ENVIRONMENTAL IMPACT ASSESSMENT FOR PROPOSED FACTORY ON PLOT NO. NJORO/NGATA BLOCK 2/6072 (NGECHA), NAKURU COUNTY.

Location: Latitude 0°14’39.38”S, Longitude 35°55’32.43”E

PROPOSENT
NAKURU EDOIL LIMITED,
P.O BOX 16906-20100
NAKURU

SUBMITTED TO
THE DIRECTOR GENERAL
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
P.O BOX 67839 00200
NAIROBI

CONSULTANTS
PETER M. ITHAGU, LICENSE NO. 0644
AND
ANNE W. KAGIRI, LICENSE NO. 0990

February, 2019
CERTIFICATION

We, the undersigned certify that to the best of our knowledge and belief, this report is correct and true reflection of the anticipated environmental and socio-economic impacts of the proposed factory on Plot No. Njoro/Ngata Block 2/6072 (Ngecha), Rongai Sub-county, Nakuru County.

Environmental Experts

Name: Peter M. Ithagu, Msc (Lead Expert)

Registration No: 0644

Signature.............................................. Date.................................

Name: Ann W. Kagiri (Lead Expert)

Registration No: 0990

Signature.............................................. Date.................................

For and on behalf of Nakuru Edoil Limited

I, certify that I have read this report and that it is to the best of my knowledge and belief correct and true.

Name: .......................................................... Stamp

Designation: ..................................................

Signature ..................................................

Tel No.: .................................................... Date: .................................
# Table of contents

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

EXECUTIVE SUMMARY ..................................................................................................... vii

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

1.1 Proposed intervention.................................................................................................. 1

1.2 Environmental Impact Assessment (EIA) ................................................................. 1

1.3 Terms of Reference .................................................................................................... 1

1.4 Methodology .............................................................................................................. 2

2.0 LEGISLATIVE, REGULATORY AND POLICY FRAMEWORK .................................. 4

2.1 Introduction ................................................................................................................ 4

2.2 The Environmental Management and Coordination Act, 1999 ............................... 4

2.3 The Environmental Impact Assessment and Audit regulations, 2003 ....................... 4

2.4 Environmental Management and Co-ordination Act (waste management) regulations, 2006 ............................................................... 4

2.5 Environmental Management and Co-ordination Act (Noise and excessive vibration pollution control) Regulations, 2009 ................................................ 5

2.6 National Construction Authority Act, 2011 ............................................................. 6

2.7 National construction authority regulations, 2014 .................................................... 6

2.8 The Occupational Health and Safety Act, 2007 ....................................................... 6

2.9 The Factories First Aid Rules, 1977 .......................................................................... 9

2.10 The Factories Other Places of Work (Fire Risk Reduction) Rules, 2007 .................. 9

2.11 The Factories and Other Places of Work (Noise Prevention and Control Rules), 2005 ............................................................................................................ 9

2.12 The Constitution of Kenya, 2010 ............................................................................ 10

2.13 The Physical Planning Act, 1996 ............................................................................ 11

2.14 The Physical Planning Act (Building and Development Control) Rules, 1998 ....... 12

2.15 The Fertilizers and Animal Foodstuffs Act, 2007 ................................................... 13

3.0 BASELINE INFORMATION ......................................................................................... 14

3.1 Topography/drainage .................................................................................................. 14

3.2 Soils ........................................................................................................................... 14

3.3 Water resources ....................................................................................................... 14

3.4 Climatic condition .................................................................................................... 14
3.5 Biological information.................................................................................................. 14
3.6 Economy...................................................................................................................... 14
3.7 Demographics............................................................................................................. 15
3.8 Infrastructure and social amenities ............................................................................ 15
3.9 Environmental sensitivity .......................................................................................... 16
4.0 PROJECT DESCRIPTION .............................................................................................. 17
  4.1 Introduction ............................................................................................................... 17
  4.2 Project overview ....................................................................................................... 17
  4.3 Site location ............................................................................................................... 17
  4.4 Flora and Fauna ....................................................................................................... 17
  4.5 Facilities .................................................................................................................... 18
  4.6 Infrastructure............................................................................................................ 18
    4.6.1 Water .................................................................................................................. 18
    4.6.2 Electricity ............................................................................................................ 18
    4.6.3 Roads ................................................................................................................ 18
  4.7 Elevation and soils .................................................................................................... 18
5.0 PROJECT ALTERNATIVES .......................................................................................... 19
  5.1 Introduction ............................................................................................................... 19
  5.2 Comparison of alternatives ...................................................................................... 19
    5.2.1 Demand alternatives .......................................................................................... 19
    5.2.2 Input or supply alternatives .............................................................................. 19
    5.2.3 Alternative site/location .................................................................................. 20
    5.2.4 Alternatives process/technology ...................................................................... 20
    5.2.5 Alternative uses ................................................................................................ 20
    5.2.6 Alternative schedule ....................................................................................... 20
    5.2.7 Alternative designs ............................................................................................ 21
    5.2.8 No project alternatives ..................................................................................... 21
    5.2.9 Conclusion ......................................................................................................... 21
6.0 ANTICIPATED ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS ....................... 22
  6.1 Introduction ............................................................................................................... 22
  6.2 Construction phase ................................................................................................... 22
  6.3 Operation phase ........................................................................................................ 27
    6.3.1 Corn oil production ............................................................................................ 27
6.3.2 Soap manufacture ............................................................ 28
6.3.3 Animal feeds production ..................................................... 29
6.3.4 Waste generation ............................................................. 30
6.3.5 Occupational hazards ....................................................... 31
6.3.6 Risk of fire ................................................................. 32
6.3.7 Noise ........................................................................ 33
6.3.8 Air pollution ................................................................. 33
6.3.9 Electricity and Water ......................................................... 34
6.4 General compliance issues ....................................................... 34
6.5 Decommissioning phase ........................................................... 35
7.0 IMPACTS OF DRILLING A BOREHOLE AT THE SITE .............. 38
7.1 Introduction ....................................................................... 38
7.2 Drilling phase ..................................................................... 38
  7.2.1 Soil disturbance ............................................................. 38
  7.2.2 Ground movement ......................................................... 38
  7.2.3 Water quality ................................................................. 38
  7.2.4 Conservation of ground water resources ......................... 39
  7.2.5 Flora and Fauna ............................................................. 39
  7.2.6 Noise pollution .............................................................. 40
  7.2.7 Air pollution ................................................................. 40
  7.2.8 Risk of Accidents and Health and Safety Concerns ............. 41
  7.2.9 Soil and water pollution .................................................. 42
  7.2.10 Impact on groundwater .................................................. 42
  7.2.11 Potential water use conflict ............................................ 43
  7.2.12 Waste generation and management ............................... 43
7.3 Operation phase ................................................................ 44
  7.3.1 Impact on local economy and employment creation ............ 44
  7.3.2 Impact on Groundwater .................................................. 44
  7.3.3 Ease Burden on Public Water Supply ............................... 45
  7.3.4 Risk of Over-exploitation ................................................ 45
  7.3.5 Disease Ecology ............................................................. 45
7.4 Decommissioning Phase .......................................................... 45
8.0 POSITIVE IMPACTS OF THE PROJECT ................................. 46
9.0 PUBLIC PARTICIPATION .......................................................... 47
  9.1 Introduction ................................................................ ........ 47
  9.2 Results of public meeting ......................................................... 47
    Date and venue ........................................................................ 47
    Attendance .............................................................................. 47
    Scope ..................................................................................... 47
    Key views and deliberations ...................................................... 47
    Resolution ............................................................................... 47

7.0 THE ENVIRONMENTAL MANAGEMENT PLAN .................................... 50
  7.1 Introduction ........................................................................ 50
  7.2 Environmental Management Plan ............................................ 50

CONCLUSION ................................................................................ 58

APPENDICES ............................................................................... 59
EXECUTIVE SUMMARY

This report was prepared in accordance with the requirements of the Environmental Management and Coordination Act, 1999 (and its subsequent revisions) and the Environmental Impact Assessment/Audit regulations under the Act. The proposed project is a factory for manufacture of cooking corn oil. The by-products from the production process shall be used to manufacture soap and animal feed. The proposed factory will be located in Sobea area of Nakuru county, some 15km from Nakuru town on Plot No. Njoro/Ngata Block 2/6072 (Ngecha) measuring 0.81 Hectares. An Environmental Impact Assessment Project Report (reference No. NEMA/PR/5/2/20495) was prepared and submitted to NEMA as required by law. After the review of the project report, the developer was advised to conduct full EIA study. Terms of Reference for the study were prepared approved by NEMA before commencement of the study.

Chapter One: This presents the general information about the project and the legal basis of the exercise. In addition, the scope of the study and the methods used are detailed in this chapter. The study was carried out through field investigations, observations, literature review, collection of views from the public, review of designs and other project documents.

Chapter two is a review of relevant legislative and regulatory framework that could impact on the project lifecycle. Baseline information is documented in the third chapter of the report including, topography, soils, climatic conditions, settlement patterns, infrastructure and economic activities in the project area. Thus is aimed at helping to understand the project within its environmental, social and socio-economic context. The project details are discussed in chapter four of the report. Necessary documents such as land ownership document, legal status of the developer, proposed building plans are appended to the report for reference. The next chapter discusses the various alternatives available for the project implementation. Chapter six and seven is presentation of the anticipated impacts of the factory and the borehole. Where necessary mitigation measures have been proposed to ensure that the proposed project does not lead to significant degradation of the total environment. Its positive impacts are outlined in chapter 8 of the report while the results of public participation are discussed in chapter nine.

In order to address the impacts that could arise from the proposed development, an Environmental management plan has been developed for the project. This will form the basis for future monitoring of the impacts of the project. The anticipated impacts and respective mitigation measures are tabulated below.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Proposed mitigation measure(s)</th>
</tr>
</thead>
</table>
| Emissions           | • Emission reduction by enhancing combustion efficiency  
|                     | • Optimize boiler efficiency through engineering controls  
|                     | • Monitor quality of stack emissions  
|                     | • Obtain air Emission license from NEMA as required under *Air Quality Regulations, 2014*                                                                                                                                       |
| Solid Waste         | • Recycle and reuse where applicable;  
| Management and      | • Segregate for appropriate disposal;  
| Disposal            | • Process and Technological improvement to minimize waste generation;  
|                     | • Material substitution to minimize waste generation;  
|                     | • Waste disposal as provided for in the Environmental Management and Coordination (Waste Management) Regulations, 2006;  
|                     | • Provide appropriate waste handling receptacles;  
|                     | • Safe disposal of electronic waste.                                                                                                                                                                                          |
| Wastewater          | • Adaption of water conservation measures  
|                     | • Formulation of an elaborate Waste Water Management Plan  
|                     | • Segregation of wastewater streams;  
|                     | • Treatment of wastewater to meet national standards for sanitary wastewater discharge before release into the environment  
|                     | • Obtain and Effluent Discharge License from NEMA for discharge into the environment  
|                     | • Quarterly monitoring of wastewater quality as required under *Water Quality Regulations, 2006*                                                                                                                               |
| Storm Water         | • Storm water should be separated from process and sanitary wastewater streams;  
|                     | • Runoff should be minimized and the peak discharge rate be reduced (e.g. through landscaping, retention ponds e.t.c);  
|                     | • Oil water separators and grease traps should be installed and maintained as appropriate along the drainage channels  
|                     | • Drainage channels should be lined with impervious surface to minimize soil erosion                                                                                                                                              |
| Dust                | • Good housekeeping and maintenance;  
|                     | • Use of air-conditioned, closed cabins where necessary  
|                     | • Install dust extraction systems  
|                     | • Dust reduction through engineering and administrative measures  
|                     | • Air ventilation (suction);  
|                     | • Workers to use appropriate PPE;  
|                     | • Strict enforcement on PPE use;  
|                     | • Ventilation at workplace to be sufficient;  
|                     | • Indoor and outdoor air quality monitoring                                                                                                                                                                                  |
| Heat                | • Shielding surfaces;  
|                     | • Using personal protective equipment;                                                                                                                                                                                          |
Minimizing the work time required in high temperature environments by implementing shorter shifts;
Use of air- or oxygen supplied respirators.

<table>
<thead>
<tr>
<th>Noise and vibrations</th>
<th>Personal hearing protection should be provided as required by law</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developing and implementing an effective noise control and hearing conservation programme;</td>
</tr>
<tr>
<td></td>
<td>Carrying out periodic noise surveys;</td>
</tr>
<tr>
<td></td>
<td>Fitting noisy machines with noise reduction devices;</td>
</tr>
<tr>
<td></td>
<td>Providing suitable hearing protection to all workers exposed to noise levels above 85dB(A);</td>
</tr>
<tr>
<td></td>
<td>Posting notices and signs in noisy areas;</td>
</tr>
<tr>
<td></td>
<td>Carrying out audiometric test by a designated medical practitioner to all workers exposed to noise levels above 85dB(A);</td>
</tr>
<tr>
<td></td>
<td>Mountain vibrating machines on vibration absorbers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Hazards</th>
<th>Good housekeeping;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marking of slippery and uneven surfaces</td>
</tr>
<tr>
<td></td>
<td>Guarding of machine moving parts;</td>
</tr>
<tr>
<td></td>
<td>Provide and mark safe passages and exits;</td>
</tr>
<tr>
<td></td>
<td>Spills to be promptly cleaned.</td>
</tr>
<tr>
<td></td>
<td>Training of all workers on workplace safety</td>
</tr>
<tr>
<td></td>
<td>Regular inspection of the workplace to detect and remove occupational hazards and risks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupational Health and Safety</th>
<th>Conduct a workplace risk assessment</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Conduct Safety and Health Audits on annual Basis</td>
</tr>
<tr>
<td></td>
<td>Conduct Fire Safety Audit on annual Basis</td>
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<tr>
<td></td>
<td>Installation of fire detection and fire fighting system</td>
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<tr>
<td></td>
<td>Training of workers on occupational safety, health and welfare</td>
</tr>
<tr>
<td></td>
<td>Provision of appropriate Personal Protective Equipment and clothing to all workers depending of the nature of risk they are exposed to</td>
</tr>
<tr>
<td></td>
<td>Training and sensitization programme</td>
</tr>
<tr>
<td></td>
<td>Medical examination of exposed workers</td>
</tr>
<tr>
<td></td>
<td>Full compliance with requirements of OSHA, 2007 and its subsidiary legislations</td>
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<tr>
<td></td>
<td>Formulation of Environment, Health and Safety Policy</td>
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</tbody>
</table>

The report concludes that the project is environmentally feasible and socially viable on condition that the developer fully complies with the recommendations of the report and any other conditions that may be imposed on the project by NEMA and other agencies.
1.0 INTRODUCTION

1.1 Proposed intervention

The developer (Nakuru Edoil Limited) is a private company registered in Kenya under the Companies Act Cap 486. The company intends to set up a factory that will manufacture cooking oil (corn oil), bar soap and animal feeds. The factory will be situated on Plot No. Njoro/Ngata Block 2/6072 (Ngecha) in Sobea area along Nakuru-Eldoret highway, some 15Km from Nakuru town. The factory will be located on 0.81Hectares parcel of land. The location was chosen on the basis of availability of land and relatively low population density. In addition, the site is along the highway and is hence accessible. The project will involve:

- Construction of a perimeter wall round the project site
- Construction of factory buildings as per approved development plans
- Assembly of boiler and related facilities
- Drilling of a borehole
- Opening of access roads, paths and parking areas
- Installation of machines and equipment
- Installation of electricity, water, security and ICT infrastructure
- Landscaping

The land on which the factory will be built is registered in the name of the developer (Appendix- Title deed).

1.2 Environmental Impact Assessment (EIA)

EIA is a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects. This process is applied prior to major decisions and commitments being made. EIA is a planning tool providing an aid to decision-makers, policy makers, developers, industrialist and the public. It does not provide the answers - only a vehicle to get to the answers in a logical and orderly manner. The objective of the EIA Report is to present an evaluation of environmental and social impacts of the proposed factory on Njoro/Ngata Block 2/6072 (Ngecha) with relevant background information to assist the developer to take an informed view on environmental and social sensitivity of the project and the level of required mitigation measures to meet environmental and social norms of the area. The report also details the environmental monitoring plan that should be put in operation during construction and operation phases of the project to minimize any anticipated adverse impacts on the project on environment, health and safety. In Kenya, it is mandatory for any project that may have adverse impacts on the total environment to be subjected to an EIA before implementation.

1.3 Terms of Reference

The terms of reference of the study were prepared and submitted to the National Environment Management Authority (NEMA) before the commencement of the
study. The TORs were approved on 30th January, 2019. This Environmental Impact and Social Impact Assessment (ESIA) study report covers the following areas;

- To provide a description of the proposed project activities with a potential focus on potential adverse impacts in the design, construction, operation and abandonment (decommissioning) phases caused by the inputs, waste generated and disposal and social economic aspects.
- To review and document relevant legislative, regulatory and policy framework likely to have an impact on the project.
- Description of the baseline and context of the proposed development including physical (water, air, soil and noise), biotic environment (vegetation, flora and fauna), chemical, socioeconomic (socio and economic structure, demographic, and socioeconomic background), cultural (aspects of cultural, archaeological, or anthropological interest) and landscape
- Precise description of the project design, activities and processes and their impacts on environmental and socio-economic conditions.
- Waste generation and management throughout the project lifecycle
- Occupational safety, health and welfare issues.
- To develop an Environmental and Social Impact Management Plan (ESMP)
- To provide a monitoring program of relevant environmental and socio-economic parameters
- Obtain views from interested and affected parties as part of the ESIA process
- Compilation of a comprehensive EIA report for submission to NEMA.

1.4 Methodology
In carrying out of the Impact Assessment, the following methodology aspects were applied:
- **Public views:** this involved holding individual interviews with the project proponent and other stakeholders using a pre-prepared questionnaire and Impact Assessment checklists and recording the feedback. During the ESIA process, a public meeting was held on 4th February, 2019 at the project site to obtain the views of the community on the project. In addition, the project will be subjected to wide public participation through advertisement in at least one Newspaper with National coverage, official Kenya Gazette and through radio advertisements. It is hoped that through these various consultation avenues, the local community and the public in general will have an opportunity to air their concerns and input into the proposed development.

- **Literature review:** this involved the review of all literature and data relevant to the project. The literature included legislation, data kept by the proponent, lead agencies, and government agencies.

- **Site observation:** this involves a transect walk across the farm and the area to get acquainted with the natural environment and also to cross check issues, arising from the semi-structured interviews above.
2.0 LEGISLATIVE, REGULATORY AND POLICY FRAMEWORK

2.1 Introduction
Legislations are defined as directives put in place by the government or a governing body to ensure compliance. That is persons are required to comply in order to remain within the legal boundaries. Regulations ensure that legislations are put into effect by allocating responsibility through putting up legal restrictions (David Levi Faur). Both are formulated to ensure compliance while also ensuring responsibility.

Such legislations exist to provide guidelines and standards to ensure compliance while also ensuring protection of the environment. Relevant regulations and legislations in regards to the proposed project have been discussed below.

2.2 The Environmental Management and Coordination Act, 1999
This is an Act of parliament to provide for the establishment of the appropriate legal and institutional framework for the management of the environment and for matters connected therewith.
Section 58- a proponent of a proposed project shall undertake an environmental impact assessment study and prepare a report and submit it to the relevant authority. The reports shall be prepared by authorized individual experts or a firm of experts in accordance with the environmental impact assessment regulations, guidelines and procedures issued under the Act.
Section 74- every owner or operator of a trade or industrial undertaking shall discharge any effluents or other pollutants originating from the trade or industrial undertaking only into existing sewerage systems. Subsection 2 requires the owner of a trade or an industrial undertaking to install an appropriate plant for the treatment of such effluents before they are discharged into the environment.

2.3 The Environmental Impact Assessment and Audit regulations, 2003
Regulation 4 - no proponent shall implement a project likely to have a negative environmental impact unless an environmental impact assessment has been conducted and approved in accordance with these regulations.
Regulation 11- an environmental impact assessment study shall be conducted in accordance with the terms of reference developed during the scoping exercise by the proponent and approved by the authority.
Regulation 13 subparagraph 2- every environmental impact assessment study be conducted by a lead expert qualified in accordance with the criteria for listing of experts specified in the fourth schedule of these regulations.

