
**ENVIRONMENTAL AND SOCIAL IMPACT STUDY REPORT FOR
THE PROPOSED INSTALLATION OF A 12-TON INDUCTION
MELTING FURNACE AOD, DIRECT HOT CHARGING CCM, AND
SHEDS ON PLOT LR NO. 12034/2 & 13037, EMBAKASI NORTH
SUB- COUNTY, DANDORA, NAIROBI COUNTY.**

**PROPONENT:
TONONOKA ROLLING MILLS LTD
P.O BOX 44689-00100
NAIROBI**



SITE COORDINATES: Lat. 1°15'33.15"S, Long. 36°54'07.79"E

**LEAD EIA EXPERT
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DOCUMENT AUTHENTICATION

This report has been prepared by Maureen Bosibori (NEMA Reg. No. 6858) in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit Regulations 2003 which requires that every development project must have an EIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

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EXECUTIVE SUMMARY

This is an environmental impact assessment study for proposed installation of a 12-ton furnace AOD, direct hot charging CCM and sheds off Komarock Road in Dandora Nairobi County. This study was commissioned by **Tononoka Rolling Mills Limited** in accordance with Section 58 of the Environmental Management and Coordination Amendment Act (2015), CAP 387, and Regulation 10 of the Environmental (Impact Assessment Audit) Regulations 2003 amended in 2016, legal notice No 31 and 32 of 2019. Other national policies and legislations relevant to the proposed project were reviewed. The purpose of this study is to establish the potential environmental impacts as a result of the said construction and operation activities of the proposed development and thereafter prescribe possible mitigation measures. The report also provides baseline information on the project that may be used in decision-making during the project's evaluation process and is also expected to form the baseline for future environmental audits and monitoring.

The proposed project will occupy a total of 11,000m² with an estimated budget of **Kshs. 287, 440,000**. The design components include:

- A metal scrape shade with melting furnace (3840m²) and water tanks.
- A godown to incorporate existing AOD and new CCM.
- A 2-storey storage godown (1782m²)
- A new godown for Oxygen plant and platform for Gas tanks (702m²)
- Ground and tower water tanks.
- 2 godowns for Finish goods storage (3672m²).
- Solar panels on top of all the godowns & Scrap Shade.
- 12-ton induction furnace and Direct charging Continuous Casting Machine (1870m²)
- 40meter Chimney stack
- Solid State power supply unit
- Two furnace crucibles.
- Dog-House and Bag filter pollution control system

Waste generation

The project will produce various streams of waste at different stages of the project. During the construction and decommissioning phase, the project will develop construction debris, electronic waste, waste water from construction, dust, smoke from transportation vehicles and domestic wastes. Some of the expected waste during the operation phase will include slag, dusts, exhaust emissions, mill scales, steel scrap, damaged furnace lining insulating materials, used oil, used grease and effluent from sanitary facilities and waste water. This requires an integrated management approach that focuses on waste reduction by implementing efficient material usage practices.

Summary of key findings

The following baseline information was derived from the assessment of the proposed project. The assessment identified some potential impacts of the project on the physical and socio-economic environment.

Potential Positive Impacts:

- Increased product variety
- Increased tax revenue to county and national government
- Increase in foreign exchange earnings through exports
- Creation of employment opportunities and on-job training to locals
- Increased support for development of local community through company CSR programmes
- Improvement of local economics
- Optimal use of land area
- Close proximity of Steel processing plant
- Increased access to Steel products
- Creation of market for goods and services
- Improved security

Potential Negative Impacts:

Various negative impacts are foreseen in the lifecycle of the project and include:

- Generation of dust and air pollution during construction
- Possible accidents amongst workers
- Solid and liquid Waste generation and its disposal or management
- Increased demand for water and energy
- Additional strain to the available existing natural resources within the area
- Noise generation and vibrations that may increase ambient noise levels
- Increase in soil erosion and change in soil structure resulting from excavation
- Increase in storm water runoff due to increase in paved areas
- Fire outbreaks
- Increased traffic along the main and feeder roads

Some other potential impacts are short term and of low significance. These will be ameliorated through proposed mitigation measures which include:

- Ensuring construction work is undertaken during the day
- Erection of a temporary barrier of iron sheets to condone the area from unauthorized trespassers.
- Collection and appropriate disposal of solid waste from the construction works and materials.
- Use of hessian cloth to protect workers from falling objects where necessary.
- Provision and enforcement of protective gears to the workers.
- Enhanced monitoring and control of vehicular movement
- Training and awareness of construction workers and staff on safety precautions.

