labour laws and maintenance of all the workplaces in safe conditions for the workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Conduct periodic audits of all the business premises to monitor compliance with environment, health, safety and welfare standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Training of workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Insurance cover as required by law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Infrastructure</td>
<td>Management</td>
<td>Operation Period</td>
<td>Varying</td>
</tr>
<tr>
<td>• Necessary approvals should be obtained before connecting to sewer line,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Explore use of alternative energy and waste management technologies.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Oil Spills
- Pumps should be inspected and serviced regularly
- Pump valves should be well fitted
- Dispenser pipes and underground tanks should be of approved quality standard
- Regular monitoring to detect leakages from tanks and pipes
- Install an oil interceptor in the drainage system at the petrol stations and restaurants
- Recovery of waste oil for proper disposal by authorized agent
- Use oil absorbent material to clean oil spills especially at the service bay
- The surface should be paved and properly drained.
- Ensure that the underground tanks comply with Kenya standards (KS 200:2002)

### Waste Management
- Provision of garbage bins
- Establishment of a central refuse chamber
- Segregation of wastes at source

<table>
<thead>
<tr>
<th>Management</th>
<th>Operation Period</th>
<th>400,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>Management</td>
<td>150,000</td>
</tr>
<tr>
<td>Regulatory Compliance</td>
<td>Waste should be disposed at the designed municipal site</td>
<td>Contract a licensed waste handler</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td></td>
<td>Obtain an EIA license</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approval of building plans by relevant authorities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply for extension of land user to include petrol stations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obtain any other relevant permit or license as may be required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conduct environmental audits on annual basis</td>
<td></td>
</tr>
</tbody>
</table>

| Security              | Security checks at the entrance                         |                                  | Management | Operation Period | 500,000 |
|                       | Installation of surveillance cameras where necessary     |                                  |            |                    |         |
|                       | Controlled traffic flow                                  |                                  |            |                    |         |
|                       | Hiring of security guards                                |                                  |            |                    |         |
|                       | Fencing off the perimeter of the project area            |                                  |            |                    |         |
|                       | Liaise with local security agents to provide security when necessary |                                  |            |                    |         |

**Decommissioning Phase**

<table>
<thead>
<tr>
<th>Demolition</th>
<th>Use of proper equipment and tools</th>
<th>Supervision by competent engineers</th>
<th>Contractor</th>
<th>During</th>
<th>450,000</th>
</tr>
</thead>
</table>

Waste should be disposed at the designed municipal site
- Contract a licensed waste handler

Obtain an EIA license
- Approval of building plans by relevant authorities
- Apply for extension of land user to include petrol stations
- Obtain any other relevant permit or license as may be required
- Conduct environmental audits on annual basis

Security checks at the entrance
- Installation of surveillance cameras where necessary
- Controlled traffic flow
- Hiring of security guards
- Fencing off the perimeter of the project area
- Liaise with local security agents to provide security when necessary

Use of proper equipment and tools
- Supervision by competent engineers

Demolition
- Use of proper equipment and tools
- Supervision by competent engineers
<table>
<thead>
<tr>
<th>Change of Ownership</th>
<th></th>
<th></th>
<th>commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provision of adequate PPE/C to all demolition workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recovery of materials, equipment and appliances for re-use or recycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proper handling and disposal of debris in accordance with environmental and other laws in force at the time of demolition</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full compliance with Occupational Health and Safety Act of 2007 or any other law applicable at the time of demolition</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of the site to original state or conversion to alternative use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment by new owner to implement EMP and subsequent revisions</td>
<td>New Management</td>
<td>During commissioning</td>
<td>Nil</td>
</tr>
</tbody>
</table>
CONCLUSION

The proposed project design shall integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. The proposed project will be submitted for the necessary approval by among others, the Municipal Council of Naivasha, Public Health, Physical Planning Department and NEMA. During project implementation and occupation, Sustainable Environmental Management (SEM) will be ensured by avoiding inappropriate use of natural resources, conserving nature sensitively and guaranteeing a respectful and fair treatment of all people working on the project, general public at the vicinity and inhabitants of the project.

In relation to the proposed mitigation measures that will be incorporated during project implementation, the project is economically and environmentally sound. It is our opinion that the proposed development will have significant socio-economic benefits to the local community. In addition, it will open Naivasha for similar development thus creating job opportunities and boosting local and national environment. The project is in line with the government vision 2030.

It is thus our recommendation that the project be allowed to go ahead with the implementation provided 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 follow-up and implementation of the recommended Environmental Management and Monitoring Plans (EMPs).
Appendices

Appendix 1: Practicing license
Appendix 2: Lease agreement
Appendix 3: Land title
Appendix 4: TORs
Appendix 5: Bill of quantities
Appendix 6: Payment receipt
Appendix 7: Building plans