2.4 Environmental Management and Co-ordination Act (waste management) regulations, 2006
Regulation 4 sub regulation 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. Sub regulation 2 requires a waste generator to collect, segregate and dispose such waste in a manner provided by these regulations.

Regulation 4- every trade or industrial undertaking shall install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking. The equipment shall be determined by the best practicable means, environmentally sound practice or other guidelines as the authority may determine.

Regulation 8- any person granted a license to transport waste shall ensure that the collection and transportation of such waste is conducted in such a manner that will not cause scattering of the waste, the vehicles and equipment for the transportation of waste are in such a state that shall cause scattering of or flowing out of waste or emission of noxious smells from such waste and the vehicles for transportation and other means of conveyance of waste follow the scheduled routes approved by the authority from the point of collection to the disposal site or plant.

Regulation 15- no industry shall discharge or dispose of any waste in any state into the environment, unless the waste has been treated in a treatment facility in a manner prescribed by the authority in consultation with the relevant lead agency.

2.5 Environmental Management and Co-ordination Act (Noise and excessive vibration pollution control) Regulations, 2009

Regulation 3(1)-no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Regulation 5 prohibits people from making noise in excess of the permissible noise levels. Regulation 11- any person wishing to engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations.

Regulation 13- no person shall operate construction equipment or perform any outside construction or repair work so as to emit noise in excess of the permissible noise levels during the night time hours

Regulation 15- any person intending to carry out construction, demolition, mining or quarrying work shall during the environmental impact assessment studies;

- Identify natural resources, land uses or activities which may be affected by the noise or excessive vibrations from the construction, mining, demolition or quarrying
• Determine measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts
• Incorporate the needed abatement measures in the plans and specifications.

2.6 National Construction Authority Act, 2011
This is an act of parliament to provide for the establishment, powers and functions of the national construction authority and for the connected purposes. Section 14 of the act requires a person carrying out the business of a contractor to register under the act by the board. Regulation 17(1) of the National Construction Authority Regulations, 2014 states that “all construction works, contracts or projects either in the public or private sector shall be registered with the Authority in accordance with the Act”. Before construction of the construction works, the developer shall ensure that the project has been registered with the NCA in accordance with these regulations. In addition, all contractors of the project must be duly licensed by the Authority in accordance with the respective regulations.

2.7 National construction authority regulations, 2014
Regulation 14 requires every person who qualifies for registration to be issued with a certificate of registration by the authority.
Regulation 7 requires that a person or firm shall submit an annual application for renewal of the certificate in the prescribed form accompanied by the prescribed fee.
Regulation 17 requires all construction works, contracts or projects either in the public or private sector to be registered with the authority in accordance with the national construction authority act. The application shall be made before commencement of the construction works.
Regulation 18 requires owners to ensure they submit information to the authority identifying the person to act as a contact person to liaise with the authority on the construction works.
Regulation 26- every owner shall notify and submit to the authority in a prescribed form the details of any contract or project with which it was awarded to a contractor whose sum exceeds five million shillings for the purpose of payment of the construction levy provided under section 31 of the act.

2.8 The Occupational Health and Safety Act, 2007
The Act makes provision for the health, safety and welfare of persons employed. The provision requires that all practicable measures be taken to protect persons employed from any injury. The provisions of the Act are also relevant to the management of hazardous and non- hazardous wastes, which may arise at the project site during construction and operation.
Section 6- every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace including provision and maintenance of plant and systems and procedures of work that are safe and without risks to health and the provision and maintenance of a working environment that is safe, without risks to health and adequate regards to facilities and arrangements for the employees welfare at work.

Section 9- every occupier shall establish a safety and health committee at the workplace in accordance with regulations where the number of employees exceeds 20.

Section 21- an employer or self-employed person shall notify the area occupational safety and health officer of any accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace.

Section 44- before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set out in the Fourth Schedule.

Section 48- an occupier shall ensure that his workplace shall not while work is being carried on; be so overcrowded as to cause risk of injury to the health of the persons employed.

Section 52- sufficient and suitable sanitary conveniences for the persons employed in the workplace shall be provided, maintained and kept clean. Effective provision shall be made for lighting the conveniences.

Section 55- all plant machinery and equipment whether fixed or mobile for use shall only be used for work which that are designated for and be operated by a competent person.

Section 59- every employer shall:

- Be responsible for the safe condition of tools and equipment which may be used by the employees.
- Ensure that no equipment or portable power tools shall be used in an environment likely to contain flammable substances.

Subsection 2 further requires that all power driven portable and hand held tools shall have their operating controls so located so as to minimize the possibility of their accidental operation if such an accidental operation would constitute a hazard to the worker or other persons.

Section 63- every hoist or lift shall be of good mechanical construction, sound material and adequate strength, free from patent defect and be properly maintained.

Section 64- all ropes and chains used for raising or lowering persons or goods in the workplace shall not be used unless it is of good construction, sound material and adequate strength and free from patent defect.

Section 65- all parts and working gear whether fixed or movable, including the anchoring and fixing appliances, of every lifting machine shall be of good construction, sound material, adequate strength and free from patent defect, and shall be properly maintained.
Section 68- every steam receiver and all its fittings shall be of good construction, sound material, adequate strength and free from patent defect and shall be properly maintained.

Section 75- every ladder issued in a workplace shall be of good construction and sound material adequate strength and suitable for the purposes it is used for.

Section 75, subsection 2-No ladder shall be used unless;
- it is securely fixed in a position to prevent from slipping or falling except when this is impracticable, a person shall be stationed at the base of the ladder to prevent it from slipping or falling.
- it stands firm on footing unless in the case of a suspended ladder
- it is secured where necessary to prevent swaying or sagging
- it is equally supported on each side
- there is sufficient space to provide adequate foothold

Section 76- all machinery, equipment, personal protective equipment appliances and hand tools used in all workplaces shall comply with prescribed health and safety standards and be appropriately installed maintained and safeguarded.

Section 89- employers shall ensure that all practicable measures are undertaken to safeguard employees against inhalation of dust, fumes or other impurities likely to be injurious or offensive to persons employed. Subsection 3- In every workplace where the level of sound energy or vibration emitted can result in hearing impairment or be harmful to health or otherwise dangerous, all practicable measures shall be taken by the employer to ensure the elimination or control of such sound energy for purposes of protecting any person who may be exposed.

Section 91- every employer shall ensure adequate supply of wholesome drinking water to employees, section 93 requires that employers to provide and maintain for use by persons employed adequate and suitable accommodation for clothing(changing rooms) not worn during the work hours. Section 95-Every occupier shall be provide and maintain so as to be readily accessible, a first-aid box or cupboard of the prescribed standard.

Section 97-employers shall not allow a person below the apparent age of eighteen years to be employed at any workplace or work process, or perform work, which by its nature or the circumstances, in which it is carried out, is likely to harm the person’s safety or health.

Section 101- employers shall provide and maintain for use by employees in any workplace where employees are employed in any process involving exposure to wet or any injurious or offensive substance, adequate, effective and suitable protective clothing and appliances such as suitable gloves, footwear, and goggles and head coverings.

Section 125- no building shall be erected or converted for use as a workplace and no structural alteration and no extension shall be made to any existing workplace except in accordance with plans showing details of the proposed construction, conversion, alteration or extension, approved by the Director.
2.9 The Factories First Aid Rules, 1977
Regulation 2 - every employer shall ensure that they avail a first aid box in the work premises. Regulation 3 - all materials and dressings contained in first aid boxes or cupboards shall be those designated in and of a grade or quality not lower than the standards specified by the British Pharmaceutical Codex or any supplement thereof.
Regulation 4 - every first aid box or cupboard shall be plainly and clearly marked on the outside. Regulation 7 - no person shall be placed in charge of a first aid box or cupboard unless he or she has received adequate training in the application of first-aid to the injured persons and holds a certificate of competence that shall be renewed annually issued by either of the following bodies;
- The St. John Ambulance of the St. John Council of Kenya
- The Kenya Red Cross Society
- Such other body or society as may be approved from time to time under the law

2.10 The Factories Other Places of Work (Fire Risk Reduction) Rules, 2007
Regulation 10 - every occupier shall continuously monitor the work place with a view to making an assessment of any possible fire risks and mitigate against them.
Regulation 14 - every occupier shall ensure that finished products, byproducts and any waste products are removed immediately they are produced so as to avoid accumulation of products or waste products.
Regulation 15 - every occupier shall ensure that a distance of at least one metre between any two machines or from any machine and a fixed structure is provided, so as to ensure easy movement and access of persons.
Regulation 16 - every occupier shall ensure that all electrical machines, equipment and hand tools in a workplace are properly earthed or double insulated.
Regulation 24 - every occupier shall identify a location in the workplace where every worker shall assemble in the event of a fire.

2.11 The Factories and Other Places of Work (Noise Prevention and Control Rules), 2005
Regulation 4 - no worker shall be exposed to a noise level in excess of the continuous equivalent of ninety dB (A) in eight hours within any twenty four hours duration and one hundred and forty dB (A) peak sound level at any given time. Sub regulation 3 states that where noise is intermittent, noise exposure shall not exceed the sum of the partial noise exposure equivalent continuous sound level of ninety dB (A) in eight hour duration within any twenty four hours duration.
Sub regulation 4 - it shall be the duty of the occupier to ensure that noise that gets transmitted outside the workplace shall not exceed fifty five dB (A) during the day and forty five dB (A) during the night.
Regulation 5- where noise in a workplace exceeds the continuous equivalent of eighty five dB (A) the occupier must develop and implement an effective noise control and hearing conservation programme in writing. The program shall address:

- Noise measurements
- Education and training
- Engineering noise control
- Hearing protection
- Posting of notices in noisy areas
- Hearing tests
- Annual programme review

Regulation 10- machinery or plant in the workplace shall be installed in such a way that the lowest possible noise is emitted when the machine is in operation. Sub regulation 2- it shall be the duty of the occupier to carry out regular inspection and maintenance of machines and installations to ensure that noise emission is prevented or controlled. Sub regulation 3 states that where noise levels exceed ninety dB (A), the process or machinery shall be segregated or be enclosed by suitable structures capable of suppressing noise.

Regulation 12- where noise cannot be controlled by engineering measures and exceeds ninety dB (A) the employer shall;

- Provide and maintain suitable hearing protection to the affected workers
- Ensure that the hearing protection is always worn correctly

Regulation 14- all workers shall wear hearing protection in all places designated as noise hazard areas, and in accordance with instructions provided by the employer.

Regulation 15- it shall be the duty of the occupier to ensure that the machines installed in the workplace are appropriately designed or have built-in noise reduction devices which ensure the lowest possible emission and in any case not exceeding ninety dB (A).

Regulation 16- the occupier shall provide medical examinations and hearing tests for workers exposed to noise above eighty five dB (A) limit as follows

- An initial test upon employment;
- Annual tests thereafter or at such an interval as may be required by the director.

2.12 The Constitution of Kenya, 2010

The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government. Kenyans passed a new constitution in a referendum held on 4 August 2010, and the State promulgated it on the 27th September 2010 into Law. The Constitution of Kenya, 2010 provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.
In relation to the environment, article 42 of chapter four, The Bill Of Rights confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70. Chapter 5 of the document provides the main pillars on which the 77 environmental statutes are hinged. Part 1 of the chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. The second part of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state’s obligation with respect to the environment. The state shall-

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; Encourage public participation in the management, protection and conservation of the environment;
- Protect genetic resources and biological diversity; Establish systems of environmental impact assessment, environmental audit and Monitoring of the environment; Eliminate processes and activities that are likely to endanger the environment; and
- Utilize the environment and natural resources for the benefit of the people of Kenya

2.13 The Physical Planning Act, 1996
This is an Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes. Section 29- empowers the local authorities to;

- Prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area.
- Control or prohibit the subdivision of land or existing plots into smaller areas.
- Consider and approve all development applications and grant all development permissions.
- Ensure the proper execution and implementation of approved physical development plans.
• Formulate by-laws to regulate zoning in respect of use and density of development.
• Reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical development plan.

Section 30- no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local authority.

Section 31- any person requiring development permission shall make an application in the form prescribed in the fourth Schedule to the clerk of the local authority responsible for the area in which the land concerned is situated. The application shall be accompanied by plans and particulars necessary to indicate the purposes of the development showing the proposed use and density and the land which the applicant intends to surrender develop.

Section 36- if in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report.

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

Regulation 3- any person intending to erect a new building or re-erect a 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.

Regulation 17- no building shall be erected on any site which has been made up or filled up by offensive or insanitary materials on which has been used for the deposit of the refuse or carcasses of dead animals or other filthy or offensive matter until such site has dealt with to the satisfaction of the medical officer of health, chief materials engineer, environment officer and the director.

Regulation 32- Any person who proposes to erect a building or to carry out any development to which these rules relate shall lodge with the local authority an application for approval together with the plans.
2.15 The Fertilizers and Animal Foodstuffs Act, 2007

This is an Act of parliament to regulate the importation, manufacture and sale of agricultural fertilizers and animal foodstuffs and to provide for matters incidental and connected with the foregoing.

Section 3- No person shall import, manufacture, compound mix or sell any fertilizer or animal foodstuff other than a substance declared by rule made under section 19 of the Act to be an approved fertilizer or an approved animal foodstuff.

Subsection 2- No person shall manufacture, import, compound mix or sell any fertilizer or animal foodstuffs unless the fertilizer or foodstuff conforms to the standard or specifications prescribed by such rules.

Section 4- No person shall manufacture or sell any fertilizer or animal foodstuff containing bone or any other substance derived from an animal carcass unless such bone or substance has been sterilized in the prescribed manner.
3.0 BASELINE INFORMATION

3.1 Topography/drainage
The area is characterized by relatively flat landscape. The topography of the proposed project site is gently sloping from east to west. The Sobea area is generally flat and is mainly used for cultivation and settlements. The soil in the area is sandy loams which are well drained. The site falls from east to west at an average slope of about 1%. The site is along Nakuru-Eldoret Highway. There exists a storm drainage channel along the highway. The area is within Lake Baringo watershed.

3.2 Soils
In general, the area is characterized by sandy loam soil. The soils are suitable for crop production. Both topography and soil types favour agricultural production and this explains why crop production (predominantly maize and wheat) is the main economic activity in the area. The proposed site has been under cultivation for many years.

3.3 Water resources
Water resources refer to various sources of water accessible in the site and its vicinity. The various water resources in the area are:

- Tap water provided by NARUWASCO;
- Underground water;
- Water from Molo River; and
- Rain water during rainy season.
- Water vendors.

The developer will connect to the public water supply though, a borehole may be sunk if necessary. The proposed project will require reliable supply of water during operation phase.

3.4 Climatic condition
The area receives between 750-1000mm of rainfall per year. The rainfall pattern depicts bimodal distribution pattern. The annual temperatures ranges between 15-17°C.

3.5 Biological information
The species of plants found within the area include both natural and cultivated plants. The plants in the area are acacia and grass. The species of fauna found within the area include both natural and domesticated animals. The domesticated animals in the area are the indigenous and exotic breeds of cattle, sheep, and goats.

3.6 Economy
Nakuru is a diversified County in terms of climate, people and livelihoods. Agriculture is the main sector providing food, income, employment creation and
raw materials for industries pursuing processing. The sector provides about 48% of the household income and employs over 60% of the employed population. The main economic activity around the project site is agriculture. There are also some commercial activities, Sobea shopping centre is about 1.5Km from the site. The area has also seen establishment of several factories due to availability of land and the low population density. As a result of increasing population in Nakuru town, the Sobea, Ngata and Salgaa areas have seen influx of people settling in these areas. Large farmlands have been sub-divided into smaller portions.

3.7 Demographics
The local community is made up of people from different tribes across Kenya. The majority are native to the land while the rest are in-migrants from different counties. The sex ratio is said to be 1:1. The types of settlement in the area include permanent and temporary housing which are clustered while others are scattered.

The proposed project will be situated in Rongai sub-county of Nakuru county covers a total area of 1049.1Km\(^2\). The sub-county has five wards: Menengai West, Soin, Visoi, Mosop and Solai. The sub-county has a population of 147,017 distributed as tabulated below.

<table>
<thead>
<tr>
<th>Ward</th>
<th>Area (Km(^2))</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menengai West</td>
<td>118.7</td>
<td>31,499</td>
</tr>
<tr>
<td>Soin</td>
<td>292.5</td>
<td>28,209</td>
</tr>
<tr>
<td>Visoi</td>
<td>204.9</td>
<td>35,438</td>
</tr>
<tr>
<td>Mosop</td>
<td>197.2</td>
<td>30,556</td>
</tr>
<tr>
<td>Solai</td>
<td>235.8</td>
<td>21,315</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1049.1</strong></td>
<td><strong>147,017</strong></td>
</tr>
</tbody>
</table>

The project is within Mosop ward in Ngata sub-location. According to 2009 National Population Census, the sub-location which had a population of 3,544 in 964 households and has a population density of 189 persons per square kilometre.

3.8 Infrastructure and social amenities
The community infrastructure consists of the basic facilities such as transport, communications, power supplies, and buildings, which enable it to function. The area is well served with Nairobi-Eldoret highway, and a network of feeder roads.

There is also widespread use of mobile phones where at least a person own one in a household thus making easier communication. In addition, there exist other means which are common such as email, and postal office as well as currier services provided by companies e.g. Wells Fargo, and G4S among others. There is also network of National Grid Line in the area supplying electricity to the area but the project site has no electricity connection. The nearest transformer is about 1.5Km from the site. The housing facilities are also available.
3.9 Environmental sensitivity
The project site is situated in an area with moderate population density. It was noted that there are about 30 households within a radius of 500m from the project site. There is no river, school, hospital or sensitive habitats within 500m from the site. In addition, there are no threatened or endangered plant species at the site. Although the factory will be located in an area with moderate population density, the operations of the factory may lead to a number of impacts on the environment e.g. air pollution, noise, odour, water pollution e.t.c. These impacts may be localized around the factory.
4.0 PROJECT DESCRIPTION

4.1 Introduction
Information regarding the Project was gathered through discussions with the developer and neighbours. The site was also visited for investigation of the physical environmental status and that of the immediate surroundings. Physical investigation additionally took into consideration among other issues the hydrology and surface geology, drainage system, water availability and sanitation status in the area as well as typical socio-economic activities around the proposed project site.

4.2 Project overview
The proponent intends to construct a factory on Plot. No. Njoro/Ngata Block 2/6072 (Ngecha). The factory will comprise of offices, production and processing rooms, boilers, sanitary conveniences, tanks, and a parking area. The main activities that will be conducted in the factory will include; manufacture of cooking oil, animal feeds and soap. The factory will occupy approximately 2 acres of land situated along Nakuru-Eldoret highway.

4.3 Site location
The proposed project will be located Sobea/Ngecha trading centre in Ngata sub location Rongai location. The site is about 15Km from Nakuru and 1.5Km from Sobea shopping centre. The site is on Latitude 0°14’39.38”S and Longitude 35°55’32.43”E and an altitude of 2047m above sea level.

4.4 Flora and Fauna
The area around and on the site was cultivated thus no natural vegetation was present. The major types of crops cultivated include; wheat, maize and beans. Maize was the crop that was present at the time of visit. It was noted that maize was ready for harvesting. Apart from cultivated crops, there were weeds and grasses that had grown on the land that had already been harvested. They include; Conyzabonariesis (Hairy fleabane), Bidenspilosa (Black jack), Pennisetum clandestinum (Kikuyu grass), Tithonia diversifolia (Wild sunflower), Cyperusrotundus (Nut grass), Tradescantia pallid (Wandering Jew), Galinsoga parviflora (gallant soldier), Acyranthes aspera (devils horsewhip), Lantana camara (wild sage), Datura stramonium (Jimsonweed), Solanum nigrum (Black nightshade), Amaranthus hybridus (smooth pigweed), Rhynchelytrum repens (Natal grass), Digitaria scalarum (Couch grass), Setaria sphacelata (bristlegrass), Cynodon dactylon (Bermuda grass). Tree species in the neighborhood included; Grevillea robusta (Silver oak), Eucalyptus Globulus (blue gum), Persea Americana (avocado tree), and Jacaranda mimosifolia (Jacaranda tree). Of all plant species present, none have been classified as threatened or endangered species. There were also no notable animal and bird habitats on site. No trees will be felled during the implementation of the project as the site is devoid of trees.
4.5 Facilities
The facilities that intend to be incorporated in the factory include; offices, processing rooms, boilers, parking area, sanitary conveniences, tanks (water tanks, condensation tank, blow down tank) and a chimney. There will also be a borehole at the site. The full details of the proposed factory are contained in the development plans appended to this report. The boilers will be prefabricated in China before being shipped into the country and being assembled at the site. Most of the machines will also be imported and will be installed by the contracted supplier.