- Transport and storage of materials in bulk.
- Signage to alert general public
- Regular inspection of underground tanks for leakages
- Prioritizing the upgrade of equipment and installation of existing facilities of a network after a defined age.
- Careful siting of the project to ensure that it lies in an environment that is far from environmental receptors including sewers, tunnels, vaults, surface water reservoirs etc.
- Provide fire extinguishers, alarms and hydrants in areas which are probable source of fires
- Landscaping and replanting of vegetation after all installation and construction is done to form a green belt which will provide habitat for small mammals and birds.
- Excavated soil will be used for landscaping or levelling of low-lying areas within the facility
- Design storm water drainage appropriately
- Recycle most water used in the plant during the operational phase
- Provision of appropriate stack heights to control air pollution.

The proposed project will take place within the property of Tononoka Rolling Mills Ltd and will take all measures to remain environmentally friendly to ensure minimal interference with the natural environment. The operations will be guided by the ESMP as provided herein. The proponent will be advised to comply with the Occupational Health and Safety procedures as required by the Kenyan law. Tononoka Rolling Mills Ltd is advised also to remain in constant consultation with project stakeholders and provide a grievance mechanism for addressing any emerging issues throughout the project cycle.

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1.0: INTRODUCTION

Construction, building, manufacturing and processing activities are regulated in section 58, of Environment Management and Coordination Act, 1999 among other law enactments. Under these laws, any activity out of character with its surrounding which is likely to cause substantial impact to the environment in areas such as waste disposal, sustainable resource use, ecosystem's maintenance, social environment, land use and water extraction; an Environmental Impact Assessment (EIA) report is required to assess such impacts and propose mitigation measures.

Legal Notice 31 & 32 of 2019 amendments to the second schedule of EMCA (1999) classify the proposed project as a high-risk project therefore necessitating an EIA study. The Project Proponent is required to submit an EIA study report to NEMA for approval before commencing implementation of the project. This report will enable decision making for NEMA approval and provide the relevant government authorities a tool to monitor impacts within the life span of the project on the immediate environment, so as to enable major stakeholders of the project including the Government agencies to manage the environment for the well-being of the community.

These TORs have been prepared based on the scoping result, field visits and information collected from both primary and secondary sources including information provided by the Project Proponent. The Terms of Reference (TOR) for conducting the EIA Study are based on the General Guidelines for Conducting EIAs in Kenya as per Environment (Impact Assessment and Audit) Regulations, 2003, which operationalizes the Environmental Management and Coordination Act, (EMCA) 1999.

1.1: Project Proponent

TONONOKA ROLLING MILLS LTD (TRM) Incorporated in 2005, located at Dandora, Nairobi is one of the leading producers of reinforcement steel for both local and international markets. The major products are TMT (Thermo Mechanically Treated) Rebars. It is a self-sustained rolling mill for producing long products. The manufacturing facility comprises of Electric Induction Furnaces, a Continuous Casting Machine (CCM), a Reheating Furnace (RHF) and a Bar Mill with mechanized cooling beds capable of Producing TMT bars from 8mm to 40mm conforming to KS 2712:2017 and BS 4449-2005 and equivalent. The mill is also augmented with a testing facility having equipment such as Universal Testing Machine (UTM), Spectrometer and a Chemical Analysis Laboratory.

Products manufactured include deformed Bars, used in the furniture, construction and building industries, hollow sections, steel plates, angles, columns, beams and wire products among others. Tononoka Rolling Mills plays a key role in metallic waste absorption as its main raw material is scrap metal. Recycling of steel scrap is preferred as it uses 60% less energy to produce steel from scrap than from iron ore.

Tononoka Rolling Mill has fully embraced and perfected the concept of circular economy because they fully rely on local scrap as raw material for production of billets.

1.2: Project Objectives

Tononoka Rolling Mills Ltd proposes to increase its current in-house smelting capacity from 7500MT per month to 11,300MT per month from recycling waste scrap metal waste. The process output will be production of steel billets which are intermediated material for producing various steel products such reinforcement bars and hot rolled structural steel. The new expansion project will also integrate a continuous casting machine from which produced hot billet will be directly charged to Bar Rolling Mill, this will substantially reduce the emission generation from the Reheating Furnace.

Proposed model of operations will include various plant components which will be seamlessly integrated to promote production efficiency and enhance the occupational health and safety features in the manufacturing processes.

1.3: Project Location

The proposed project will be located on Plot LR No. 12034/2 & 13037 (now amalgamated plots), off Komarock Road, Dandora, Embakasi North Sub County, Nairobi County; to increase product range and process efficiency. The project lies at **Latitude: 1°15'33.15"S, Longitude 36°54'07.79"E**. This land is already owned by Tononoka Rolling Mills Ltd so no resettlements will be required for this project. The proposed project area is zoned for industrial use and features other steel processing activities. The property borders other industries to the West, a mosque to the south while the rest of the neighboring land uses feature a mix of commercial and residential activities. Project site has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage in its neighborhood; as such its siting would have no sensitivity in this regard.