4.6 Infrastructure
The site has access to basic infrastructure.

4.6.1 Water
Persons around the site obtain water from NARUWASCO (Nakuru Rural Water and Sanitation Company) that is supplied three times weekly. Alternate sources of water include harvesting rain water and boreholes. A borehole will be sunk to supplement water from the Nakuru Rural Water and Sanitation Company (NARUWASCO).

4.6.2 Electricity
At the time of visit, it was noted that residents near the proposed project site did not have an electricity connection. The likely reason was that the area is sparsely populated with low population density. Sobea trading centre which is about 1.5Km from the site is served with electricity from KPLC. The developer intends to apply to be connected to the mains electricity.

4.6.3 Roads
Access to roads is excellent since the proposed factory site is situated along Nakuru-Eldoret highway. There is also a 6 metre wide murram road that is used as an access road to the site.

4.7 Elevation and soils
The soils in the area are planosolic soils mainly derived from weathering of basement rock systems. They have highly developed textured top soils with dark brown subsoil's. These soils make the area ideal for growth of wheat, maize and beans. The site slopes at about 1%.
5.0 PROJECT ALTERNATIVES

5.1 Introduction
Project alternative refers to different ways in which the proposed project can be implemented to achieve the intended goals and objectives. Comparison of alternatives is necessitated by the key issues during scoping process and need to minimize the adverse impacts of the proposed project while maximizing the benefits. The comparison of alternatives will thus determine the best method of achieving project objectives while minimizing environmental impacts or, more creatively, indicate the most environmentally friendly or best practicable environmental option.

The type and range of alternatives that were considered include:
- Demand alternatives
- Input or supply alternatives
- Activity alternatives
- Location alternatives
- Process alternatives
- Scheduling alternatives
- The “No project” alternative

This chapter is therefore about the finding of different alternatives available to the proposal that was compared in determining the socially accepted, economically viable, and environmentally sound alternatives.

5.2 Comparison of alternatives
5.2.1 Demand alternatives
Demand alternatives refer to, different ways that can be used to reduce the demand of the commodity/commodities that the proposed project seek(s) to meet. The demand for the intended products (cooking oil, soap and animal feeds) has continued to grow with the increasing population and economic development. There is an increasing demand for healthier foods (including healthier cooking oil-vegetable based), animal feed and soap. It is not possible to minimize or reduce demand for the intended goods. In this context for the proponent ought to be allowed to implement the project in order to meet the growing demand as stated above.

5.2.2 Input or supply alternatives
This option explores the possibilities of using different input in place of inputs described in the proposal in part or all aspects of the project in question. The project input or supply includes human or machine labor, water, and electricity, petroleum products among others. The available input or supply alternatives to the project include:
- Use of machine in place of human labor, which may drag the construction period; and
- Use of renewable energy to run the factory operations

5.2.3 Alternative site/location
The alternative site refers to site relocation option. This option explores the possibility of the proponent to look for another land to implement the project where minimal adverse effects are likely to be experienced. However the option may not be viable due to the following reasons:
- There is scarcity and high cost of acquiring land in the area;
- The proposed project site will continue to remain under-utilized as in “No Project Alternative option”; and
- The developer must ensure that the project conforms to the County Government of Nakuru physical planning regulations. The developer is already applied for approval of change of land user from agricultural to industrial. The area around Sobea and Salgaa has seen development of several industrial establishments.

The developer has already incurred the cost of buying the project land. Unless there are compelling reasons why the factory should not be set up at the said land, the project should be implemented.

5.2.4 Alternatives process/technology
The developer intends to use the available technologies in the production of the intended goods.

5.2.5 Alternative uses
Alternative use, in this case, refers to the use of project site for other purposes other than the proposed purpose. Other than the proposed use, the land can be used for farming, which may not generate the anticipated level of income and employment.

5.2.6 Alternative schedule
This option entails carrying out the project at a later time thereby offsetting the possible impacts at the current time. The only benefit is the hope that in future there may be improvements in baseline conditions and implementation technologies. However these conditions are not guaranteed and may only amount to delays in the project implementation. Therefore carrying out the proposed project with the proposed mitigations would be the most preferred option due to future uncertainties. In addition carrying out the proposed project at later time may lead to more operational and logistic costs due to increasing inflation and standards of living.
5.2.7 Alternative designs
This option entails undertaking the project objectives using different project designs. The available designs to the project are limited and the proposed design is the most preferred due to factors such as cost, ease of operation, and reducing adverse impacts.

5.2.8 No project alternatives
The “No Project” alternative is a situation where the available alternatives to the proposed project are not suitable to the proposed site leading to the proposed project not being implemented. In this case, both the positive and negative impacts of construction and operation of the project would not occur. This option will however, involve several losses both to the developer and the country as a whole. The developer will continue to pay rent on the land while the property will remain unutilized. The major impact of not proceeding would be the loss of expected benefits.

5.2.9 Conclusion
It is my opinion that the project should be implemented subject to compliance with all the County and National laws and regulations. If implemented, the project will spur development in the area as well as creating the much needed employment opportunities. Adequate mitigation measures should be implemented to eliminate or minimize any negative impacts that may arise from implementation of the project.
## 6.0 ANTICIPATED ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

### 6.1 Introduction
Project activities through the project cycle (construction phase, operational phase and the decommissioning phase) result to various impacts that are either positive or negative. Positive impacts will arise from development and existence of the project activities however, most of the anticipated negative environmental and human health impacts from the project are controllable therefore relevant mitigation measures have been outlined for each phase.

### 6.2 Construction phase
This is the first phase in the project cycle. Some of the works done during construction will include; purchase of materials by the proponent for use in construction, digging and excavation of soil, installation of drainage works, connection to electricity and sewer lines and waste transport and disposal upon completion of the construction activities. Activities, impacts and mitigation measures in the construction phase have been tabulated below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Impacts</th>
<th>Mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing</td>
<td>This involves putting a barrier around the perimeter of the property to prevent unauthorized access. The developer intends to erect a masonry wall around the whole circumference of the project site. The construction of the fence will have direct and indirect impacts on the environment and the neighbouring community.</td>
<td>• Injuries to employees from sharp objects such as nails.</td>
<td>• Emphasize on maintenance of personal safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clearance of vegetation</td>
<td>• Restrict activities to only the required areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid waste</td>
<td>• Designate an area for temporarily holding waste materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Corrosion of hands by cement</td>
<td>• Provide appropriate Personal Protective Clothing/Equipment to all workers. These should include hand gloves, reflector jackets, helmets, dust masks, ear protection, safety boots, overalls e.t.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Injuries from falling objects for example debris or stones.</td>
<td>• Ensure that development does not encroach into road reserve and other wayleaves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Exposure to dust, noise and vibrations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Exposure to emissions from concrete mixers, generators and other machineries.</td>
<td></td>
</tr>
<tr>
<td>Borehole drilling</td>
<td>The developer intends to sink a borehole at the site to provide water for the project. A</td>
<td>• Impacts of sinking of a borehole at the site have been discussed in</td>
<td>• Discussed in borehole section of the report.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Discussion of impacts of sinking a borehole at the site have been discussed in</td>
<td></td>
</tr>
</tbody>
</table>

Prepared by: Ecolink Services ♦ Email: ecolinkse@gmail.com ♦ Tel: 0721-543294 ♦ Page 22
A hydrogeological survey has already been carried out (appended to the report).

### Excavation of trenches

This is a type of excavation or depression on the ground made in initial construction stage. It involves digging. It is made so as to help in laying the initial foundation of the building being constructed. This will be done manually by hand. The depth of foundation trenches will depend on the sub-surface profile of the soil.

- Fall hazards
- Inhalation of dust particles
- Solid waste
- Clearing of vegetation
- Distortion of the soil profile
- Exposure to dust
- Provide dust masks for use by employees and enforce rules on use of PPE’s
- Restrict excavation to only the required areas
- Avoid unnecessary clearing of vegetation

### Concrete slabs

A concrete slab is made by mixing cement, sand, aggregates and water in prescribed ratios. Mixing should be thorough by ensuring the cement is fully saturated in water. The mixture is then poured on the surface that the slab is being built on. The thickness of the slab varies from 4-6 inches depending on the type of building. The mixture is held together by the formwork that is the determinant of the shape it will take upon drying. A strip foundation will be poured in the foundation trenches to form a base for the erection of walls.

- Hand injuries from corrosion by cement
- Inhalation of particulate matter
- Fall hazards
- Exposure to noise and noise
- Emissions from concrete mixers
- Injuries from sharp objects
- Provide appropriate PPEs for use by construction workers,
- Enforce rules on use of PPE’s
- Install scaffolds and ensure that they are in good condition
- Formulation of safety rules to be adhered to by all workers and contractors.

### Steel fixing

Steel bars are used to reinforce concrete in construction. Steel fixing requires cutting, bending, binding of steel rods and bars. Reinforcements are required in construction of beams, columns, strip foundations e.t.c.

- Injuries from sharps (steel bars)
- Exposure to noise (from cutting and grinding).
- Generation of wastes.
- Provision of PPEs
- Safe handling and disposal of wastes. Scrap metal may be sold out to recyclers.

### Walls

In construction of the walls an appropriate mortar mix is first made, a layer of the mix is then applied to mark the base of the wall, the blocks are then aligned on top, and another

- Fall hazards
- Injuries from falling objects
- Corrosion of hands by cement
- Exposure to noise
- Install scaffolds and ensure that they are in good condition
- Provide helmets for use by employees
- Install nets to trap debris
<table>
<thead>
<tr>
<th>Layer is applied in the blocks. The excess mortar is removed using a trowel. The procedure is repeated until the walls reach the desired height.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of straining when lifting heavy objects such as stones</td>
</tr>
<tr>
<td>Formulate clear work plans</td>
</tr>
<tr>
<td>Provide earmuffs</td>
</tr>
<tr>
<td>Use alternate methods of lifting heavy objects to heights for example use of pulleys, chains and hoists.</td>
</tr>
<tr>
<td>Ensure that all hoists, chains, pulleys e.t.c are serviced and inspected as per the OSHA, 2007.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beams and columns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beams are made from reinforcement using wires. In this case the beams will be nailed on top of the walls after the needed height is achieved. After wires have been used to bind the beams, concrete is poured. Columns are constructed like beams the difference being that they are placed vertically instead of horizontally.</td>
</tr>
<tr>
<td>Injuries from metals</td>
</tr>
<tr>
<td>Solid waste</td>
</tr>
<tr>
<td>Corrosion of hands by cement</td>
</tr>
<tr>
<td>Emphasize on importance of observing personal safety</td>
</tr>
<tr>
<td>Sell recyclable materials to recyclers</td>
</tr>
<tr>
<td>Designate a temporary waste disposal site for holding waste before collection</td>
</tr>
<tr>
<td>Provide durable work gloves and enforce rules on use of PPE's</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roofing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing will be done by use of steel trusses, purlins e.t.c. Galvanized iron roofing sheets will be used.</td>
</tr>
<tr>
<td>Fall hazards</td>
</tr>
<tr>
<td>Cuts from roofing materials</td>
</tr>
<tr>
<td>Exposure to noise and vibrations</td>
</tr>
<tr>
<td>Risk of falling from height</td>
</tr>
<tr>
<td>Exposure to welding radiations and fumes</td>
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<tr>
<td>Install scaffolds and ensure the scaffolds are in good condition</td>
</tr>
<tr>
<td>Emphasize on personal safety.</td>
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<tr>
<td>Provide PPEs</td>
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<tr>
<td>Provide safety belts and harnesses to workers working at height</td>
</tr>
<tr>
<td>Formulation of safety rules.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plaster and flooring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement plasters are done where cement is mixed with water and gypsum powder. It is then applied to the walls to give it an attractive outlook. For floors a concrete mixture is poured and evenly distributed on the floor. A smooth cement mixture is then applied to complete the floor, red oxide can then be applied or other floor furnishings such</td>
</tr>
<tr>
<td>Corrosion of hands by cement</td>
</tr>
<tr>
<td>Fall hazards</td>
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<tr>
<td>Inhalation of cement dust</td>
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<tr>
<td>Provide durable work gloves and enforce rules on PPE's</td>
</tr>
<tr>
<td>Use ladders where applicable</td>
</tr>
<tr>
<td>Provide dust masks to employees</td>
</tr>
<tr>
<td>Enforce rules on use of PPE's</td>
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</tbody>
</table>
**Installation of windows, grills, doors and glass fitting**

Windows and doors are first fitted and glass fitted using glass bonding adhesives. Fitting also can include cutting and welding.

- Risk of eye injuries when welding
- Cuts from glass shards
- Risk of electric shocks
- Exposure to noise

<table>
<thead>
<tr>
<th>Risk</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Risk of eye injuries when welding</td>
<td>- Provide eye protection gear (welding glasses) for use by employees</td>
</tr>
<tr>
<td>- Cuts from glass shards</td>
<td>- Emphasize on observation of personal safety</td>
</tr>
<tr>
<td>- Risk of electric shocks</td>
<td>- Ensure electrical tools are insulated to avoid electrocution</td>
</tr>
<tr>
<td>- Exposure to noise</td>
<td>- Provide all appropriate PPEs to all workers.</td>
</tr>
</tbody>
</table>

**Plumbing and wiring**

Involves running pipes and electrical wires through walls. Outlets are also installed by an electrician for example light switches.

- Solid waste
- Risk of electrocution
- Injuries such as bruises and cuts.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Solid waste</td>
<td>- Sell recyclable materials to recyclers</td>
</tr>
<tr>
<td>- Risk of electrocution</td>
<td>- Ensure employees use PPEs appropriately</td>
</tr>
<tr>
<td>- Injuries such as bruises and cuts.</td>
<td>- Emphasize on importance of personal safety</td>
</tr>
</tbody>
</table>

**Painting**

Involves applying paint to the building after completion of major construction works to enhance its outlook. Paints can be applied using rollers or a paint brush. They can be water based or organic solvent based. Water based paints are more eco-friendly as compared to the organic based paints.

- Inhalation of fumes from paints
- Fall hazards
- Exposure to volatile organic compounds (VOCs).

<table>
<thead>
<tr>
<th>Risk</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Inhalation of fumes from paints</td>
<td>- Ensure employees use respirators</td>
</tr>
<tr>
<td>- Fall hazards</td>
<td>- Install scaffolds and use ladders where necessary</td>
</tr>
<tr>
<td>- Exposure to volatile organic compounds (VOCs).</td>
<td>- Use water based paints</td>
</tr>
</tbody>
</table>

**Installation of machinery**

Involves assembling of machinery that will be used in the factory. After assembling all machinery are installed in their designated areas. Besides installation of production machines as per design. The developer shall also install boilers as specified in the designs.

- Risk of injuries for example cuts and bruises when handling machines.
- Risk of strains when lifting machines
- Fall hazards in instances where machines will be placed in elevated positions.
- Risk of entanglement of clothes

<table>
<thead>
<tr>
<th>Risk</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Risk of injuries for example cuts and bruises when handling machines.</td>
<td>- Provision of appropriate PPEs.</td>
</tr>
<tr>
<td>- Risk of strains when lifting machines</td>
<td>- Use alternate methods for lifting heavy machines</td>
</tr>
<tr>
<td>- Fall hazards in instances where machines will be placed in elevated positions.</td>
<td>- Ensure means of access e.g. platforms have been properly installed</td>
</tr>
<tr>
<td>- Risk of entanglement of clothes</td>
<td>- Ensure persons testing the machines are not wearing loose clothing</td>
</tr>
<tr>
<td></td>
<td>- Ensure employees are instructed on machinery safety</td>
</tr>
</tbody>
</table>
| Installation of tanks | This involves installation of tanks in designated areas. Where the tanks are to be placed on top of buildings, the tanks are hoisted by use of hoisting materials such as ropes, chains or other lifting mechanisms available. | - Fall hazards  
- Risk of injuries |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cleaning of the site after completion of construction activities | This involves removing all waste from the construction site. After waste removal flowers trees and other desirable vegetation can be planted around the site to enhance the outlook of the area. | - Solid waste  
- Inhalation of dust  
- Liquid waste  
- Risk of injuries from sharp objects when cleaning  
- Mobilization of particulates |
| | when testing the machines  
- Risk of injuries from moving parts of machinery when testing | - Use ladders where necessary and ensure persons are aware on importance of maintaining personal safety  
- Ensure hoisting materials are in good condition |
| | | - Contract a licensed waste handler to transport solid waste from the site  
- Sell recyclable materials to recyclers  
- Ensure employees use dust masks provided  
- Reuse waste water for example sprinkling to minimize dust  
- Ensure employees have footwear to prevent injuries to feet  
- Ensure employees make appropriate use of PPE's provided |
6.3 Operation phase
This is the phase that follows after all construction activities have been finalized. The activities in this phase include; production of oil, manufacture of soap and animal feeds. These activities will result to various impacts on health, safety and the environment. Mechanisms should be put in place to ensure occurrence of such impacts is avoided and where avoidance is not possible, reduce the impacts to manageable levels.

6.3.1 Corn oil production
Corn oil is obtained from the germ of maize. It is valuable oil mainly used in cooking. Other industrial uses of corn oil include; making of soap, salve, margarine e.t.c. By-products from the corn production process include animal feeds and corn syrup. The process involves four major steps that is; preparation of kernels, oil pressing, solvent extraction and refining of oil. The processes are as discussed below;

a) Preparation of kernels- corn kernels are dehulled (process of removing the husks from corn using a machine known as a huller to prepare them for oil extraction) and are then crushed with a roller. The resultant cake is then wet milled, steeped in water and then acidified with sulphur dioxide to separate different seed components. The developer intends to obtain corn germ from the market.

b) Oil pressing- this is the second step where oil is expelled from the germ using a heated screw press which yields to around 50 percent of the germ oil. The remaining oil is stripped from the press cake with a solvent (hexane).

c) Solvent extraction- the corn oil in the solvent solution is heated in order to vaporize the volatile solvent which is then collected and condensed for reuse in step 2. The heat is then expelled and extracted oils are combined as crude corn oil, the remaining cake is processed for animal feeds.

d) Refining of oil- this is the final step. The crude corn oil is first filtered and then degummed. Clay that has been activated with acid wash to remove metals present in the clay is then used to bleach the corn oil.

The flow chart below summarizes the production process of corn oil.
6.3.2 Soap manufacture

Soap is manufactured through a process called saponification. Saponification is a chemical soap manufacturing process that produces soap from fatty acid derivatives. It involves hydrolysis of esters under basic conditions to form carboxylates and an alcohol. The saponifiable substances produced from the process are converted into soap. The process produces a byproduct called glycerol. The process is discussed below.

a) **Step 1**: triglyceride fats hydrolyze into free fatty acids and then combine with an alkali (lye) to form crude soap (glycerin).

b) **Step 2**: soap production is done through continuous processes. They include the cold process (process takes place at room temperature), hot process (reaction takes place near boiling point) and the fully boiled process (reactants are boiled at least once and glycerol is recovered) the fully boiled process is the most widely used method of production in industrial scales.

c) **Step 3**: Purification and finishing is done in this step whereby the soap is further purified to remove any excess sodium hydroxide, glycerol and other impurities. This is done by boiling the crude soap curds in water and then precipitating the soap with salt. Excess water is removed to produce soap flakes which are then compacted into small pellets or noodles that are ready for soap finishing.
d) **Step 4** - The soap pellets are combined with fragrances and other materials and blended to homogeneity in a mixer. The mass is then discharged into a refiner where the soap is passed through a roller mill. It is then passed through additional refiners to further plasticize the soap mass. It is then passed through a vacuum chamber to remove any trapped air and then extruded into long logs that are cut to convenient lengths which are then stamped into shape. The pressed bars are then packaged for sale.