1.4: Project Site

The existing site layout features a scrap shed, hot rolling mill, office blocks, section mill, finished goods storage sheds, oxygen plant, a melting shop, HFO storage, security office, diesel storage, sanitation block, garage, parking and loading bays. Utilities include access roads, driveways, borehole, water storage tanks, water supply infrastructure, storm water drainage, electrical connections and waste collection point. The property is secured by a concrete perimeter wall with two entry and exit points to the adjacent feeder road. Tononoka Rolling Mills Ltd occupies a total area of 8.967Ha. The proposed project activities will occupy approximately 11,000m² with an estimated budget of **Kshs. 287, 440,000**.

1.5: Project Components.

The project will have the following components:

- A metal scrape shade with melting furnace (3840m²) and water tanks.
- A godown to incorporate existing AOD and new CCM.
- A 2-storey storage godown (1782m²)
- A new godown for Oxygen plant and platform for Gas tanks (702m²)
- Ground and tower water tanks.
- 2 godowns for Finish goods storage (3672m²).
- Solar panels on top of all the godowns & Scrap Shade.
- 12-ton induction furnace and Direct charging Continuous Casting Machine (1870m²)
- One 40m Chimney stack
- Solid State power supply unit
- Two furnace crucibles.
- Dog-House and Bag filter pollution control system

1.6: Scope of the Study

The Environmental and Social Impact Assessment will include but not necessarily be limited to:

1. Project Scope and Objectives
2. Complete description of the existing site proposed for development.
3. Significant environmental issues of concern through the presentation of baseline data, including social, cultural and heritage considerations.
4. Development of an environmental and social monitoring program (ESMP) during construction and operation and presentation of plans to minimize, mitigate, or eliminate negative effects and impacts.
5. Policies, Legislation and Regulations relevant to the project.
6. Likely impacts of the development on the described environment, including direct, indirect and cumulative impacts, and their relative importance to the design of the development's facilities.
7. Mitigation actions to be taken to minimize predicted adverse impacts if necessary and quantify associated costs.
8. Alternatives to the project that could be considered at that site or at any other location including no action alternative.
9. A decommissioning plan.
10. A climate change vulnerability assessment of the project area.
11. Maintenance of all correspondences with NEMA relating to the ESIA including improvement orders in close consultation with the client.
12. Acquisition of an Environmental and Social Impact Assessment License from NEMA within reasonable timelines.

2.0: PROJECT DESCRIPTION

2.1: Project Activities

2.1.1: Pre construction Activities

The following activities will be undertaken before the construction phase:

- Project design and planning
- Obtaining necessary approvals
- Site selection and feasibility study
- Contract agreements and contingency planning
- Procurement of supplies

2.1.2: Construction activities

The construction activities will include civil, electrical, mechanical, plumbing and landscaping activities. The project will make use of various earth moving and lifting equipment, transport vehicles in addition to skilled and unskilled labor. Excavation will be done according to the architectural designs provided. The foundations will all be made of concrete.

The construction of the godown walls, foundations, pavements, drainage systems, landscaping among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities include stone shaping, concrete mixing, plastering, construction of foundations, and erection of godown walls and steel beams and curing of fresh concrete surfaces. These activities will be labor intensive and time consuming and therefore will be supplemented by machinery such as concrete mixers.

All godowns will have concrete floors with a concrete power finish with a hardener for durability. The scrap shade and AOD godowns will have stone walls upto 3 meters high with IT5 sheets cladding. Storage and Oxygen plant godowns will feature stone walls. Roofing activities will include raising the roofing materials consisting of steel trusses with IT5 sheets, designed to accommodate solar lighting panels. Windows will be fitted with metal louvres. All doors will be metal, constructed according to detailed specifications. The godowns will be reinforced with structural steel for stability as it will be designed by structural engineers. Structural steel works will involve steel cutting, welding and erection.

Outdoor LV distribution will be installed by armored cable direct buried. LV cable will be armored XLPE insulated 0.6/1KV copper cables. Cable buries depth shall not be lesser than 700mm. Indoor electrical work will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, telephone points, and security points sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

Installation of pipe-work will be done to connect liquid waste to waste water line so that will be connected to the sewerage line system in the area. Plumbing will also be done for drainage of storm water from the roof-tops into the storm water collecting channel of into the water harvesting facility. Plumbing activities will include metal and plastic pipe cuttings, the use of adhesives, metal grinding and wall drilling among others.