The flowchart below shows the industrial soap manufacturing process:

![Flowchart](image)

**6.3.3 Animal feeds production**

This is the process of producing animal feeds from raw agricultural products that are formulated to meet nutritional requirements for animals at different life stages. The by-products from the corn-oil production will be used as a raw material for manufacture of animal feeds. Animal feed production will involve mixing of various ingredients (corn oil by-product, broom meal, fishmeal, e.t.c) to required standards depending on the intended outcome. The animal feeds...
manufactured must meet the stipulated standards and be certified by the Kenya Bureau of Standards (KEBS).

Feed manufacturing process usually starts with grinding of selected raw materials to produce convenient particle sizes. The second step is pelleting where specific compositions are proportionately homogenized. The most common method for pelleting is extrusion. Steps involved are discussed below;

a) **Raw material selection**- this involves selection of ingredients that are to be used in processing of the feeds. The materials are selected based on their characteristics. Some of the ingredients include starch, proteins, fat, fiber and vitamins.

b) **Preparation of raw materials**- raw materials are prepared. This can be done through grinding of larger particles so as to achieve uniformity. They are then passed through a screen that traps larger particles. Pre-conditioners are used to mix elements. They consist of rotating shafts with radial attached puddles.

c) **Mixing** of the ingredients, weighing and packaging.

The flowchart below summarizes the process of animal feed production.

The impacts and mitigation measures in the operation phase are discussed below.

**6.3.4 Waste generation**

The types of waste generated include solid and liquid waste. Waste generated will be majorly comprised of by products from the different production activities in the factory. Some examples of waste from the industry will include:

- Waste water from cleaning activities
• Waste oils
• By products from corn oil production
• Plastic waste from packaging materials
• Electronic waste
• Broken machine parts
• Sanitary waste
• Emissions from boilers
• Odour especially from soap manufacture

There is need to manage the above waste products thus the management will be required to put in place mechanisms to ensure that waste from the factory are minimized to acceptable levels.

Mitigation measures
• Waste products such as glycerin can be as raw materials for other production processes for example manufacture of lotions.
• Sell usable waste to other manufacturers.
• Install an oil water interceptor to trap oils that may be present in waste water.
• Contract a licensed waste transporter to transport waste from the factory.
• Sell plastic and metal waste to recyclers.
• Provide bins for temporarily holding waste before collection by licensed transporters.
• Install mechanisms for treatment of waste water before discharge.
• The factory must ensure that the boilers are fitted with scrubbers to clean the emissions before release
• Regular sampling of stack emissions to monitor as per the air quality regulations
• Must obtain an Effluent Discharge License from NEMA for any effluent released into the environment
• Construction of an effluent treatment plant since the site has no sewerage connection.
• Maintain waste tracking documents
• Formulation of environmental policy
• Maintain high standards of housekeeping

6.3.5 Occupational hazards
Occupational hazards are defined as long term or short term risks associated with the workplace environment. Occupational hazards include;
• Physical hazards- hazards that can cause harm to a person without necessarily being in contact they include; noise and vibration, radiation, electric shocks, heat and cold stress etc.
- **Chemical hazards** - these are hazards occurring as a result of exposure to chemicals in the workplace. They include; acids and bases, petroleum products, heavy metals, paint, cleaning products among others.

- **Psychological hazards** - these are hazards that affect the psychological well-being of persons thus affecting their ability to participate fully in the workplace. They include; workplace bullying, stress etc.

- **Biological hazards** - these are living organisms or substances that pose a threat to the health of persons in the workplace. They include; toxins, viruses, bacteria etc.

Hazards in the workplace pose significant risks to employees thus there is need to minimize them as much as possible. This will help in creating optimal working environments for employees.

**Mitigation measures**

- Formulate workplace policies for example a first aid policy and an Occupational Safety and Health policy.
- Restrict access of unauthorized personnel to machine operation areas.
- Provide machinery safety manuals and enforce rules on machinery safety.
- Provide PPE’s for use by employees and enforce rules on their use. For example gloves, aprons etc.
- Ensure employees working with moving machines do not wear loose clothing at any given time to prevent entanglement.
- Ensure employees have insurance covers.
- Formation of a safety and health committee at the workplace
- Conduct regular EHS inspections at the workplace
- Conduct annual Safety and Health Audits
- Conduct annual Fire safety audits
- Training of workers on safety and health
- Installation of fire detection and fire-fighting appliances
- Construct access platforms for use by persons working at heights.
- Train employees on various types of occupational hazards and how to mitigate them.
- Full compliance with the provisions and requirements of the Occupational Safety and Health Act, 2007 and other relevant regulations.

**6.3.6 Risk of fire**

Fires in industries lead to major losses in monetary terms including loss of lives. These mostly occur due to lack of awareness on fire risks in the workplace. The major causes of fires in industries include; hot work processes, combustible dust, flammable liquids and gases, machinery and electrical faults. The activities in the factory will pose significant risks of fire incidences. They include; use of sawdust in boilers, use of electrical equipment, production of oil and presence of by products
from oil. Since these activities are unavoidable, mitigation measures need to be put in place to ensure fire safety. The mitigation measures are outlined below.

**Mitigation measures**

- Purchase fire extinguishers and ensure the extinguishers are regularly serviced by approved persons
- Provide a fire hydrant system for dire fighting
- Installation of smoke detectors
- Installation of circuit breakers
- Ensure employees are trained on basic fire safety and ensure formation of a fire fighting team.
- Put up warning signs prohibiting smoking in premises where flammable liquids and other flammable substances are stored.
- Ensure all electric equipment is properly insulated and regularly check for any electrical faults in the factory.
- Prohibit access by unauthorized persons to areas with flammable substances.
- Put up fire exit signs and ensure all exits are unobstructed at all times.
- Inspection of boilers as required by law.
- Provide adequate water storage for fire fighting
- Formulate an elaborate fire action plan for the factory.

6.3.7 **Noise**

The major processes that are sources of noise in industries include; product assembly, power generation, product fabrication and processing of products. Noise from industries majorly affects employees since they are the nearest to noise sources. There is therefore need for employers to ensure mitigation measures have been put in place in order to ensure that noise levels are within the acceptable levels. Noise from the factory arising from processing activities, operation of machinery, running pumps and release of pressure from boilers needs to be mitigated.

**Mitigation measures**

- Provide earmuffs to employees working in noisy areas.
- Ensure rooms with noisy machines are soundproofed or use machinery with inbuilt sound proofing mechanisms.
- Conduct annual noise surveys.
- Take all necessary measures to minimize off-site noise impacts

6.3.8 **Air pollution**

Air pollution is defined as introduction of harmful substances into the atmosphere from natural processes or human activities. Some common air pollutants include
烟、化学烟雾、颗粒物和生物分子。工厂的空气污染将来自气味、备用发电机和锅炉的烟雾。

**Mitigation measures for the above have been outlined below.**

**Mitigation measures**
- Use blowers for the boilers to ensure complete combustion in order to minimize smoke.
- Ensure regular servicing of the generator to minimize emissions to the atmosphere.
- Install pollution control mechanisms such as installation of scrubbers.
- Monitoring of the quality of stack emissions
- Obtain license from NEMA for stack emissions
- Full compliance with air quality regulations

**6.3.9 Electricity and Water**
Factory activities will require water and electricity in large amounts. There is therefore need for the management to ensure water and energy conservation measures have been put in place to avoid over utilization.

**Mitigation measures**
- Reuse water where applicable.
- Harvest rain water for use in activities such as cleaning, cooling and for use in the washrooms.
- Employ energy conservation measures e.g. utilization of natural lighting and only using artificial lighting where necessary.
- Conduct annual energy audits to track power consumption.
- Explore use of renewable energy e.g solar at the factory.
- Formulation of Energy Management Plan for the factory

**6.4 General compliance issues**
The developer must ensure full compliance with the laid down laws, policies and regulations. The following must be complied with for smooth operations of the factory (the list is not comprehensive and may change from time to time as may be influenced by changes in laws, policies and regulations applicable to the industry):-
- The factory must obtain EIA license from NEMA
- Conduct annual environmental audits for factory operations
- Obtain an Effluent Discharge License from NEMA as required under *Water Quality Regulations, 2006*
- Contract a Licensed waste handler for off-site disposal of wastes as required under the *Waste Management Regulations, 2006*
- Obtain Air Quality license from NEMA
- Obtain water permit for abstraction of water from the proposed borehole
- Registration of the factory under OSHA, 2007
- Regular inspection of boilers, hoists, forklifts, electrical installations, air receivers, refrigeration systems e.t.c as required by law
- Conduct Health and Safety Audits on annual basis as required under OSHA, 2007
- Conduct Fire safety audits on annual basis as required under OSHA, 2007 and Fire Risk Reduction Rules, 2007
- Formulation of safety and health policy for the factory
- Formulation of Environmental Policy for the factory
- Formation and training of fire marshals
- Formation of Health and Safety committee as required by law.
- Maintain a general register as stipulated under OSHA, 2007
- Training of staff in First aid skills, Hygiene and sanitation, hazard control, handling of heavy loads, ergonomics, machine operator, health and safety, fire safety, e.t.c
- Obtain Kenya Bureau of Standards (KEBS) clearance before exposing products for sale
- Device a quality monitoring and control programme
- Obtain all operational permits and licenses e.g Business permit, Food Hygiene License, e.t.c.
- Workers should undergo regular medical examinations
- Insurance cover for factory workers
- Registration of the workers with the National Social Security Fund (NSSF)
- Registration of the workers with the National Hospital Insurance Fund (NHIF)

6.5 Decommissioning phase
This phase follows the operational phase as the project nears its end when the project is no longer viable or needed. During this stage better alternatives are evaluated. Such alternatives can include; leasing the property, selling the property or changing the use of the property. When all available alternatives have been evaluated and none is applicable, demolition can be done as a last resort. Alternatives that can be explored are explained below.

a) Changing the use of the property- the owner may decide to change the use of the property in the event that the factory operations are is no longer viable. For example changing the factory to an oil refinery.

b) Leasing to interested parties- alternatively, the owner can lease the property to interested parties.

c) Demolition- this is the last alternative if all other options fail. This will entail pulling down all structures in the factory. This is a process that will require funding. It will also result to impacts on the environment and to human health. The impacts have been discussed below.
Impacts of demolition

- **Solid waste**- solid waste will be generated from the demolition activities in large quantities. The waste will include; concrete, metals, wood, sawdust among other materials that were used during construction and also during the operation phase.

- **Vibration and noise**- noise from demolition will be as a result of tearing all structures that had been put up. Demolition activities are estimated to exceed the maximum noise levels of 75 decibels. Persons around the demolition area will be the most affected.

- **Machinery and electronics**- machines and other electronic devices used in the factory maybe lost in the process of demolition. There is a need to ensure that they have been taken care of before demolition starts.

- **Inhalation of dust and other particulates**- large amounts of dust will be generated from the demolition activities. Other particulates will also be mobilized for example chaff and cement dust. There will therefore be a need to take safety measures.

- **Risks of injuries**- demolition activities pose significant safety concerns to persons working or present at the site. Such safety concerns include; risk of cuts, bruises and injuries from debris, risk of accidents from the stones (stones might fall on persons at the site), risk if electrocution from naked wires among other safety concerns.

Mitigation measures

- **Formation so safety and health committee**- the proponent should ensure that safety and health committees have been established to offer advice on the adequacy of measures put in place for risky activities. The committee will also ensure proper and effective communication channels between the employees and supervisors have been put up.

- **Personal safety sensitization**- the supervisors should ensure that all employees have been sensitized on upholding their safety and that of their colleagues. This will reduce instances of work hazards that may occur from negligence. The supervisors should also ensure that work plans have been formulated to ensure every employee is at their designated work areas.

- **PPE's**- the supervisors should ensure all employees have PPE's during work to minimize injuries. The PPE's that should be availed at all times include gloves, helmets, eye protection gear, earmuffs and safety boots. The proponent should also ensure that demolition activities are carried out during the day.

- **Recycling of waste**- scrap metal, glass and other metal parts of machinery can be sold to recyclers to minimize the load of solid waste that will require disposing.
• **Reuse**- reusable materials from the site such as stones, wood, iron sheets, pipes and wires that had been used in wiring can be collected and used in other areas.

• **Sale of machines and other electronic equipment**- machines used in the factory can be sold to willing buyers. Computers and other electronic equipment can also be sold.

• **Waste transport and disposal**- waste materials that are unusable need to be discarded. This will require the proponent to contract a licensed waste handler to transport the waste from the site to designated disposal areas.

When the proponent wishes to decommission the project, he will be required to contract a licensed person to formulate a decommissioning plan and submit it to the National Environment Management Authority for review and approval before any works of decommissioning can be commenced.
7.0 IMPACTS OF DRILLING A BOREHOLE AT THE SITE

7.1 Introduction
The developer intends to drill a borehole at the site. A hydargeological survey has been conducted by a license Hydrogeologist (Mr. David Kiplang’at Mutai, Licence No. WD/WRP/214). According to the report, the site has fair potential for groundwater. The borehole will be on latitude 00.24488 S and longitude 035.92525 E at an altitude of 2052m above sea level. The borehole is estimated to be 235m deep.

7.2 Drilling phase
This section analyzes the potential impacts of the proposed drilling of a borehole on L.R No. Njoro/Ngata Block 2/6072 (Ngecha), Nakuru County in the context of the project cycle and recommends feasible mitigation measures. The potential impacts associated with this project can be negative, positive, direct or indirect. The impacts can be measured on how significant, minor, negligible, temporary or permanent, long-term or short term, specific (localized) or widespread, reversible or irreversible. The impacts are discussed in depth below;

7.2.1 Soil disturbance
Drilling the borehole will involve removal of soil from the ground. Assuming a diameter of 6 inches and maximum depth of 200m (most of the boreholes in the area are sunk to this depth), the volume of soil and rocks removed will be about 3.65m$^3$. The sinking of the borehole per se will therefore have no significant negative impact on the stability of the ground as only a small core will be removed.

7.2.2 Ground movement
Although sinking of the borehole is unlikely to cause any ground instability, normal movement and re-alignment of underground rocks may have impact on the borehole. If plastic pipes are used, these can easily be bent or broken by underground rock movements rendering the borehole unusable. On the other hand metal pipes may have impact on the water quality through oxidation and corrosion processes. These factors should be taken into account in the design stage.

7.2.3 Water quality
The quality of ground water is hard to predict prior to sinking of boreholes. In the project area, the main concern may be high levels of fluoride in groundwater. This can easily be ameliorated if the water is to be used for drinking or production. It is however recommended that full water quality analyses be conducted prior to commissioning of the borehole as required by law. This will help to devise pre-treatment processes as well as determining the piping to be used in the distribution system. The water quality must be treated appropriately to meet the national and World Health Organization (WHO) standards.
Recommended measures

- Conduct full water analyses to ascertain water quality before water use.
- Take all necessary steps to ensure that water from the borehole meets national standards for drinking water before use for human consumption.

7.2.4 Conservation of ground water resources

The project area has low to moderate potential for ground water resources. With increasing destruction of the environment water scarcity is likely to worsen in future. Conservation of water resources will imply that the developer should put in place adequate measure that will not only minimize the amount of water abstracted from the borehole but also to harvest rain water to supplement the borehole as a source of water for the proposed development on L.R. Njoro/Ngata Block 2/6072 (Ngecha), Nakuru County. The following recommendations are hereby proposed:-

- Participation of the developer in water resources conservation activities in the catchment, including tree planting
- Rain water harvesting be incorporated in the design of the facility
- Proper maintenance of water distribution system to prevent water losses through leakages.
- Full compliance with the conditions of the Water Permit to be issued by the Water Resources Management Authority (WRMA)
- Recycling and re-use of water where possible
- Covering of water reservoir tanks to minimize water loss through evaporation.
- Installation of airline peziometer to monitor groundwater level.
- Installation of water master meter at the borehole to monitor abstraction
- Formulation of a comprehensive water management and conservation plan for the factory.

7.2.5 Flora and Fauna

The process of drilling a borehole occupies a small space for the machinery equipment and materials; specifically the drilling rig and support truck. It is anticipated that the impact of drilling on soil, flora and fauna will be limited a small area around the borehole site. The duration of drilling may be influenced by the type of machine uses, nature of underlying rocks among other factors. Drilling may take a week or a month depending on the aforementioned factors. The site for the proposed borehole is inhabited by grass mainly Cynodon sp and Pennisetum sp. These are very common in the area and are also colonizing are bound to re-establish within less than three months if climate conditions are favourable. No resident birds are small mammals of economic importance were cited in the area during the site visits. The project land has been under cultivation for many years.
and hence the natural vegetation and habitats have already been cleared. The project (borehole) will therefore not adversely affect plants and animal population in the site. The developer must ensure that the drilling machines and equipment do not contaminate the land e.g through leakages.

7.2.6 Noise pollution
Noise is unwanted/undesirable sound that can affect job performance, safety and health. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea and interference with communications when the exposure is severe. Potential sources of noise impacts during the drilling phase include drilling operations, vehicular transportation and equipment operations. The drilling operations are undertaken continuously producing noise in the process. However all drilling equipment and power generators are modern and fitted with noise reduction mechanisms. The transportation of large equipment such as drilling rigs may cause temporary noise (and occasional vibration) but this is of a limited duration. There is also crew noise (yelling, shouting, and talking) produced at the sites also. There is a school near the drilling site and hence the noise from the drilling process may be disrupt learning. Measures for prevention of off-site noise impacts must therefore be implemented.

Mitigation measures
- Erect sound barrier around the site to minimize noise nuisance at the nearby school.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Provide all workers exposed to extreme noise with ear muffs
- Drilling work should be done during the day when the outside environment is noisy and the people residing around or close to the construction site are away.
- Adhere to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 regarding noise limits at the workplace.
- Drilling should only be carried out during the day to minimize noise disturbance at night.

7.2.7 Air pollution
Drilling will be accomplished by use of diesel powered air compressor. Emissions from the engine could be a health hazard especially to workers. In addition dust blown from drilling rig is also anticipated. The impact of air pollutants will be localized at the drilling site. Besides emissions and dust, the noise from the compressor could be a nuisance through not likely to be above allowable level.
**Recommendations**

- Provide dust masks to workers during drilling
- Drilling should be carried out during working hours between 8 am and 5 pm to minimize disturbance of the members of the public by noise.

**7.2.8 Risk of Accidents and Health and Safety Concerns**

During drilling activities, it is expected that the construction workers may encounter occupational health hazards as a result of coming into contact and handling hazardous waste e.g. engine oil and grease. Setting up and operating the drilling machines, workers will be exposed to risk of accidents and injuries. Such injuries can result from loading and unloading truck mounted drill rig, transportation of the drill rig, hand tools and cuts from sharp objects, slips and fall hazards among others. We recommend that necessary safety precautions be taken. If the site is unsecured, access by members of the public may also expose them to risks and hazards associated with equipment mobilization, setting up and operation.

**Mitigation measures**

- Ensure compliance with occupational health and safety act, 2007;
- Ensure all equipment are inspected before use for appropriate safeguards and that the machine operators are trained on machine safety;
- Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay;
- Involve the local people where possible to enhance project ownership and involvement
- Upon completion and commissioning of the works, public safety in regard to water quality will be important.
- Secure the borehole site and storage tanks to ensure safety
- Provide workers with insurance cover for workplace related injuries
- First aid facilities should be availed at the site. These include properly stocked first aid boxes and persons in charge of first aid box should be competent and licensed to administer first aid services.
- Document and display on-site emergency procedures
- Provide and enforce use of personal protective equipments - during drilling all workers should wear protective clothing including overalls, helmets, safety boots and gloves among others where necessary.
- Create EHS awareness among the personnel prior to commencement of the work.
• Ensure proper storage of materials and equipments to avoid accidents occurring from falling - delivery and storage of material at appropriate locations.
• Provide sanitary facilities during drilling.
• Restrict un-necessary movement of public to the site in order to avoid accidents.
• Adequate and clean water supply for drinking.
• Employ skilled and trained workers, educated on machine operations, site safety procedures.
• Maintain environmental management records on site during and after drilling period

7.2.9 Soil and water pollution
The drilling machine contains movable parts which will require oiling and greasing to minimize wear and tear. Likewise the truck for carrying the drilling rig, pipes and other construction materials to site may require oil and other lubricants change. Possibilities of oil spillage contaminating the soil and water within the project areas are real.

Mitigation measures
• Safety procedures will be enforced to minimize cases of oil spillage. Such procedures may include maintaining the machinery in specific designated areas designed for such purposes;
• Ensure that oil/grease spills and other oils and associated materials (filters, rags and cans) are immediately removed along with all contaminated material and disposed of at an waste disposal site; and
• Ensure that contaminated materials including used/spilled oils/grease as well as other contaminated materials are stored in a banded area before being disposed off.

7.2.10 Impact on groundwater
Borehole drilling activities have the potential to introduce contaminants into ground water reservoirs creating a great concern to human and animal health. Pollution of groundwater quality during the drilling may occur following one or more of the following deficiencies:
  a) Insufficient or substandard well casing hence drawing contamination from the subsurface or perched water,
  b) Inadequate seal between the well casing and the borehole
  c) Poor welding of casing joints
  d) Lack of sanitary protection at the wellhead
The effects of the drilling process are covered in this ESIA. However, there are other factors that could influence the quality of borehole water. These factors may include:

- Proximity of deep pit latrines to the wellhead,
- Land use practices within the borehole area including excessive application of agrochemicals.

Abstraction of water from the borehole will have a direct impact on groundwater resources. The developer must ensure that the conditions of the water permit are fully complied with.

Mitigation measures

- Ensure that all potential sources of pollution are eliminated;
- The proponent must adhere to the regulations set by WRMA on the amounts to be abstracted from the borehole and the number of pumping hours.
- Avoid improper land use activities within the proximity of the borehole wellhead; and
- Undertake an audit on the integrity of the borehole abstraction piping and associated casings.
- Installation of water meter to monitor abstraction

7.2.11 Potential water use conflict

There are other boreholes in the area. The Water Resources Management Authority (WRMA) must ensure that the siting of the borehole complies with the requirements of the water Act of 2002 which provide for the minimum distance between boreholes.

Mitigation measures

- The siting of the borehole must ensure that the minimum distance from the next nearest borehole is observed.

7.2.12 Waste generation and management

Waste material generated during the drilling process may include: “Cuttings” of drilled rock which need to be removed from the well bore. The “cuttings” consist of a mixture of different types of soils and debris through which the well is bored. Other types of wastes likely to be generated will include waste like mud, gels, drilling fines, used or product petroleum products such as diesel as well as emissions and fugitive dust from the drilling machinery and equipment. On a positive note however, no significant volume of waste is anticipated from both the drilling and operational phases of the project. No hazardous wastes are anticipated.
from the drilling process. The anticipated wastes will comprise of soil and stone dust. These are natural and limited in volume and will thus not have any significant impacts on the natural environment. Other wastes such as oil spills, paper wastes etc should also be minimized.

Mitigation
- Measures to minimize oil spills should be implemented
- The contractor should clear and clean the site before leaving the site

7.3 Operation phase
On completion of the borehole and the installation of the pump, the operation phase will also have some impacts on the environmental and human health, these impacts will include:
- Boosting the local economy
- Employment creation
- Provide data for groundwater monitoring
- Easy burden on existing public water supply
- Risk of over-abstraction
- Disease ecology (drainage)
These impacts are discussed below

7.3.1 Impact on local economy and employment creation
The main objective of sinking the boreholes is it to supply water to a proposed factory on Plot No. Njoro/Ngata Block 2/6072 (Ngecha). Once completed, the proposed factory will provide employment opportunities for close 500 persons. This will thus be a major boost to the economy through employment creation, opening the area for other developments, infrastructural development among others.

Recommendations
- The developer must ensure that the locals are given the first priority during hiring of employees for the new factory. During the public meeting held on 4th February, 2019, the developer had promised to ensure that this is achieved.

7.3.2 Impact on Groundwater.
Since water will be abstracted from the underground aquifers, the distribution of water for use will negatively affect the aquifers. The need to monitor status of the ground water is therefore critical. If properly operated, the borehole can serve to provide long-term data for better understanding and management of ground water resources.
Recommendations

- Installation of peiziometer or airline to monitor static water level (SWL) in borehole
- Keep up to date record on borehole water monitoring

7.3.3 Ease Burden on Public Water Supply
Drilling of the borehole will ensure that the developer have adequate water to maintain the required cleanliness standards as well as providing portable water to workers without putting too much pressure on the existing public water supply.

7.3.4 Risk of Over-exploitation
Rise in water demand at the factory may lead to over-abstraction of water from the borehole. The developer must ensure that conditions stipulated in the water permit are fully complied with.

Recommendations

- Installation of master meter to monitor abstraction
- Full compliance with all conditions of water permit
- Keep up to date abstraction records

7.3.5 Disease Ecology
Poor management of water system may have negative impact on health. Poor drainage may create breeding grounds for mosquitoes and other disease causing organisms. In addition to contamination and thus diseases

Recommendations

- Provide for adequate drainage in proposed commercial facility
- Monitoring of water quality.

7.4 Decommissioning Phase
There are no decommissioning plans in the foreseeable future. Decommissioning of the borehole will involve removal of installations and filling the borehole with soil or pebbles
8.0 POSITIVE IMPACTS OF THE PROJECT

The implementation of the project will bring about various benefits. The benefits will be from all stages of the project cycle. The benefits are outlined below.

- **Creation of employment** - implementation of the project will create many job opportunities thus it will help in adding to the job markets. Jobs will be created during all phases of the project. Employment opportunities will include construction workers, security guards, department managers, office assistants among others. Individuals will therefore get a chance to improve their livelihoods.

- **Economic growth** - the factory will help in adding to revenue streams through payment of taxes and land rates thus promoting economic growth.

- **Increase in land value** - land value will increase from establishment of the factory thus benefiting land owners.

- **Promotion of development** - the factory will promote development in the area since employees will require places to live and also places for leisure and also for food and drinks. This will encourage business persons to put up businesses. Public amenities such as dispensaries and schools will also be improved.

- **Improving access to electricity and water** - the factory will require use of electricity. In the process, persons not connected to electricity will be able to access electricity existence of the factory will also improve access to water.

- **Manufacture of cholesterol free corn oil** will serve as a means to avail cholesterol free oil at affordable prices thus promoting healthy living.
9.0 PUBLIC PARTICIPATION

9.1 Introduction
Public participation is an integral part of any development. Apart from fulfilling the legal requirement, participation of members of the public during project planning and implementation helps to ensure that the concerns and views of the public are incorporated into the project. Public participation helps prevent future conflicts as well as creating awareness on how the proposed project is likely to impact on their livelihoods, health, environment e.t.c. The ESIA study involved the public through the following ways:

- Community meeting held on 4th February, 2019
- Direct interviews with immediate neighbours
- Advertisement in Kenya Gazette
- Advertisement in a newspaper with national coverage
- Advertisement in atleast one radio station

Advertisements in Kenya gazette, Newspaper and radio will be carried out after submission of this report to NEMA. The outcome from these advertisements was not available during preparation of this report. The outcome of the public meeting held at the site has been detailed in the section below.

9.2 Results of public meeting
Date and venue
The meeting was held on 4th February, 2019 at the proposed project site. The site was selected in consultation with the local administration (Chief’s office). The meeting lasted slightly over two (2) hours.

Attendance
The meeting was attended by a total of 55 persons. Both the area chief and assistant chief were present throughout the meeting. In attendance also were village elders, director of Nakuru Edoil Limited and the environmental consultant.

Scope
The meeting covered the following areas;

- Address from local administrators
- Presentation on the scope of the proposed project by the proponent
- Presentation on the possible impacts of the project
- Open forum where community members were asked to give their views on the project and raise any concern they had
- Resolution of the meeting on the proposed project

Key views and deliberations
A total of 12 participants (locals) gave their views during the meeting.

Concerns of the community
Those who spoke during the meeting raised the following concerns;
• The factory could lead to pollution in the area (emissions and wastewater):
The project proponent assured the community that modern technologies will be used. In addition, the developer promised to take all measures to ensure full compliance with pollution prevention and control regulations to the satisfaction of NEMA and other agencies.

• Corporate Social Responsibility (CSR):
The community noted that the community was not benefitting from other investors (industrial projects) established in the area. They requested that the developer should make some investments in community to continue to enjoy community support. One of the speakers requested the developer to help repair a local road near the site which was in bad state. The developer promised to ensure the road was repaired immediately. The developer further promised to be part of the community by participating in developments in the area.

• Employment:
The community was concerned that the developer may not employ locals. The developer promised to give priority to locals to fill job opportunities that will be created by the factory.

• Electricity:
The community lamented that their area has not been connected to the electricity mains despite being promised for many years. The community requested to be allowed to connect to the supply once the factory is connected to national grid. The developer promised that the company will not restrict locals from connecting to the transformer that will be installed at the site. This was a major concern to the community. The promise by the developer to allow community to access the electricity from its supply was well received by the community who promised to support the project.

• Raw materials:
The community also wanted to know the variety of maize that will be required at the factory so that they can grow the same for sale to the factory. The developer promised to advise them on the right variety at a later date after further research.

• Security:
The community noted that the area had no electricity making it unsafe especially at night. They requested the company to help install security lights which the company promised to do.

Resolution
The community was in full support of the project. The community expects to benefit from the community through:
• Employment of locals (suggested 70-75%) at the factory
• Connection to electricity supply
• Improved infrastructure e.g roads, water and other CSR projects initiated by the company.
• Sale of raw materials to the factory

Certified minutes of the meeting have been annexed to this report together with the full list of the attendants and their telephone numbers and signatures.
7.0 THE ENVIRONMENTAL MANAGEMENT PLAN

7.1 Introduction
The Environmental management plan has been developed in order to assist the proponent of the proposed project in identifying environmental impacts arising from the project activities in various phases and formulates the best ways to mitigate and manage the impacts. The proposed mitigation measures will help in eliminating environmental and human health impacts. Where elimination is not possible recommended measures will help offset impacts arising as a result of the development project.

Implementation of the proposed measures by the responsible parties will ensure that impacts identified are reduced to levels that do not pose any environmental and human health risks. It is therefore recommended that the responsible parties take all practicable measures to ensure that mitigation measures outlined in the environmental management plan are implemented. The environmental management plan is tabulated below.

7.2 Environmental Management Plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Timeframe</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing</td>
<td>Clearance of vegetation</td>
<td>• Restrict activities to only the required areas</td>
<td>During construction</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>Potential injuries to employees from; sharp objects such as nails, steel rods and from falling objects for example debris or stones.</td>
<td>• Emphasize on maintenance of personal safety</td>
<td>During construction</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide PPE's. (Gloves, safety boots, helmetsetc)</td>
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<td></td>
<td></td>
<td>• Formulation of site safety rules</td>
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<tr>
<td>Solid waste</td>
<td></td>
<td>• Designate an area for temporarily holding waste materials.</td>
<td>During construction</td>
<td>Contractor</td>
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<tr>
<td></td>
<td></td>
<td>• Proper organization of the construction site to enhance safety.</td>
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<td></td>
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<td>• All wastes should be disposed off in accordance with the <em>Waste Management Regulations, 2006</em> and other relevant</td>
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</tr>
<tr>
<td>Activity</td>
<td>Potential Hazards</td>
<td>Safety Measures</td>
<td>Responsible Party</td>
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<tr>
<td>-------------------------------</td>
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<tr>
<td>Excavation of trenches</td>
<td>Fall hazards and inhalation of dust particles.</td>
<td>• Mark excavated areas and prevent access by unauthorized persons.</td>
<td>During construction Contractor</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Provide dust masks for use by employees and enforce rules on use of PPE's.</td>
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<tr>
<td>Distortion of the soil profile</td>
<td></td>
<td>• Restrict excavation to only the required areas.</td>
<td>During construction Contractor</td>
<td></td>
</tr>
<tr>
<td>Clearing of vegetation</td>
<td></td>
<td>• Restrict unnecessary clearing of vegetation.</td>
<td>During construction Contractor</td>
<td></td>
</tr>
<tr>
<td>Concrete slabs</td>
<td>Potential injuries from:</td>
<td>• Provide PPE's such as earmuffs, dust masks, helmets, safety boots e.t.c.</td>
<td>During construction Contractor</td>
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<tr>
<td></td>
<td>• Corrosion by cement</td>
<td>• Enforce rules on use of PPE's.</td>
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<tr>
<td></td>
<td>• Exposure to noise</td>
<td>• Allow rest period during the working hours.</td>
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<tr>
<td></td>
<td>• Muscular strains and possible</td>
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<tr>
<td></td>
<td>injuries</td>
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<tr>
<td>Fall hazards</td>
<td></td>
<td>• Install scaffolds and ensure that they are in good condition.</td>
<td>During construction Contractor</td>
<td></td>
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<tr>
<td>Inhalation of particulate matter</td>
<td></td>
<td>• Provide dust masks</td>
<td>During construction Contractor</td>
<td></td>
</tr>
<tr>
<td>Walls</td>
<td>Potential injuries from:</td>
<td>• Provide appropriate PPE's</td>
<td>During construction Contractor</td>
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<tr>
<td></td>
<td>• Falling objects</td>
<td>• Install nets to trap debris.</td>
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<tr>
<td></td>
<td>• Corrosion of hands by cement</td>
<td>• Formulate clear work plans.</td>
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<tr>
<td></td>
<td>• Exposure to noise and noise</td>
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<tr>
<td>Fall hazards</td>
<td></td>
<td>• Install scaffolds and ensure that they are in good condition.</td>
<td>During construction Contractor</td>
<td></td>
</tr>
<tr>
<td>Risk of straining when lifting heavy objects such as stones</td>
<td></td>
<td>• Use alternate methods of lifting heavy objects to heights for example use of pulleys.</td>
<td>During construction Contractor</td>
<td></td>
</tr>
</tbody>
</table>
| Beams and columns | Potential injuries from; | • Emphasize on importance of observing personal safety  
• Provide durable work gloves and enforce rules on use of PPE’s.  
• Training of workers lifting or carrying heavy loads | During construction | Contractor |
| Solid waste | • Metals  
• Corrosion of hands by cement | • Sell recyclable materials to recyclers.  
• Designate a temporary waste disposal site for holding waste before collection. | During construction | Contractor |
| Roofing | Potential injuries from;  
• Cuts from roofing materials  
• Exposure to noise | • Emphasize on personal safety.  
• Provide earmuffs. | During construction | Contractor |
| Fall hazards | | • Install scaffolds and ensure the scaffolds are in good condition.  
• Provision of harness straps to workers working at heights | During construction | Contractor |
| Plaster and flooring | Potential injuries from;  
• Corrosion of hands by cement  
• Inhalation of cement dust | • Provide durable work gloves and enforce rules on PPE’s.  
• Provide dust masks to employees.  
• Enforce rules on use of PPE’s. | During construction | Contractor |
| Fall hazards | | • Use ladders where applicable.  
• Ensure that ladders and scaffolds are properly secured. | During construction | Contractor |
| Installation of windows, grills, doors and glass fitting | Potential injuries and accidents from;  
• Welding  
• Cuts from glass shards  
• Electric shocks  
• Exposure to noise | • Provide eye protection gear (welding glasses) and ear protection (earmuffs).  
• Emphasize on observation of personal safety.  
• Ensure electrical tools are insulated to avoid electrocution. | During construction | Contractor |
<p>| Plumbing and wiring | Solid waste | • Sell recyclable materials to recyclers | During construction | Contractor |
| Risk of injuries from; | • Ensure employees use PPE’s appropriately | During | Contractor |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Risks/Precautions</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Painting</strong></td>
<td></td>
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<tr>
<td>Inhalation of fumes from paints</td>
<td>Emphasize on importance of personal safety</td>
<td></td>
</tr>
<tr>
<td>Fall hazards</td>
<td>Ensure employees use respirators.</td>
<td>During construction</td>
</tr>
<tr>
<td>Air pollution</td>
<td>Purchase and use water based paints.</td>
<td>During construction</td>
</tr>
<tr>
<td><strong>Installation of machinery</strong></td>
<td>Risks of;</td>
<td></td>
</tr>
<tr>
<td>- Injuries from cuts and bruises when handling machines.</td>
<td>Ensure means of access e.g. platforms have been properly installed.</td>
<td>During construction</td>
</tr>
<tr>
<td>- Strains when lifting machines</td>
<td>Use alternate methods for lifting heavy machines</td>
<td></td>
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<tr>
<td>- Risk of entanglement of clothes</td>
<td>Ensure persons testing the machines are not wearing loose clothing</td>
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<tr>
<td>- Injuries from moving parts of machinery when testing</td>
<td>Ensure employees are instructed on machinery safety</td>
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<tr>
<td>- Risks associated with welding, steel cutting and grinding</td>
<td>Provision of appropriate PPEs</td>
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<tr>
<td>Fall hazards</td>
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<tr>
<td><strong>Installation of tanks</strong></td>
<td>Risk of injuries</td>
<td></td>
</tr>
<tr>
<td>Fall hazards</td>
<td>Use ladders where necessary and</td>
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<tr>
<td><strong>Cleaning the construction site</strong></td>
<td>Solid waste</td>
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<td></td>
<td>Contract a licensed waste handler to transport solid waste from the site.</td>
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<td></td>
<td>Sell recyclable materials to recyclers.</td>
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</tr>
</tbody>
</table>

Prepared by: Ecolink Services  •  Email: ecolinkse@gmail.com  •  Tel: 0721-543294  •  Page 53
### Liquid waste
- Reuse waste water for example sprinkling to minimize dust.

### Risk of injuries from;
- Inhalation of dust
- Sharp objects when cleaning
- Ensure employees make appropriate use of PPE's provided.