2.1.3: Mechanical works

The project is essentially aimed at improving smelting efficiency and capacity while integrating an improved emission evacuation system. The main components will include:

Induction Melting System

This will include the installation of a 5000KW 12-ton induction furnace with a melting capacity of 9995kg per hour at pouring temperature. The furnace will be fed by automated ladles to eliminate manual feeding done by workers. Oil Forced Water Forced (OFWF) furnace transformers (11kv,570V x4) will be fitted to regulate electric supply to the furnace. The motor control center shall be housed in a four- fold construction panel, fabricated in a 1.6mm powder coated CRCS Sheet. The system will include a cooling tower, furnace pumps and water softening plant. The human involvement in the actual melting platform will be minimal with only two to three qualified workers running the melting operations. The furnace will have a higher melting rating for steel of approximately 10,000kgs/hour which will significantly decrease the heat turnaround time hence increasing the daily smelting capacity. The high production rate will be achieved because the entire scrap melting operations will be mechanized in the following manner.



Figure 1: Dog-House Furnace Hood

1. Use of magnet and grabber to fill scrap the scrap on to the dumper bin.
2. Direct charging of scrap through tilting trolley and vibro-feeder method.
3. Scrap burring process will be done by a motorized remote control poking system.
4. Removal of slag and tapping will also be seamless aided by the slag pot and ladle car trolleying system.

The team of workers who were initially doing the manual charging will be transferred to the scrap yard for segregation and processing the scrap which will translate to better scrap quality for higher productivity and yield.

MSS Conversion/ AOD

The chemical composition of the molten steel is analyzed before the liquid metal is tapped into the ladle by hydraulic tilting and then transferred from the melting furnace to the AOD vessel. High purity oxygen and nitrogen will be blown in the vessel with the liquid steel to oxidizing all unwanted chemical elements which will be removed in form of slag and carbon powder.

Alloys of silicon, manganese and aluminum are finally added to achieve the required chemical composition for reinforcement steel and products from the section mill. The processed liquid metal in the AOD vessel is then poured into a casting ladle and the molten steel is transferred to the Continuous Casting Machine for the casting process.

Direct Charging Continuous Casting Machine

Tononoka Rolling Mills Ltd is seeking to further improve the existing Continuous Casting Machine by installing a direct hot charging casting process. This will bring more benefits as unlike the current CCM model where the cast billets had to cool down to ambient temperature before being transferred manually by trucks to the rolling mill and reheated using heavy furnace oil, the new model will provide for the casting of the liquid metal, and the cast billets will be transferred via high-speed conveyor belt to the rolling mill for further rolling into finished reinforcement steel.

This new model of continuous casting and direct charging ensures a higher degree of automation and will substantially save on energy, reduce cost of production by eliminating burning of furnace oil in the reheating furnace as well as the GHG emissions generated from the reheating furnace.

Air Pollution control System

The air pollution control system will consist of a dog house equipped with Bag filters. Its purpose is to purify fume gas by removing dust particles or particulate matter, ensuring that only clean gas is released through a stack measuring 33 meters in height from ground level. The air pollution control system will comprise of various components such as:

- Dog house type hood
- Hood type assembly
- Pneumatic actuated dilution damper
- Spark arrester
- Bag filter unit – pulse jet

The air pollution control system will be collecting tons of the GHG and particulate matter in form of carbon powder. The waste will be directly filled into sealable plastic

jumbo bags in the bag house chambers. The dog house will be movable through motorized remote control between the two crucibles. Proper handling and disposal measures are already in place to minimize pollution of the environment. The bag filters will also have a maintenance and cleaning schedule to ensure optimum permeability of the filter media.