### Risk of fire
- Installation of fire fighting appliances and ensure that they are regularly serviced by approved persons
- Ensure employees are trained on basic fire safety and ensure

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#### OPERATION PHASE

<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Timeframe</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory operations</td>
<td>Liquid waste</td>
<td>- Sell usable waste to recyclers</td>
<td>During factory operations</td>
<td>Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Install an oil water interceptor to trap oils that may be present in waste water.</td>
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<td></td>
<td>- Install mechanisms for treatment of waste water before discharge.</td>
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<td></td>
<td></td>
<td>- Apply and obtain an Effluent Discharge License (EDL) for effluent released into the environment</td>
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<td></td>
<td></td>
<td>- Monitor quality of waste water to ensure compliance with the Water Quality Regulations, 2006</td>
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<tr>
<td></td>
<td></td>
<td>- Have a mechanism for recycling wastewater</td>
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<tr>
<td>Solid waste</td>
<td></td>
<td>- Segregation of wastes at the source for ease of handling and disposal</td>
<td>During factory operations</td>
<td>Management</td>
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<tr>
<td></td>
<td></td>
<td>- Contract a licensed waste transporter to transport solid waste from the factory.</td>
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<tr>
<td></td>
<td></td>
<td>- Sell recyclable waste to recyclers.</td>
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<tr>
<td></td>
<td></td>
<td>- Provide bins for temporarily holding waste before collection by licensed transporters.</td>
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<tr>
<td>Risk of fire</td>
<td></td>
<td>- Installation of fire fighting appliances and ensure that they are regularly serviced by approved persons</td>
<td>During factory operations</td>
<td>Management</td>
</tr>
<tr>
<td>Environmental Concerns</td>
<td>Responsible Parties</td>
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<tr>
<td>------------------------</td>
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</tr>
</tbody>
</table>
| Fire safety | Preparation of a fire fighting team.  
- Put up warning signs prohibiting smoking in premises where flammable liquids and other flammable substances are stored.  
- Ensure all electric equipment is properly insulated and regularly check for any electrical faults in the factory.  
- Prohibit access by unauthorized persons to areas with flammable substances.  
- Put up fire exit signs and ensure all exits are unobstructed at all times.  
- Conduct fire safety audits on annual basis  
- Inspection of boilers and other plants as per the law  
- Care should be taken when handling or storing flammable substances  
- Full compliance with the *Fire Risk Reduction Rules, 2007* |
| Noise |  
- Provide earmuffs to employees working in noisy areas.  
- Ensure rooms with noisy machines are soundproofed or use machinery with inbuilt sound proofing mechanisms.  
- Conduct annual noise surveys |
| Air pollution |  
- Use blowers for the boilers to ensure complete combustion in order to minimize smoke.  
- Ensure regular servicing of the generator to minimize emissions to the atmosphere.  
- Install pollution control mechanisms such as installation of scrubbers. |
| Utilization of electricity and water |  
- Reuse water where applicable.  
- Harvest rain water for use in activities such as cleaning, |

*During factory operations*  
*Management/ Employees*  
*Management*
<table>
<thead>
<tr>
<th>Activity</th>
<th>Impacts</th>
<th>Mitigation measures</th>
<th>Timeframe</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling and for use in the washrooms.</td>
<td>• Employ energy conservation measures e.g. utilization of natural lighting and only using artificial lighting where necessary. • Conduct annual energy audits to track power consumption.</td>
<td>Occupational hazards</td>
<td>• Formulate workplace policies for example a first aid policy and an Occupational Safety and Health policy. • Restrict access of unauthorized personnel to machine operation areas. • Provide machinery safety manuals and enforce rules on machinery safety. • Provide PPE's for use by employees and enforce rules on their use. For example gloves, aprons etc. • Ensure employees working with moving machines do not wear loose clothing at any given time to prevent entanglement. • Ensure employees have insurance covers. • Construct access platforms for use by persons working at heights. • Train employees on various types of occupational hazards and how to mitigate them. • Formation of safety and health committee • Registration of the workplace in accordance with the requirements of OSHA, 2007 • Conduct a workplace risk assessment</td>
<td>During factory operations</td>
</tr>
<tr>
<td>Demolition</td>
<td>Solid waste</td>
<td>During demolition</td>
<td>Proponent</td>
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</tbody>
</table>
|            | • Sell materials that can be recycled to recycles.  
|            | • Reuse materials such as iron sheets, stones etc. in other construction activities.  
|            | • Recovery of re-usable or recyclable materials, machines and equipment  
|            | • Contract a licensed garbage transporter | |
| Vibration and noise | • Provide PPEs to demolition staff  
|            | • Carry out demolition activities during the day. | During demolition | Proponent |
| Machinery and plants | • Sell machines and other electronic equipment to willing buyers. | During demolition | Proponent |
| Occupational safety and health issues | • Use of PPEs e.g. gloves, safety boots and helmets.  
|            | • Formulation of safety rules to guide decommissioning plan | During demolition | Employees |
| Termination of employment | • Provide adequate notice to workers before termination of employment | | |

Prepared by: Ecolink Services  Email: ecolinkse@gmail.com  Tel: 0721-543294  Page 57
CONCLUSION

The proponent intends to construct a factory whose major activities will include production of corn oil, bar soaps and animal feeds. This project is viable project in that it will bring about a range of benefits ranging from individual level to the national level. The area is sparsely populated with low population density and well accessible. It was noted that the project site had been under cultivation and no natural vegetation or animal habitats were present. The plants mainly comprised of weeds and some few species of trees in the neighborhood. All plant species present are not endangered or threatened therefore there will be fewer impacts from establishment of the project. From the Environmental Impact Assessment study, it was noted that Implementation of the project will not result in significant degradation of the environment if the proposed mitigation measures are incorporated into the project. It is therefore necessary that the project proponent take all practicable measures to ensure integrity of the environment, public and occupational health and safety are upheld. I highly recommend that the project be approved on the basis of this report and any other conditions that may be imposed by NEMA and other relevant agencies.
APPENDICES

Appendix 1: Certificate of Incorporation
Appendix 2: Title Deed
Appendix 3: Minutes of Public Meeting held at the site
Appendix 4: Hydrogeological report
Appendix 5: Building plans
Appendix 1: Certificate of Incorporation

CERTIFICATE OF INCORPORATION

I hereby CERTIFY that,

NAKURU EDOIL LIMITED

is on this date 22 Oct 2018 Incorporated under the Companies Act 2015 and that the Company is a PRIVATE LIMITED COMPANY.

Registrar Of Companies

This is a system generated certificate. To validate this document send the word BRS to 21546
Appendix 2: Land Title Deed

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT
(No. 3 of 2012, section 108)

THE REGISTERED LAND ACT
(Chapter 300) (REPEALED)

Title Deed

Title Number  NJORO AGATA BLOCK 2/5072 (NGECHA)

Approximate Area  0.81 HECTARES

Registry Map Sheet No.

This is to certify that

Nakuru EDOIL LIMITED

P.O. BOX 17841, ELBURGON

is (are) now registered as the absolute proprietor(s) of the land
comprised in the above-mentioned title, subject to the entries in
the register relating to the land and to such of the overriding
interests set out in section 28 of the Land Registration Act (No. 3
of 2012) as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

Nakuru District Land Registry

19th December 2018
At the date stated on the front hereof, the following entries appeared in the register relating to the land.

**PART A—PROPERTY SECTION**

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**REGISTRATION SECTION**

AJORO NGATA BLOCK 2

(NORECHA)

PARCEL NUMBER

6072

APPROXIMATE AREA

0.81 HA

REGISTRY MAP SHEET No.

1

**PART B—PROPRIETORSHIP SECTION**

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Appendix 3: Minutes

MINUTES OF THE PUBLIC CONSULTATIVE MEETING ON THE PROPOSED NAKURU EDOIL FACTORY HELD AT NGECHA (AT THE PROPOSED SITE) ON 04/02/19

PRESENT
The meeting was attended by 55 persons. Full list of attendants has been attached herein.

PRELIMINARIES
The meeting was opened with a word of prayer by Eunice Nginyo at 10:56 AM. The Assistant Chief gave a brief introduction on the purpose of the meeting, thanked Mr Kangethe for mobilizing residents to attend the meeting and formally welcomed everyone present. Introductions were conducted for familiarity purposes and the meeting handed over to the area Chief who later invited the developer to brief the community on the proposed project. The meeting was the handed over to the Consultant (Mr. Peter M. Ithagu) who facilitated collection of views and perceptions from those in attendance.

AGENDA
1. Presentation on the proposed project to the residents
2. Discussion of possible impacts arising from the proposed project and collection of views from members present at the meeting
3. Way forward

SPEAKERS
Assistant Chief – Ngata Sub-location (Lucia Akai)

- The Assistant chief briefed residents on the state of security within the area and sensitized them on the need to be vigilant while attending gatherings with special emphasis on supermarkets and churches.
- She informed residents on the intended population registration of persons that will run from 30th March to 30th April from 6.00AM to 6.00PM daily. This will form a central database for all citizens giving a unique identification number that will be used to access government services in future.
- She also asked those in need of replacement of IDs to do so early enough.
- She asked residents to be vigilant due to the rise in cattle theft in the area and report any theft immediately.
- Residents were also sensitized to speak up on the rise of bars within Sobea Centre and ensure that the trend does not negatively affect the community.
Chief Ngata Location (Augustine Rotich)

- The chief highlighted on the rights to education for all children as well as the need for the community to play its role in ensuring 100% transition from primary to secondary school. Those who did not get admission to any school were requested to go to the Chief’s office for assistance in bid to ensure that all children who sat for KCPE in 2018 join secondary schools.
- Beneficiaries of the bursary fund awarded through Rongai MP’s office were required to fill in the necessary form and return it at the designated station (Karibu na tank) at 3.00pm on 13th March 2019.
- He also put emphasis on the need to remain vigilant on matters security.

Project Proponent (Nakuru Edoil Limited)

- Mr. Edward Ngigi spoke on behalf of the company. Mr. Ngigi gave an overview of the proposed project to ensure that the residents were conversant with the project. He said that the proposed project will process cooking oil from corn. The wastes from the process will be used to manufacture maize flour, animal feed and soap. He reiterated that the company will use modern technology and machines to minimize any possible impacts on the environment.

NEMA consultant (Lead Expert – Peter Macharia)

- An overview of the importance of the public consultation in matters of development. The consultant informed the community that they had the right to raise any issue or concern about the proposed development. He urged the community to consider both positive and negative impacts of the proposed development in making a decision on the project.
- The consultant advised the developer not to make any promise that he could not keep as this may lead to conflicts with the community in future. He urged both the community and developer to engage in discussions openly and honestly.
- The consultant highlighted on proposed project activities before opening the forum for discussions.
- He asked the residents to give their opinions freely with no fear of intimidation.
Views from various residents

1st Speaker: Eston Kamau Charles
- He raised a concern of where the proponent would source his maize for the production process
- The proponent assured the residents that he would source the maize locally if it met the required standard before buying maize from other sources.

2nd Speaker: James Ngigi
- The resident requested that locals be given the first priority during employment at the construction site and the proposed factory.
- The proponent promised to do so once he was well conversant with the locals.

3rd Speaker: David Mungai
- The speaker welcomed the company to the community saying that it was a noble idea to establish a factory in the area.
- The speaker raised concern on air pollution from smoke during the production processes that will be carried out at the proposed factory, sewerage and waste water management.
- The speaker also requested that the locals be given at least 70% of the employment opportunities once the project commences.
- He also asked the proponent to engage in Corporate Social Responsibility Projects to integrate social and environmental concerns in his business operations and in his interaction with stakeholders on a voluntary basis. The speaker requested the developer to help repair a road passing near the site which was in poor state.
- The speaker also assured the proponent of the residents’ cooperation during the time he will be an investor in the area assuring him of the social cohesion the area enjoys.
- The proponent assured the locales that he would only use environmentally friendly machines that do not release toxic emissions. He said that the processes carried out were also not expected to emit any hazardous gases with negative impacts on human health and that regular monitoring will be carried out in line with prevailing regulations and laws.
- For the boilers, the proponent assured the residents that he would mount cyclones as well as scrubbers to minimize pollutants in the stack emissions.
- Waste water will be recycled and reused and all waste will be channeled to a constructed conservancy tank that will be occasionally exhausted.
• The proponent assured the residents of giving locals priority during the recruitment of employees. Records will be maintained at the chief’s office.
• The proponent proposed to provide murram to repair the local road as requested.

4th Speaker: Moses Njoroge
• He requested that the proponent install security lights to improve on the areas security
• He also assured of the locals support for the proposed project.
• The proponent responded by assuring the community that the area around the factory will be well lit.

5th Speaker: Mary Akeno
• She expressed her support for the proposed project and requested that all promises given on the day be fulfilled.

6th Speaker: Eunice Nginyo (Village Elder)
• She pledged her support and that of the community for the proposed project adding that the benefits accruing from the same will improve the residents’ livelihood.

7th Speaker: Constance Mumbua
• Expressing her support, she pointed that the employment of the local youths would keep them away from social vices that are on the rise in the area.

8th Speaker: Hellen Githinji
• She noted that the residents will benefit a lot from the establishment of the factory and thus pledged her support for the same.
• She also noted that the proposed development will open up the area and spur economic development.
• She expressed her expectation that the area will finally be connected to electricity supply.

9th Speaker: James Kimani
• He asked the proponent to research more on the best variety of maize to plant and make the locals aware so as to increase their chances of their produce meeting the required standard for purchase.
• The proponent promised to do so.

10th Speaker: Francis Mbugua Nginyo (Village Elder)
• He expressed his gratitude for the proponent’s initiative to involve the residents in the decision making process noting that none of the previous investors in the area had done so.
• He asked that only qualified people be employed at the factory and not delinquent youth.
• The speaker urged the proponent to ensure that all that was promised is fulfilled especially on employment and electricity.
• The speaker cited alcoholism as a major problem in the area and was hopeful that establishment of the factory will help curb this problem.
• He also sensitized the residents to always show up for meetings for the sake of overall development of the area.

11th Speaker: Francis Chege (youth)
• As a representative of the youth present in the meeting, he thanked the proponent and termed the proposed project a noble idea requesting that youth in the area be given the first priority during employment recruitment.

12th Speaker: Hannah Wambui
• She expressed gratitude for the proponent’s initiative to involve the residents and noted that all benefits accruing will be of great help to the locals given that promises had been made earlier by local politicians but not seen through.

Way forward:
After views and presentations from different participants, the consultant highlighted the key issues and concerns raised during the meeting. He then reminded the community on the importance of making a sober and honest decision on the project since the project was still at the initial stages and could be modified or re-located in case the community was opposed. The consultant asked anyone who had reservations or opposed the project to raise his/her hand. When nobody responded to the request, the consultant asked the community whether or not the project should be implemented. The community unanimously agreed that the factory be established at the proposed site.
The consultant requested the community members present at the meeting were invited for a photograph at the site which they all agreed.

**A.O.B**
The area assistant chief thanked residents for availing themselves. There being no other business the meeting was concluded with a word of prayer by David Njenga at 12.45pm.

**Confirmed by:**
**Area Chief/Ass. Chief**

Name:________________________________________

Signature:____________________________________

Date:____________________________

**Project Proponent**

Name:________________________________________

Position:____________________________________

Signature:____________________________________

Date:____________________________

**Consultant**

Name:________________________________________

Signature:____________________________________

Date:____________________________
The consultant requested the community members present at the meeting were invited for a photograph at the site which they all agreed.

A.O.B
The area assistant chief thanked residents for availing themselves. There being no other business the meeting was concluded with a word of prayer by David Njenga at 12.45pm.

Confirmed by:
Area Chief/Ass. Chief

Name: LUCIA AKAH
Signature: [Signature]
Date: [Date]

Project Proponent

Name: ELIAS NGAI AGGO
Position: DIRECTOR
Signature: [Signature]
Date: 06/02/2019

Consultant

Name: PETER M. ITHAGU
Signature: [Signature]
Date: 06/02/2019
# EIA PUBLIC PARTICIPATION

**Project:** Nakuru Refit Ltd Factory

**Venue:** Ngera (Proposed Site)

**Date:** 4/02/2019

## ATTENDANCE SHEET

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Appendix 4: Hydrogeological Survey Report

31/01/2019

HYDROGEOLOGICAL ASSESSMENT REPORT

1(a) NAME AND DETAILS OF APPLICANT:

Nakuru Edoil Limited

P.O. Box 16906

Nakuru

1(b) LOCATION: Sobea

COUNTY: Nakuru

GPS S 00.24488⁰

E 035.92525⁰

ALTITUDE: 2052 Metres

2. DESCRIPTION OF PROPOSED ACTIVITY:

The proposed site is at Ngecha farm (Njoro) in Sobea of Rongai sub county. Its adjacent to the main tarmac from Nakuru to Salgaa town and is about 1.5 kms from Sobea centre towards Salgaa. This is a multi purpose production unit with animal
feeds being key component of this industry. Several boilers will be used and that cooling process could include use of cold water. Other uses of water will similarly be crucial and as such client found it important to source for his independent source of water which similarly need be reliable.

The activity entails overall farm visual inspection to isolate areas of high groundwater accumulation and isolate high depositional areas. Sounding data is subsequently collected at various depths. Preliminary data interpretation is done on site; however final and conclusive interpretation is done upon model simulation using 6win model.

3. DETAILS OF CLIMATE:

The climate of this area may be described as mid highland type characterized by moderate weather conditions where temperature range from 17 to 26°C during the day and 10 to 14°C at night. The common type of rainfall experienced here is conventional with little of the relief type on the higher grounds. The vegetation type range from savannah grasslands to forest cover in most parts of the selected site. The general area drain towards the west with all rivers draining to Lake Baringo. The main River which crosses this area is the Rongai River which sometimes get seasonal when there is over abstraction at its upper course. The rates of both evapotranspiration and evaporation could be considered moderate though actual figures could not be established for this report.

Just like most places within Nakuru County, Rainfall is bimodal with long rains falling at the month of April to June; whereas short rains is in the months of October through to December. It may however be noted that climate change
influence has not left this place unaffected. In many occasions, long rains come by early to mid March then subsequently disappear early only to appear again towards end of May. This has had bad effects on crops and such sensitive crops such as maize which may not withstand change and often go dry which results in low food crop production in most areas. The warm weather often assists in fast crop growths which hastens the rate of return on cash crops. Groundwater is potentially recharged from hilltops and fault lines where it's anticipated that inflows get into aquifers and pass on through porous formations depending on porosity levels.

4. GEOLOGY AND HYDROGEOLOGY

The general geology of the area is made up of the tectonically stable basaltic formation of late Miocene to early Pleistocene period characterized by severe episodes of active tectonic movements resulting in southern and Northern Graben throws, which significantly affected the groundwater flow. The North Eastern throw includes the remnants of active volcanic episodes which form the agriculture rich volcanics in Kabarak area. This is further superimposed by reliable relief rains which favour massive agricultural activities there. One can infer groundwater flow to be to the lower side in assumption that no major fault lines cross this area.

The formation crystal size range from course fine grain to medium size grain and is anticipated to allow fair recharge to borehole. The anticipated recharge area is from the eastern side of the selected site and the selected site is located on a rather flat land on an otherwise sloping area (Plateau) where surface water stagnation is not experienced, a likely indication of good surface water percolation to recharge likely aquifer. Other outcrops seen at the selected site include weathered rhyolites on road crossings with minor inclusions of ironstones. No clear
outcrops are evident in the area, though few could be spotted on isolated areas. The absence of murram is good indication of low weathering episode earlier experienced in this locality. Weathering episode could greatly boost aquifer recharge during pumping/operationalization of borehole. Episodes of folding are evident and could be inferred that this could led to various degrees of faulting which largely affect groundwater flow direction. The absence of clay in isolated/selected site help eliminate chances of limited recharge to this borehole.

5. BOREHOLES IN NEIGHBOURHOOD OR WITHIN THE SURVEY AREA:

Borehole data play key role in prediction on expected borehole potential both in water struck level and yields. Minor variations could be experienced in this kind of formation. However the prevailing soil and formation nature do not allow significant effect on neighbouring boreholes due to their properties. The only possible way that boreholes can affect one another is when there is the presence of major fault lines which link two neighbouring sites or boreholes. Most boreholes drilled in this area are dry and significantly show that the groundwater potential in the selected site is poor; however this study attempts to isolate and likely come out with isolated success case. Other aquifer parameters cannot be determined due to scanty information available for the study area.

6.0 GROUNDWATER PROSPECTING METHODS

Prospecting methods

The main categories of groundwater exploration techniques are Hydrogeological maps, geophysical surveys conducted at the ground surface, borehole sampling
procedures and Geophysical logging of bores. Geophysical instruments provide information on the physical and chemical character of the subsurface environment.

However, it is important to recognize that geophysical data by themselves provide little definitive information. Therefore all data obtained by geophysical prospecting methods must be correlated or verified with actual borehole samples. To date, no groundwater exploration method can be used to determine the quantity of water before drilling.

6.1 Hydrogeological characteristics

a) Introduction

Groundwater recharge can be determined from the base flow. Base flow is the smallest quantity of water which flows annually in a river or stream. A simple method of estimating groundwater recharge utilizes stream hydrographs from two or more consecutive years. If the remaining potential groundwater discharges at the end of a recession and then the total potential groundwater discharge at the beginning of the next recession, the difference between the two is the groundwater recharge that has taken place between the recessions.

Some knowledge of the amount of natural recharge to an aquifer is mandatory in groundwater development and management. A water budget for the recharge area of an aquifer is a very useful means of determining groundwater recharge. Many of the parameters used for a hydrologic budget are measured directly: precipitation, stream flow, transported water and reservoir evaporation. Groundwater inflow, outflow and change in storage are computed from the hydraulic aquifer characteristics and measured potentiometric data.
The safe yield is the amount of naturally occurring groundwater that can be withdrawn from an aquifer on a sustained basis economically and legally, without impairing the native groundwater quality or creating an undesirable effect such as environmental damage.

A groundwater model is used to understand why a flow system is behaving in a particular observed manner and to predict how a flow system will behave in future. Models can be used to analyse hypothetical flow situations in order to gain generic understanding of that type of flow system. The term model refers to any representation of a real model. In studying a groundwater flow system, we develop a conceptual model.

No matter how much field work is performed in describing a flow system, a model may not fully describe all the minute details of the real system. There are many types of dynamic models of groundwater flow. These are physical scale models, analog models and mathematical models.

b) Data Requirement

It is necessary to have a data base which provides adequate information to apply the requisite equations. All models start with a groundwater flow model. You need to know the physical configuration of the aquifer. This includes the location, areal extent and thickness of all the aquifers and confining layers; the locations of the surface water bodies and streams; and the boundary conditions of all the aquifers.

Hydraulic properties that need to be known include the variation of transmissivity or permeability and storage coefficient of the aquifers, the variation of permeability and specific storage of the confining layers, and the hydraulic
connection between the aquifers and surface water bodies. Hydraulic energy, as indicated by water table or potentiometric surface maps and the amounts of natural aquifer recharge and natural stream flow are also needed.

In order to model stresses on the natural groundwater flow system, the modeler must know the locations, type, and amounts through time of any artificial recharge, such as results from recharge basins and wells or return flow from irrigation, as well as the amounts and locations through time of groundwater withdrawals from wells. Changes in the amounts of water flowing in the streams and changes in the water levels of surface water bodies should also be known.

A model is initially calibrated by taking the initial estimates of the model parameters and solving the model to see how well it reproduces some known condition of the aquifer. Once a model has been calibrated, the model is finally verified. This is usually done by history matching. Model field verification can then be performed by actually stressing the aquifer to see if the model correctly predicts the response of the aquifer as it is stressed. The following parameters can be obtained from the mudflow model, upon development of layer grid, properties (boundary conditions), time, hydraulic head, conductivity, transmissivity and effective porosity.

In consideration of the nature of the soils in the area, and using the soil antecedent value ii which give intermediate soil condition, the following are estimates for the selected area:

- Aquifer transmissivity=0.002
- Borehole specific capacities for given area =5
- Storage coefficient and or specific yield = 0.005
- Hydraulic conductivity = 0.07 cubic meter/head

These parameters are calculated using Logans formulae of
Transmissivity (T)=1.22 Q/s
Where Q is the discharge in cubic meters and
S is the drawdown in meters

7.0 GROUNDWATER QUALITY IN RELATION TO NATIONAL STANDARDS

The chemical nature of groundwater is determined by the unusual ability of water to dissolve a greater range of substances or minerals than any other liquid. The slow percolation of water through the ground results in prolonged contact of water with minerals in the soil and rock. Many of these minerals are dissolved slowly as groundwater passes over them, and in time, a quasi-chemical equilibrium can be reached between the groundwater and the minerals in the soil and rock.

Groundwater chemistry changes with depth and lateral distances as water flows along in the subsurface environment, increasing in dissolved solids and most major ions. The longer water remains underground, and the farther it travels, the more it resembles sea water.

a) Water Quality
The main purpose of a water quality analysis is to determine the suitability of water for a proposed use. The three main classes of water use are domestic, agricultural and industrial. A supply intended for public use may include all the three classes and accordingly require a standard of quality that is generally higher than that needed for any one class. Water for use in a particular industry may require a quality that is substantially higher than the one required by a public supply. Occasionally, more than one water-bearing formation is encountered in a well and the composition of the respective water may vary drastically. Under these conditions, it may be desirable to exclude the poor-quality water from the principal supply by grouting; Bacteriological quality of a water supply is determined by analyzing for coliform bacteria. The coliform group of organisms is used as an indicator of dangerous contaminant levels.

b) Water for Irrigation

Water quality problems in irrigation include salinity and toxicity. Excessive salinity occurs when there is an accumulation of salts in the topsoil especially in arid or semi-arid regions with extensive flat terrains. Some waters contain high enough concentrations of certain elements to retard or even eliminate the growth of some plants. Boron, chlorides and sodium are common toxic substances. has far-reaching effects on soils. Of particular interest is the ratio of sodium to calcium and magnesium. When sodium-rich water is applied to soil, some of the sodium is taken up by clay: the clay gives up calcium and magnesium in exchange. This reaction is called Base Exchange and alters the physical characteristics of soil and can even lead to growth retardation. Even worse, high concentrations of sodium salts can produce alkali soils in which little or no vegetation can grow.
In order to measure the effect of sodium ions, the sodium effect is calculated as the Sodium Adsorption Ratio (SAR). Development of excess sodium in soils will result from irrigation water that has a high SAR value (18 or above); values below 10 indicate little danger of a sodium problem.

WATER QUALITY PROTECTION

All water that seeps into the ground is contaminated to some degree even before entering the subsurface environment. For instance, rainwater picks up carbon dioxide, minerals, bacteria, and inorganic contaminants such as oxides of sulphur and nitrogen from the atmosphere and soil. Once in the ground, any water percolating through soils near sources of pollution can become heavily contaminated with dangerous solvent or chemical residues.

Percolation of water from septic systems and refuse disposal sites poses a serious threat to the preservation of groundwater quality. In properly designed and constructed systems, the movement of contaminated discharge through finer grained soils is quite effective in removing pathogenic bacteria over short travel distances. The occurrence and widespread migration of chemical in the subsurface environment may ultimately become the most serious threat to groundwater quality. Unfortunately, many of these substances are not absorbed into soil particles and can travel great distances in the subsurface environment. Protection of groundwater quality depends on the well design and the methods and materials used to construct the well: some of the deficiencies in well construction are:

(i) Insufficient or substandard well casing.
(ii) Use of well pits, inadequate seal between the well casing and the borehole.
iii) Poor welding of casing joints.

(iv) Lack of sanitary protection at wellhead.

a) Groundwater Pollution

Groundwater can be polluted by poisonous or pathogenic substances or by other detrimental changes in its quality especially through:

(i) Poisonous substances such as compounds of lead, cadmium, chromium, cyanide, fluoride or mercury.

(ii) Chemicals for plant protection, herbicides, pesticides and plant growth regulators

(iii) Sewerage, refuse or garbage.

(iv) Detergents, fats, petroleum products. Acids, alkalis and salts.

(v) Coloring agents such as dyes, paints and aromatic substances.

(vi) Metabolic and decomposition products of micro-organisms and fertilizers.

(vii) Acids, alkalis and salts.

b) Sources of Danger

A borehole should certainly be located as far away as possible from all the sources of danger such as:

(i) Plants and installations, especially those which release radio active substances or those that can impair the quality of water, sewerage waste, gaseous and participant emissions etc.

(ii) Manufacture, transportation, usage, storage and deposition of substances which can impair the quality of water,
(iii) Transportation, utilization, storage and deposition of garbage, refuse or scrap metals

(iv) Hospitals, sanatoriums, hotels and cemeteries.

(v) Sewage seepage into the ground through septic tanks, injection of sewerage or other dissolved and undissolved substances into the ground and surface water

vi) Pipelines for substances which can impair the quality of water.

vii) Polluted water bodies, parking and washing of motor vehicles.

(ix) Use of chemical substances for plant protection, herbicides, pesticides and growth regulators, Pollution substances from the source of danger can reach the groundwater and the point of abstraction by several different ways e.g. seepage through sinks, infiltration, leaching action.

c) Groundwater Protection

Permanent measures for the protection of groundwater are required in the immediate vicinity of the proposed borehole and also it’s catchment area. The danger of contaminating groundwater quality is correspondingly increased by factors such as negligence, population density and over abstraction. Groundwater is an important source of drinking water and minimizes deterioration of their quality is necessary because of:

(i) The increasing chemical diversity of potential groundwater pollutants manufactured, used and disposed of by mankind,

(ii) The widespread disposal of domestic, agricultural and industrial effluents to the ground, especially due to the high cost of alternative arrangements
(iii) The enormous increase in the application of fertilizers and pesticides to agricultural land.

(iv) The potentially insidious health effects associated with the pollution of groundwater supplies, consequent upon slow but persistent increases in concentration of contaminants with uncertain toxicity.

(v) Rehabilitation of polluted aquifers will always be expensive and may often prove impracticable, leading to abandonment of valuable groundwater resources at considerable economic cost. Groundwater movement, and pollutant migration from the land surface to production boreholes, tends to be a relatively slow process in many aquifers. This means that it can take many years, even decades, before the full impact of a pollution episode, involving a persistent contaminant, becomes fully apparent in groundwater supplies.

d) Health Criteria

It will not be practicable to prevent all pollution. Water quality standards and guidelines for potable or other uses thus, in effect, become the design criteria for groundwater pollution protection. The guidelines are based on two separate criteria: health implications (toxic, carcinogenic, mutagenic effects), which are of primary importance. Aesthetic grounds (taste, odour, and colour) are of secondary importance providing the consumer will accept the water.

Among the inorganic constituents of health significance, by far and away the most widespread is nitrate, because of its high mobility and stability in aerobic groundwater systems. Others, generally of natural origin, such as fluoride, arsenic
and selenium, occur quite widely and may be mobilized by imposed stresses on aquifers.

The hazardous heavy metals tend to be immobilized by precipitation, or other processes, but migrate significantly in groundwater systems of low pH. Numerous inorganic constituents listed in the guidelines on aesthetic grounds occur widely at elevated levels in groundwater; often naturally, sometimes due to pollution. Most notable amongst these are chloride, iron, manganese, sodium, and sulphate. Organic constituents that appear from current evidence to represent the greatest threat to groundwater quality are some of the chlorinated alkanes, alkenes and benzenes, which are relatively mobile and persistent in groundwater. The bacteriological standards for drinking water are also of direct relevance because groundwater is often consumed with minimal disinfection.

e) Groundwater Protection Zones

These can basically be divided into three zones as follows:

ZONE 3 is the outer protection

ZONE 2 is the inner protection zone

ZONE 1 is the abstraction area.

Zone 3 generally extends up to about two kilometers from the abstraction works. This zone serves the purpose of groundwater protection from far-reaching impairments especially from non-degradable chemical pollution or those degradable only with difficulty and from radioactive pollutants.
Zone 2 serves the purpose of groundwater protection from pollution, which results from various human activities and installations and is especially hazardous because of their closeness to the point of abstraction. This zone extends from the boundary of Zone up to a line which marks the distance that the groundwater will cover to reach the point of abstraction in 50 days. Zone 2 can be left out when deeper lying sealed aquifers are tapped that are covered for the 50-day-line-to-the point of abstraction distance by sufficiently thick impervious layers.

Zone 1 should ensure protection to the immediate vicinity of the point of abstraction from pollution. The following are not allowed in this Zone:

(i) Installations, activities and proceedings mentioned for Zone 2 and Zone 3.
(ii) Vehicle and pedestrian traffic,
(iii) Any type of agriculture,
(iv) Organic fertilizers.
(v) Use of chemical substances for plant protection, herbicides, pesticides and growth regulators.

Zone 1 generally extends 10 metres in all directions in case of wells or 10 metres in the direction from which the groundwater flows in case of springs. However, Zone 1 should at least extend so far as to permit the use of organic fertilizers in Zone 2.

8.0 ASSESSMENT OF AVAILABILITY OF GROUNDWATER

Groundwater potential in the whole area may be estimated to be fair to fairly good potential; however aquifer properties could vary within short distance and this
could translate from a successful to a dry borehole within short distances. Many factors play role to this effect and could range from soil types, rock formation type to tectonic effects on the aquifer. Water quality too can play role in the availability of groundwater as discussed above.

9.0 ANALYSIS OF RESERVE

Groundwater potential in this area is as described above but may be noted that no groundwater conservation area has been identified in this area or its environs since this is a purely rural set up and may not face any restriction in the near future. Groundwater exploration is on the rise in the region and that Water Resource Management Authority need to develop boreholes to monitor for this purpose.

10.0 IMPACT OF PROPOSED ACTIVITY ON AQUIFER, WATER QUALITY, OTHER ABSTRACTORS:

The estimated water demand for this applicant is considered moderate as per the current water demand. The groundwater flow pattern is such that the recharge at least should be greater than the discharge and as indicated later in this report, the main recharge to this aquifer is precipitation, stream and river recharge to the aquifer and surface water percolation depending on the nature of the formation.

In consideration of the applied amount of water, the said amount may not have any significant impact on the aquifer. The said applicant may have to make an undertaking to safely dispose the used or waste water in a way likely not to pollute the groundwater. No major chemicals are used in this set up and may not therefore pose any danger to groundwater as a source.

11.0 BOREHOLE DEVELOPMENT RECOMMENDATIONS
All drilling methods cause some plugging of fractures or crevices in rocks. Borehole development is designed to maximize the well yield by repairing damage done to the formation by the drilling operation so that natural hydraulic properties are restored. Development also alters the basic characteristics of the aquifer near the borehole so that water will flow more freely to a well. These objectives are accomplished by applying some form of energy to the screen and formation. Well development is confined to a zone immediately adjacent to the well, where the formation materials have been disturbed by the well construction procedures or adversely affected by the drilling fluid. The undisturbed part of the aquifers just outside the damaged zone may be reworked physically during development to improve its natural hydraulic properties. All new wells should be developed so as to achieve sand-free water at the highest possible specific capacity. Development procedures have the following beneficial purposes:

(i) Reducing the compaction and intermixing of grain sizes produced during drilling by removing fine materials from the pore space,

(ii) Increasing the natural porosity and permeability of the previously undisturbed formation near the borehole by selectively removing the finer fraction of aquifer materials,

(iii) Removing the filter cake or drilling fluid film that coats the borehole, and remove much or all of the drilling fluid and natural formation solids that have invaded the formations so that the well will yield sand-free water.
GEOPHYSICS

As indicated above, overall site assessment entailed looking at probable sites for surface water percolation and likely maximize on high accumulation points. Fine-grained depositional areas are isolated since limited recharge may be experienced here. In consideration of general topography and land use of the farm, one site at the right hand at mid ground was suitably identified. The following data was subsequently collected at the selected site.

Site raw data

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Measurement: edoil nop

Coordinates: (0, 0)

Surface level: 0.00 m + Ref level

Geo-electrical model

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End resistivity: 130

SD on log-scale: 0.01212

Date (y-m-d): 2019-1-30
Measurement: edoil opt

Coordinates: (0, 0)
Surface level: .00 m+Ref level

Geo-electrical model

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End resistivity: 139

SSD on log-scale: .00265

Date (y-m-d): 2019-1-30
CONCLUSION AND RECOMMENDATION

From the Geological, Geophysical and Hydrogeological studies for the selected site, it can be concluded that the groundwater prospect at this site are fair. Shallower aquifers may have low yields but is expected that the deep-seated contact area could give more water to this borehole. It may therefore be concluded as follows:

a) That a borehole be drilled at the selected site to a maximum depth of 235 meters for likely water abstraction.

b) That a two litre sample of water be taken from the borehole to an accredited laboratory for adequate analysis.

c) That the awarded driller to drill this site takes responsibility to inform the Water Resource Management Authority of its intention to start drilling for proper supervision.

d) That the chosen site is well marked on the ground, geo referenced as above and well known to Mr. Edward Ngigi on 0729219666 and Peter Rukwaro on 0728814944 who were present during this survey.

David K. Mutai  
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WD/WRP/214  
Email: davidmutai09@gmail.com  
Tel: 0724106328

Mutai D.K. (Licensed Hydrogeologist-WD/WRP/214)  
(dkkmutai09@yahoo.com or dkmutai09@gmail.com M.Tel 0724106328)
Appendix 5: Building plans

NOTES

1. Only written dimensions to be taken from these drawings.
2. 200mm French drain removed from plant area excavated area and back filled with appropriate road base stone.
3. All excavation and materials including workmanship strictly to comply with the Building Code of Practice L.A. Bye-Laws and All M.O.H. Regulations.
4. Foundation depth to be determined on site.
5. D.P.C(Dump Proof Course) to be placed under all necessary walls 100mm above Actual Ground Level(AGL).
6. Approved steel beams to enclose alternate columns.
7. All openings except ventilation are made in accordance with Architectural details.
8. All M.S. window casements, door frames and other framed fittings are to comply with Structural Engineer's details and drawings.
9. Floor finish to be client's approval.
10. All walls internally plastered smooth and painted to client's approval.
11. All storm water collected from roof and any other discharge to the soakaways to architect's details.
12. All other waste water collected and soil water collected into a central septic tank specifications to be provided by the Architect.
13. Provide 4No. 9litres Co2/water fire extinguishers next to each horse reel as to be latter shown in Architectural details.
14. Provide automatic alarm to cover the project.
15. Provide 1000 gallons water reserve tank for horse reels.
16. Provide emergency escape purpose-made steel commercial stairs to voids.
17. Foundation depth to be determined on site.

PROPOSED FACTORY DEVELOPMENT

Client
NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

Drawing Scale
1:100, 1:500

Drawn by
K. Kibe

Scale
1:100, 1:500

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equipment layout

±0.00 layout chart

Zhengzhou QIE Grain and Oil Machinery Co., Ltd.
20TPD oil mill and dewaxing process layout

DIE-01

LY-BZ-01

Client
NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

Drawing Scale
1:100, 1:500

Drawn by
K. Kibe

Scale
1:100, 1:500

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±0.00 layout chart

equipment layout
first floor layout chart

### V310, V311 water-oil separator and solvent cycle tank foundation
- Foundation load-bearing: 30 tons
- Standard height: ±0.000m

### V312 cooking pot foundation
- Foundation load-bearing: 250*250
- Standard height: ±0.000m

### V304 mixed oil tank foundation
- Foundation load-bearing: 16 tons
- Standard height: ±0.000m

### V314a, b crude oil tank, paraffin oil tank, T304 absorption tower, T305 analytic tower foundation
- Foundation load-bearing: 20 tons
- Standard height: ±0.000m

### Fill the trench after burying pipe
- Standard height: -0.200m

### T301
- Standard height: ±0.000m

### T302 stripping tower foundation
- Foundation load-bearing: 8 tons
- Standard height: ±0.000m

### M301 feeding pot foundation
- Foundation load-bearing: 2 tons
- Standard height: ±0.000m
water seal pool foundation condition drawing

1. The foundation of water seal pool and gutter are constructed at the same time;
2. The place of water seal pool foundation and gutter foundation pls see JC-JT-01;
3. basic level according to inside extraction workshop ground level ±0.000;
4. The foundation is designed according to local geological conditions;

remark

1. The foundation of cycle water pool and gutter are constructed at the same time;
2. Cooling tower foundation buyer according to real base size design.
3. basic level according to inside extraction workshop ground level ±0.000;
4. The foundation is designed according to local geological conditions;

cycle water pool

foundation condition drawing

1. The foundation of cycle water pool and cycle water pump are constructed at the same time;
2. Cooling tower foundation buyer according to real base size design.
3. basic level according to inside extraction workshop ground level ±0.000;
4. The foundation is designed according to local geological conditions;

remark

1. The foundation of water seal pool and gutter are constructed at the same time;
2. The place of water seal pool foundation and gutter foundation pls see JC-JT-01;
3. basic level according to inside extraction workshop ground level ±0.000;
4. The foundation is designed according to local geological conditions;
second floor layout chart (+4.80)
The location of the embedded iron shall be constructed in strict accordance with the drawing, and the horizontal elevation difference shall not be greater than 5mm; remarks:
1. Equipment total base load bearing is 60T;
2. The depth of foundation Hx shall be determined according to the local foundation bearing capacity. Backfill soil under foundation shall be compacted in layers, and the compaction coefficient shall not be less than 0.96;
3. The foundation of equipment and workshop do at the same time, the foundation place in workshop pls see JC-JT-01;
4. The position of embedded bolts should be strictly constructed according to the figure, and the relative spacing error should not be greater than 1mm;
5. Inside workshop ground level is ±0.000;
6. All openings except sanitation area doors to be provided with frame door (V302);

V302 extractor base condition drawing

reinforced concrete
third floor layout chart(+9.50)

NOTES

- Only written dimensions to be taken from these drawings.
- All construction materials, including markmanship, strictly to comply with Building Code of Practice, L.A. Bye-Laws and M.O.H. Regulations.
- Foundation depth to be determined on site.
- D.P.C (Dump Proof Course) to be placed under all necessary walls 150 mm above Actual Ground Level (AGL).
- Approved loop drains to every alternate house.
- All openings except rainwater gully to be soundproofed with framed steel (6 x 6).
- All M.S. window frames, door frames and other framed fittings to be made with Structural Engineers details and drawings.
- Floor finish to client's approval.
- All walls internally plastered smooth and painted to client's approval.
- All drains pipes to be encased in concrete of not less than 150mm thickness.