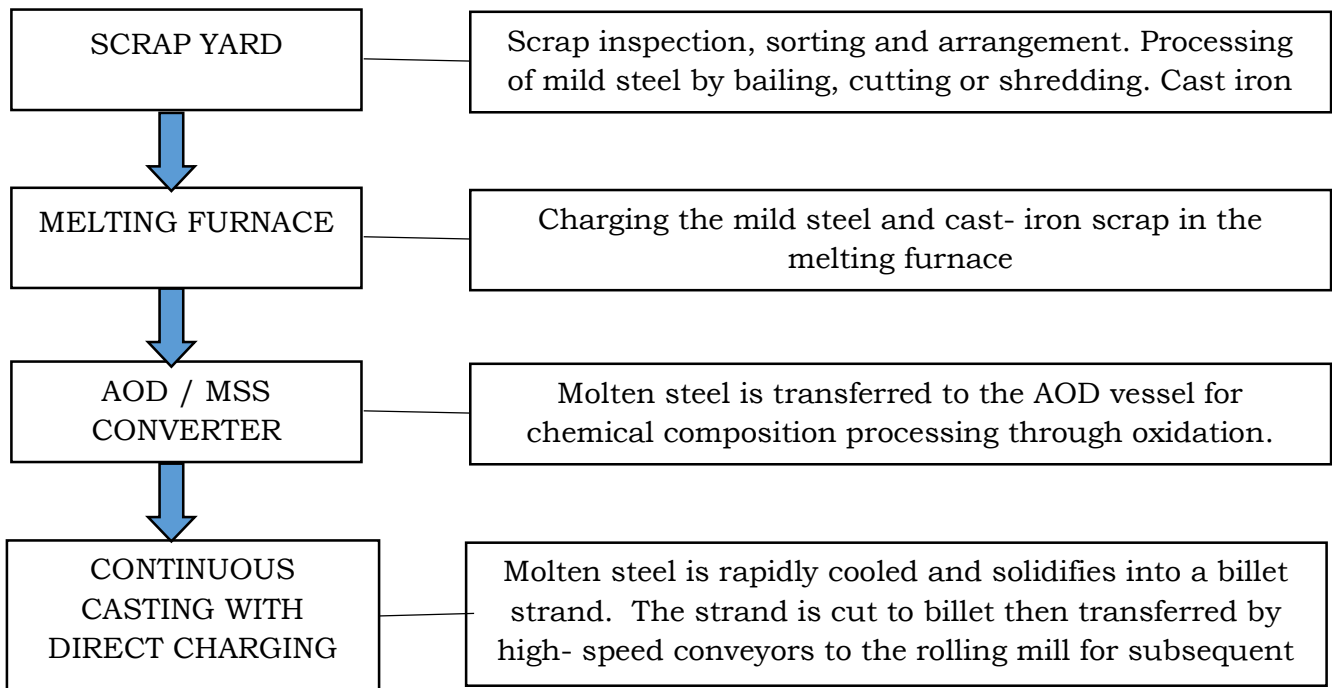
Relocation of oxygen plant

The existing oxygen plant will be relocated to provide room for expansion of the melting shop to accommodate all the proposed components associated with the new furnace installation. Details are provided in the architectural drawings attached here.

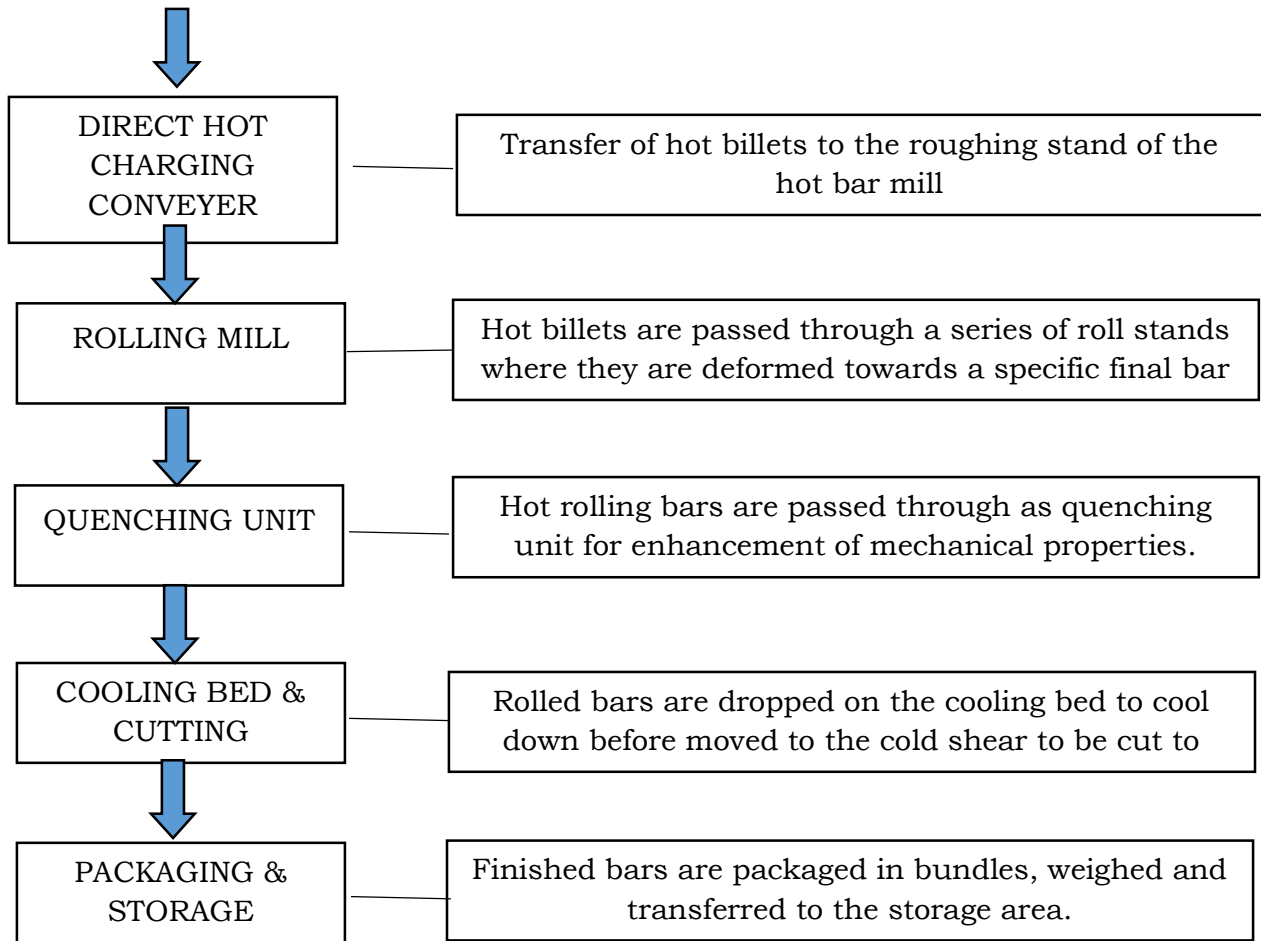
2.2: Operation Phase

2.2.1: Process flowcharts

MELTING SHOP



ROLLING MILL



Rebar Production Process Flow.

The raw material is scrap metal of mild steel and cast-iron grade. the production process is as follows;

i. Collection

It involves collecting ferrous metals mainly mild steel and cast-iron scrap metal. This process involves inspection to ensure scrap metal receive is the right quality and safe for smelting.

ii. Sorting

Once the metals have been collected, the next important step is to sort the metals. This involves segregation of the scrap into heavy, medium, light and cast-iron scrap. These are offloaded at their designated area within the scrap yard. The rejected scrap is weighed and sent back to the vendor.

iii. Processing

After sorting, the next step is to process the scrap metal. This involves reducing the size of the scrap metal by either cutting, bailing or shredding which help to ensure the scrap is safe and easy to smelt.

iv. Melting

The processed scrap is put in bins and taken to the furnace platform for melting. The melting is done in a cycle where mild steel scrap and cast iron is melted together. The chemistry of the molten is controlled with the help of the chemical laboratory. Impurities such as slag is removed to allow more scrap to be added until the furnace molten is full.

v. MSS Conversion / AOD

The molten product is transferred from the furnace to the AOD vessel using the ladle. The chemistry of the molten steel is analyzed before oxygen and nitrogen is added in the molten to oxidize unwanted chemical elements. The refined molten steel at the AOD is then poured in a ladle and transferred to the CCM.

vi. Continuous Casting Machine (CCM)

The molten steel received in a ladle is placed at the top of the CCM section and the molten is allowed to flow into a tundish which directs it into a mold. The molten steel in the mold is cooled rapidly and solidifies to taking shape of the mold. The solidified strand is pushed out and cut to billets. The hot cut billets will immediately be transferred by high-speed conveyor to the rolling mill for direct hot charging and rolling into finished products.

vii. Rolling Mill

The hot billets are then passed through a series of roll stands reducing their cross-sectional area progressively towards the target bar size. The bars are passed through a quenching unit to improve the mechanical properties before proceeding to the cooling bed where they are left to cool down and later cut to the standard 12m lengths.

viii. Packaging and storage.

The finished products in form of 12mts bars are then bundled and color-coded with their respective product size colors. The bundled bars are weighed before being transferred to the storage pockets using the overhead cranes.

2.3: Project inputs and Outputs

2.3.1: Construction Phase

- Labour force – Both skilled and unskilled labour will be required.

- Water – this is to be sourced from a borehole already on site. Water will be required for construction activities, Sanitary purposes and dust control.
- Energy –Energy will be sourced from the National Grid supplied by KPLC. Electricity is expected to be used for certain processes of construction. A stand by generator shall be used as an alternative source of energy in case of power surges. Fossil fuels will be used for vehicular traffic and the back-up generator
- Building Materials -Timber, Steel bars and wire mesh, Ms Plates, Steel and pvc pipes, roofing sheets/iron sheets, Bolts, nuts, gaskets, seals, flanges, Cement, sand, aggregate, Paint, Electric cables, switches, sockets, chains and related components
- Excavation heavy earth moving equipment – excavator, trucks,

2.3.2: Operation Phase

Project inputs include scrap metal, water, electricity, furnace oil, silico manganese, lime, aluminum, ferro silicon for steel production and; natural air for the production of oxygen/nitrogen. The oxygen and nitrogen gases are used in the decarbonisation unit for refining the molten steel by lowering the carbon percentage. Manufacturing process will yield various steel products including TMT bars, steel angles, flats, IPE, Beams, Channels among others. By products include Mill Scale, Off Cuts & carbon powder.

2.4: Waste Management

A summary of the types of waste anticipated throughout the project cycle are classified in the table:

Table 1: Types of waste throughout the project

Type of waste	Management
Construction debris	Recovered scrap during construction would serve as primary raw-material for the production of steel billets to be converted to various steel products in the hot rolling mill plant for use in the fabrication and construction industry. Any other waste to be carted away for proper disposal
Slag and carbon powder	Collection by NEMA licensed handler
Assorted office waste	Collection by NEMA licensed handler
Rejected scrap	Returned to supplier
Mill scale	Collection by NEMA licensed handler
Refractory waste	Collection by NEMA licensed handler
Baghouse waste	Collection by NEMA licensed handler
Domestic waste water	Connected to NCC sewer
Industrial waste water	Recycled in a closed loop processing
Storm water	Storm water drain
Air emissions	Pollution control system

A detailed plan is provided in the subsequent section.