PROPOSED FACTORY DEVELOPMENT

Client
NAKURU EDOIL LIMITED, P.O.Box 16906-20100, NAKURU-KENYA.

Job Title

Drawing Status

Drawn by
M.Kibe

Designated Title

Civil Work Condition Drawing

Drawing Scale

1:100, 1:500

100TPD Extraction Line

Standard height: +9.50m
4-supporting lug position load bearing: 8tons
E305 First Evaporation Reserved Hole
Standard height: +9.50m
4-supporting lug position load bearing: 3tons
V305 Flash Box Reserved Hole φ400
Standard height: +9.50m
2-supporting leg position load bearing: 8tons
E312 Stripping Condensor
Standard height: +9.50m
2-supporting leg position load bearing: 8tons
E308 Evaporation Condensor
Standard height: +9.50m
3-supporting leg position load bearing: 2tons
V307 Second Evaporation Flash Box Reserved Hole

Third floor layout chart (+9.50)
1. solvent tank standard height according to extraction workshop ±0.000. 
2. solvent tank is 4600x9000 pit Measures should be taken to prevent the collapse of the foundation pit.
3. The position of embedded iron should be constructed in strict accordance with the drawing, with the horizontal elevation difference less than 5mm.
4. The solvent tank is filled with medium sand after foundation construction.
5. Single machine load bearing is 52T.
6. The solvent tank is 4600x9000 pit Measures should be taken to prevent the collapse of the foundation pit.
7. The location of solvent tank and extraction workshop shall comply with local fire safety codes.

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**NOTES**

1. All written dimensions to be taken from these drawings.
2. 200mm vegetable soil removed from plant area excavated area to be backfilled with appropriate quarry stone.
4. Foundation depth to be determined on site. 
5. D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above Actual Ground Level (AGL).
6. Approved hoop irons to every alternate course.
7. All structural elements to be initially drawn, columns, tie rod, foundation and pavement details to be in accordance with Structural Engineers details and drawings.
8. Floor plans to client approval.
9. All walls internally plastered smooth and painted to client approval.
10. All cast water collected from roof and any other discharge to the soakaways to architectural details.
11. All other waste water collected into a central septic tank. Specifications to be provided by the Architect.
12. Provide 40m. Milano Coil/Cell water reserve tank to be installed outside the site boundary.
13. All the pavers are confined to site boundary.
14. Provide automatic alarms to cover the project.
15. Provide 1000 gallons water reserve tank for bare rocks.
16. Provide emergency escape purpose-made steel casement stairs to voids.

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**PROPOSED FACTORY DEVELOPMENT**

**Client:** NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

**Drawing Status:**

- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Client:** NAKURU EDOIL LIMITED
- **Drawing No.:** 007
- **Drawing Scale:** 1:100, 1:500
- **Status:** Revision 1

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**floor plans, section & elevations.**

**Clients:**

- **M.Kibe**
- **Date:**
- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Status:** Revision 1

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**Job Title:** PROPOSED FACTORY DEVELOPMENT

**Scale:** 1:100, 1:500

**Client:** NAKURU EDOIL LIMITED

**Drawing Status:**

- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Client:** NAKURU EDOIL LIMITED
- **Drawing No.:** 007
- **Drawing Scale:** 1:100, 1:500
- **Status:** Revision 1

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**floor plans, section & elevations.**

**Clients:**

- **M.Kibe**
- **Date:**
- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Status:** Revision 1

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**Job Title:** PROPOSED FACTORY DEVELOPMENT

**Scale:** 1:100, 1:500

**Client:** NAKURU EDOIL LIMITED

**Drawing Status:**

- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Client:** NAKURU EDOIL LIMITED
- **Drawing No.:** 007
- **Drawing Scale:** 1:100, 1:500
- **Status:** Revision 1

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**floor plans, section & elevations.**

**Clients:**

- **M.Kibe**
- **Date:**
- **Job Title:** PROPOSED FACTORY DEVELOPMENT
- **Scale:** 1:100, 1:500
- **Status:** Revision 1

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**legend**

- **2--2**
  - reinforced concrete
- **1--1**
  - medium sand
- **under ground solvent tank base conditioning drawing**
Only written dimensions to be taken from these drawings.

200mm vegetable soil removed from plants areas excavated to backfill with appropriate quarry stone.

All contamination materials including ballast to be removed in accordance with Building, Code of Practice, A.R.A., Bye-Laws and M.O.H. Regulations.

Foundation depth to be determined on site.

D.P.C. (Damp Proof Course) to be placed under all necessary walls 100mm above actual ground level (AGL).

Approved back填 to every alternate course.

All openings in elevation now shown to be protected with stainless steel sheeting (SS).

All vitrified windows to be framed and also framed fittings to architect's details.

All drainage pipes passing under building in excavated area backfilled with appropriate quarry stone.

150mm thickness

All structural elements, e.g. columns, beams, floor slabs, foundation and concrete stair walls are to be designed with Structural Engineers details and drawings.

Floor finish to client's approval.

All walls internally plastered smooth and painted to client's approval.

All waste water collected and used water collected into a central septic tank specifications to be provided by the architect.

Provide 400 litres of hot and cold water storage tanks in each basement to be filled by means of reticulated water system.

Provide emergency escape purpose-made steel casement stairs to voids.

Provide emergency escape purpose-made steel casement stairs to voids.

Provide automatic alarm to cover the project.

Provide 1000 gallon water reserve tank for horse reels.

Provide 164 litres of Co 2 and water extinguishers next to each hose reel as to be latter shown in architectural details.

FIRE FIGHTING

Provide emergency escape purpose-made steel casement stairs to voids.

Provide 1000 gallon water reserve tank for horse reels.

Provide emergency escape purpose-made steel casement stairs to voids.
second floor part of civil work conditioning drawing +4.800,+5.300

Zhengzhou Qi’e Grain and Oil Machinery Co., Ltd.

NOTES

- Only written dimensions to be taken from these drawings.
- 200mm vegetable soil removed from plant area excavated area back filled appropriate quarry stone.
- All圣亭, sections, including workmanship strictly to comply with Building Code of Practice, A & B Bye-Laws and M.O.H. Regulations.
- Foundation depth to be determined on site.
- D.P.(Drain Proof Course) to be placed under all necessary within 150 mm above Actual Ground Level (AGL).
- Approved loop beam to every alternate column.
- All openings except sanitation ones done to be provided with framework for Year 2018.
- All M.S. windows, columns, door frames and other framed fittings to architects’ details.
- All drainage pipes passing under building to be secured in concrete of a minimum thickness.
- All structural elements to be planned and painted to clients approval.
- All walls internally plastered smooth and painted to clients approval.
- All storm water collected from roof and any other discharge to the soakaways to architects instructions and approval.
- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.
- Provide 4No. 9litres Co 2/water fire extinguishers next to each horse reel as to be latter shown in architectural details.
- Provide automatic alarm to cover the project.
- Provide 1000 gallons water reserve tank for horse reels.
- Provide emergency escape purpose-made steel commercial stairs to voids.

PROPOSED FACTORY DEVELOPMENT
NOTES
1. Only units dimensions to be taken from main drawings.
2. 200mm vegetation soil removed from plant area excavated area back filled appropriate quarry stone.
3. All construction materials, including masonry, strictly to comply with Building Code of Practice A. No Lays and M.K. Regulations.
4. Foundation depth to be determined on site.
5. D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above Actual Final Level (A.F.L).
6. Approved loop beam to every alternate column.
7. All openings vary location was drawn to be permitted with Erection Site Plan (S.P.P).
8. All W.S. window and door frames and other framed fittings to architect’s details.
9. All drainage pipe passing under building/drawings to be secured in concrete no less than 150mm thickness.
10. All structural elements (columns, beams, columns, floor slab, foundation and concrete spike holes are formed with Structural Engineers details and drawings.
11. Plan finish to clients approval.
12. All walls internally plastered smooth and painted to clients approval.
13. All sewer water collected from roof and any other drainage to the soakaways to architect’s instructions and approval.
14. All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.
15. Provide 40m. Milano Coil/Mater Fire Extinguishers next to each horse reel as to be set in client’s approval.
16. Provide automatic alarm to cover the project.
17. Provide 1000 gallon water reserve tank for horse reels.
18. Provide emergency escape purpose-made steel access stairs to walls.

**PROPOSED FACTORY DEVELOPMENT**

**client**

NAKURU EDOIL LIMITED,  
P.O.Box 16906-20100,  
NAKURU-KENYA.

**Drawing Status**

Floor plans,section & elevations.

**Job Title**

NAKURU EDOIL LIMITED,

**Drawing Scale**

1:100,1:500

**Drawing No.** 010

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**Job Title**

PROPOSED FACTORY DEVELOPMENT

**client**

NAKURU EDOIL LIMITED,  
P.O.Box 16906-20100,  
NAKURU-KENYA.

**Drawing Status**

Floor plans,section & elevations.

**Job Title**

NAKURU EDOIL LIMITED,

**Drawing Scale**

1:100,1:500

**Drawing No.** 010

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NOTES

1. Only written dimensions to be taken from these drawings.
2. 200mm vegetation soil removed from plant area excavated area backfilled with appropriate quarry stone.
3. All construction materials including workmanship strictly to comply with Building Code of Practice, A & R Bye-Laws and M.O.H. Regulations.
4. Foundation depth to be determined on site.
5. D.P.P (Deep Pile Pore) to be placed under all necessary walls 150mm above Actual Ground Level (AGL).
6. Approved loop beams to every alternate column.
7. All openings except sanitation area door to be provided with framemart air Vent (PAVs).
8. All M.S. window casements, door frames and other framed fittings to architect’s details.
9. All drainage pipes passing under foundations to be covered in concrete of not less than 150mm thickness.
10. All structural elements ie stairs, beams, columns, foundation and concrete edge closures are to be designed with Structural Engineer’s details and drawings.
11. Floor slabs to clients approval.
12. All walls internally plastered smooth and painted to clients approval.
13. All clean water collected from roof and any other discharges in the evacuation to architectural instructions and approval.
14. All other waste water collected and soil washed into a central septic tank, specifications to be provided by the architect.
15. Provide 4No. 9 litres Co2/water extinguishers next to each horse reel as to be latter shown in architectural details.
16. Provide automatic alarm to cover the project.
17. Provide 1000 gallons water reserve tank for horse reels.
18. Provide emergency escape purpose made steel component stairs to voids.

PROPOSED FACTORY DEVELOPMENT

Zhengzhou Qi’er Grain and Oil Machinery Co., Ltd.

vertical drawing

5～1

 Equipment bay layout 4 5 5

Job Title

PROPOSED FACTORY DEVELOPMENT

Client

NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU KENYA.

Floor plans, section & elevations.

Drawing Status

Drawing Scale

1:100, 1:500

012
100 TPD maize germ oil project
first floor layout chart (±0.00)

NOTES

Only written dimensions to be taken from these drawings.

1. 200mm vegetable soil removed from plant area excavated and back filled with appropriate quarry stone.
2. All concrete, mortars, including reinforcement placed to comply with Building Code of Practice, A. Bye-Laws and C.S.I. Regulations.
3. Foundation depth to be determined on site.
4. D.P.C (Damp Proof Course) to be placed under all sanitary units on West side above Actual Ground Level (AGL).
5. Approved hoop brace to every alternate column.
6. All openings except ventilation and doors to be provided with permanent air vents (PAV).
7. All M.S. window casements, door frames and other framed fittings to architect's details.
8. All drain pipes under building/structures to be encased in concrete of not less than 150mm thickness.
9. All structural elements to be lined with rendered clay, reinforced brickwork and concrete to architect's details and drawings.
10. Floor finish to architect's approval.
11. All walls internally plastered smooth and painted to architect's approval.
12. All storm water collected from roof and any other discharge to be provided with architect's details.
13. All other rain water collected and soil water collected into a central storage tank, specifications to be provided by the architect.
14. Provide fire fighting equipment as per architect's instructions.
15. Provide automatic alarm to cover the project.
16. Provide 1000 gallons water reserves tank for horse reels.
17. Provide emergency escape purpose made steel casement stairs to voids.

PROPOSED FACTORY DEVELOPMENT

Client
NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

Drawing Status
Floor plans, section & elevations.

Drawing No:
Q-SP-01

Scale:
1:100,1:500

Drawing Date:

Client:

Designer:
M Kibe

Drawing Scale:

Revision:

Scale:

Drawing Title:

Zhengzhou QIE Grain and Oil Machinery Co.,Ltd
second floor layout chart +4.80
third floor layout chart (+9.50)

NOTES

- Only written dimensions to be taken from these drawings.
- 200mm vegetative soil removed from plant area excavated area back filled appropriate quarry stone.
- All construction materials including workmanship strictly to comply with Building Code of Practice, A & Byelaws and M.O.H. Regulations.
- Foundation depth to be determined on site.
- D.P.C (Deep Proof Course) to be placed under all sanitary with 100mm above Actual Ground Level (AGL).
- Approved loop boxes to every alternate room.
- All openings except sanitation area door to be provided with frames and fixed glass.
- All M.R. window casements, door frames and other framed fittings to architect's details.
- All drainage pipes passing under building/atriums to be encased in concrete of 150mm thickness.
- All structural elements, e.g. columns, beams, slabs, foundation and concrete slab sections are to be checked by Structural Engineers.
- Floor finish to client's approval.
- All walls internally plastered smooth and painted to client's approval.
- All storm water collected from roof and any other discharge to the soakaways to architect's instructions and approval.
- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.
- Provide emergency escape purpose made steel ornamental gates to voids.

PROPOSED FACTORY DEVELOPMENT

Job Title

Client

Drawing Status

Drawing Scale

Third floor layout chart (+9.50)

Zhengzhou QIE Grain and Oil Machinery Co., Ltd

Equipment layout

QSP-03

003

Nakuru QIE Grain and Oil Machinery Co., Ltd

Equipment layout

QSP-03

003
to meal workshop

B-B vertical layout
NOTES
- Only written dimensions to be taken from these drawings.
- 200mm vegetable soil removed from plinth area excavated area back filled with appropriate quarry stone.
- All construction materials including marking out strictly to comply with Building Code of Practice, L.A. Bye-Laws and M.O.H. Regulations.
- Foundation depth to be determined on site.
- D.P.C. (Damp Proof Course) to be placed under all necessary walls 150mm above Actual Ground Level (AGL).
- Approved shop floor to every alternate course.
- All openings except exterior awnings are to be provided with frames made to site details.
- All M.S. window, doors and frames and other framed fittings are to be provided with Structural Engineer’s details and drawings.
- Floor finish to clients approval.
- All walls internally plastered smooth and painted to clients approval.
- All storm water collected from roof and any other discharge to the soakaways to architects instructions and approval.
- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

FIRE FIGHTING
- Provide 4No. 9 litres CO2/water fire extinguishers next to each horse reel as to be latter shown in architectural details.
- Provide automatic alarm to cover the project.
- Provide 1000 gallons water reserve tank for horse reels.
- Provide emergency escape purpose made steel component stairs to voids.

PROPOSED FACTORY DEVELOPMENT

Client
NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

Job Title

Drawn by
M. Kibe

Drawing Scale

1:100, 1:500

Scale
Revision
006
+5.00m layout chart

equipment layout

NOTES

1. Only written dimensions to be taken from these drawings.
2. 200mm vegetable soil removed from plant area excavated area back filled appropriate
   quarry stone.
3. All construction materials, including masonry, strictly to comply with
4. Foundation depth to be determined on site.
5. D.P.C (Damp Proof Course) to be placed under all basement walls 100mm above Actual
   Ground Level (AGL).
6. Approved hoop irons to every alternate course.
7. All openings including sanitary and doors to be opened with framework for Year Testing.
8. All m.s. window casements, door frames and other framed fittings to Architect's details.
9. All other waste water collected and soil water collected into a central septic tank, specifications
   to be provided by the Architect.
10. Provide 1000 gallons water reserve tank for fire works.

PROPOSED FACTORY DEVELOPMENT

Client
NAKURU EDOL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

Floor plans, section & elevations.
B-B vertical view equipment layout
**NOTES**

- Only metric dimensions to be taken from these drawings.
- 200mm vegetable soil removed from plant area excavated area back filled with appropriate quarry stone.
- All construction materials including reinforcement steel to comply with Building Code of Practice, A & E Code and M.O.H. Regulations.
- Foundation depth to be determined on site.
- D.P.C (Damp Proof Course) to be placed under all necessary walls 100mm above Actual Ground Level (AGL).
- Approved loop beam to every alternate column.
- All openings except ventilation axes done to be provided with frame work for fire proofing.
- All M.S. window frames, door frames and other framed fittings to architect's details.
- All drainage pipes passing under building/drainage to be covered in concrete of not less than 150mm thickness.
- All structural elements to be cast beams, columns, roof slab, foundation and concrete slab ratios set in accordance with Structural Engineer's details and drawings.
- Floor finish to clients approval.
- All walls internally plastered smooth and painted to clients approval.
- All excess water collected from roof and any other discharge to the soakaways to architect's instructions and approval.
- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.
- Provide 400 Million Gallons water reserve tank for horse reels.
- Provide emergency escape purpose made steel component stairs to voids.
- Provide automatic alarm to cover the project.
- Provide emergency escape purpose made steel component stairs to voids.
- Provide 1000 gallons water reserve tank for horse reels.
- Provide emergency escape purpose made steel component stairs to voids.

**PROPOSED FACTORY DEVELOPMENT**

**Client**
NAKURU EDOIL LIMITED,
P.O.Box 16906-20100,
NAKURU-KENYA.

**Drawing Status**

**Floor plans, section & elevations.**
Only native dimensions to be taken from these drawings.

- 200mm vegetable soil removed from plinth area excavated and back filled with appropriate quarry stone.

- All construction materials including workmanship strictly to comply with Building Code of Practice, A.R. Bye-Laws and M.O.H. Regulations.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.

- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

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- All structural elements, e.g. steel beams, columns, floor slabs, foundation and concrete stair cases are to be calculated with Structural Engineers details and drawings.

- Floor finish to be confirmed.

- All walls internally plastered smooth and painted to client's approval.

- All storms water collected from roof and any other drainage to be in accordance with architect's instructions.

- All other waste water collected and soil water collected into a central septic tank, specifications to be provided by the architect.

- Foundation depth to be determined on site.

- D.P.C (Damp Proof Course) to be placed under all necessary walls 150mm above actual ground level (AGL).

- Approved loop hose to every alternate room.

- All openings except ventilation ones down to be provided with framed steel fire proof (FRP).

- All W.R. window frames, door frames and other framed fittings to architect's details.

- All drainage pipes passing under building/holdings to be secured in concrete of minimum dia.
Only written dimensions to be taken from these drawings.

200mm vegetable soil removed from plinth area excavated area back filled appropriate quarry stone.

All construction materials including workmanship strictly to comply with Building Code of Practice, A.N.R. Bye-Laws and M.O.H. Regulations.

Foundation depth to be determined on site.

D.P.C (Dump Proof Course) to be placed under all necessary walls 150 mm above Actual Ground Level (AGL).

Approved slope slope to every alternate corner.

All openings except ventilation are to be provided with frameless Fire Doors (FD30).

All M.S. window sections, door frames and other framed fittings to architect's details.

All drainage pipes passing under building/allowances to be secured in concrete or similar materials.

150mm thickness.

All structural elements i.e. beams, columns, Floor slabs, Foundation and concrete appurtenances are to be designed and drawn with Structural Engineers details and drawings.

Floor finish to client's approval.

All walls internally plastered smooth and painted to client's approval.

All water and water-collected roof water to discharge to architects instruction and approval.

All storm water collected from roof and any other discharge to the soakaways to architects instructions and approval.

All other waste water collected and soil water collected into a central septic tank specifications to be provided by the architect.

Provide 4no. 9 litres Co2/water fire extinguishers next to each fire reel as to be latter shown in architect's details.

Provide automatic alarm to cover the project.

Provide 1000 gallons water reserve tank for fire reels.

Provide emergency escape purpose-made steel casement stairs to voids.