2.4.1: Extended Producer Responsibility

The Extended Producer Responsibility (EPR) model is based on the polluter-pays principle, which aims to include producers of material goods in the management and treatment of waste and keep raw materials and goods in the economic cycle. Section 13 of the Sustainable Waste Management Act, requires every producer to bear mandatory extended producer responsibility to reduce pollution and environmental impacts arising. The study shall include a detailed description of the various waste streams, management and take back systems within the facility. Tononoka Rolling Mills does not package its products in any way. The steel products are sold directly from the factory and are used in various structural purposes but all the scrap is always reabsorbed back to the mill to manufacture more products.

The company however maintains an updated record of the waste and by products from the manufacturing process and has developed ways of taking back or safely disposing according to the requirements for sustainable waste management. The average quantities of various types of waste generated are as shown in Table***

Table 2: Current Waste Management practices

	DESCRIPTION OF SOLID WASTE	UNIT	AVG. MONTHLY GENERATION	DISPOSAL
1	Internal scrap from mill	Ton	350	TONONOKA MELTING SHOP
2	Furnace slag	Ton	800	EASY BINS ENTERPRISES LTD
3	General waste	Ton	2	EASY BINS ENTERPRISES LTD
4	Furnace dust powder	Ton	60	SHEASHI CLEANING SERVICES
5	Mill scale	Ton	120	BAMBURI CEMENT
6	Used oil and sludge	Lts	250	POWEREX LUBRICANTS LTD
7	Electronic & electrical waste	Kgs	20	WEEE CENTER
8	Paper waste	Kgs	100	TONONOKA PAPER

2.5: Environmental, Health & Safety (EHS) Management Plan

Tononoka Rolling Mills has an established EHS policy and committee that meets on a quarterly basis to ensure implementation of safe work processes for both environmental and human wellbeing. The company has committed to comply to relevant statutory requirements to ensure this. Additionally, for the purposes of this project an EHS Management Plan has taken into account the following aspects:

Employee Participation: All managers, employees and contract workers are responsible for the successful implementation of the Health and Safety System. Management organizes and leads the initial effort, and the employees are fully involved in its implementation and improvement because they are the people who know the most about how a process really operates, and they are the ones who have to implement recommendations and changes. Specifically, this is fundamentally a line responsibility.

Process Safety Information: Complete and accurate written information concerning process chemicals, process technology, and process equipment is essential to an effective process safety management program and to a process hazard analysis. The compiled information will be communicated appropriately to a variety of users including the team performing the process hazard analysis as required by company management, those developing the training programs and the operating procedures; contractors whose employees will be working with the process; as well as local emergency preparedness planners, and insurance and enforcement officials.

Process Hazards Analysis: A Process Hazard Analysis (PHA) is used to assist employers and employees in making decisions for improving safety and reducing the consequences of unwanted or unplanned risks and hazards. The PHA focuses on equipment, instrumentation, utilities, human actions (routine and non-routine), and external factors that might affect the manufacturing process.

Operating Procedures: The operating procedures will need to be technically accurate, understandable to employees, and revised periodically to ensure that they reflect current operations. The process safety information package helps to ensure that the operating procedures and practices are consistent with the known hazards of the process and that the operating parameters are correct. Operating procedures are reviewed by engineering staff and operating personnel to ensure their accuracy and that they provide practical instructions on how to actually carry out job duties safely. The specific instructions should include the applicable safety precautions and appropriate information on safety implications. For example, the operating procedures addressing operating parameters contain operating instructions about pressure limits, temperature ranges, flow rates, what to do when an upset condition occurs, what alarms and instruments are pertinent if an upset condition occurs, and other subjects. Control room personnel and operating staff, in general, have a full understanding of operating procedures. In addition, operating procedures are changed

when there is a change in the process. The consequences of operating procedure changes are fully evaluated and the information conveyed to the personnel. For example, mechanical changes to the process made by the maintenance department (like changing a valve from steel to brass or other subtle changes) are evaluated to determine whether operating procedures and practices also need to be changed. All management of change actions are coordinated and integrated with current operating procedures, and operating personnel are alerted to the changes in procedures before the change is made. When the process is shut down to make a change, then the operating procedures are updated before starting the process.

Employee Training: All employees, including maintenance and contractor employees involved in either construction or operation activities fully understand the safety and health hazards associated with the processes they work with so they can protect themselves, their fellow employees, and the citizens of nearby communities. Training informs employees about the chemicals they work with and familiarize them with reading and understanding Material Safety Data Sheets (MSDSs). However, additional training in subjects such as operating procedures and safe work practices, emergency evacuation and response, safety procedures, routine and non-routine work authorization activities, and other areas pertinent to process safety and health are covered by the employer's training program. In establishing their training programs, employers clearly identify the employees to be trained, the subjects to be covered, and the goals and objectives they wish to achieve. The learning goals or objectives are written in clear measurable terms before the training begins.

Contractors: The company has established a screening process so that they hire and use only contractors who accomplish the desired job tasks without compromising the safety and health of any employees at a facility. In addition, the company ensures that the contractor has the appropriate job skills, knowledge, and certifications (e.g., for pressure vessel welders). Contractor work methods and experience are evaluated. Considering that contractors often perform very specialized and potentially hazardous tasks, such as confined space entry activities and non-routine repair activities, their work must be controlled while they are on or near a process. Necessary permits must be obtained before any works begin.

Pre-Startup Safety Review: For new or modified processes, like with the new furnace, the company fully evaluates the initial startup procedures and normal operating procedures before the pre-startup review to ensure a safe transfer into the normal operating mode. For existing processes that have been shut down for turnaround or modification, the company ensures that any changes other than "replacement in kind" made to the process during shutdown go through the management of change procedures. Piping and Instrumentation Diagrams (P&IDs) are updated, as necessary, as well as operating procedures and instructions. If the changes made to the process during shutdown are significant and affect the training

program, then operating personnel as well as employees engaged in routine and non-routine work in the process area may need some refresher or additional training.

Mechanical Integrity of Equipment: Elements of a mechanical integrity program include identifying and categorizing equipment and instrumentation, inspections and tests and their frequency; maintenance procedures; training of maintenance personnel; criteria for acceptable test results; documentation of test and inspection results; and documentation of manufacturer recommendations for equipment and instrumentation.

Incident Investigation: The intent of an incident investigation is for the company to learn from past experiences and thus avoid repeating past mistakes. The company has developed inhouse capability to investigate incidents that occur in their facilities. There is a multi-disciplinary team that is trained in the techniques of investigation including how to conduct interviews of witnesses, assemble needed documentation, and write reports. Team members are selected on the basis of their training, knowledge and ability to contribute to a team effort to fully investigate the incident.

Emergency Preparedness: The company has an emergency action plan in case of accidents like spills or fires that facilitates the prompt evacuation of employees when in case of such incidences. This means that the employer's plan will be activated by an alarm system to alert employees when to evacuate, and that employees who are physically impaired will have the necessary support and assistance to get them to a safe zone. The intent of these requirements is to alert and move employees quickly to a safe zone or assembly point.

Compliance Audits: The company has a trained individual to audit the process safety management system and program. The audit includes an evaluation of the design and effectiveness of the process safety management system and a field inspection of the safety and health conditions and practices to verify that the employer's systems are effectively implemented. For detailed audits, an external consultant is contracted to undertake the task. The essential elements of an audit program include planning, staffing, conducting the audit, evaluating hazards and deficiencies and taking corrective action, performing follow-up and documenting actions taken

Hot Work: Common hot work processes are welding, soldering, cutting and brazing. When flammable materials are present processes, such as grinding and drilling become hot work processes. Fire prevention measures will be implemented by all the contractors as well during construction.

3.0: ENVIRONMENTAL BASELINE OF THE PROJECT

3.1: Bio-Physical Aspects

The baseline condition is dependent on the geographical and physical orientation of the zones. The physical characteristics of the proposed project site is described in terms of soils, geology, topography, drainage, climate, ambient noise levels and ambient air.

Drainage and topography

Nairobi Metropolitan Region sits on a drainage basin between highlands in the northwest and plains east of the city. The main river in the Nairobi (the Central Zone) is the Nairobi River flowing through the city. It is the main river of the Nairobi River basin, comprising of several parallel streams flowing eastwards. All of the Nairobi Basin Rivers joins together east of Nairobi and meet the Athi River, eventually flowing to the Indian Ocean. Nairobi River tributaries include Ruiru River, Kamiti River, Rui Ruaka, Karura River, Gitathuru River, Mathare River, Kirichwa and Motoine-Ngong River. The Motoine River flows to the Nairobi Dam and further onwards the stream continues as Ngong River. All these rivers suffer from contaminations by agriculture, slums and industrial areas. During the rainy seasons, the discharge tends to multiply, causing floods on low-lying riverbanks. Nairobi's watercourses divide the city as the main roads are generally aligned along these rivers in roughly east-west orientation, while only few roads cross them.

Hydrology

Nairobi City lies east of the Ngong Hills and this situation shapes the City's topography. As can be seen from the Figure below, the western part of Nairobi lies on high ground with a rugged topography and elevations of approximately 1700 to 1850 m above sea level (ASL). The terrain then gradually falls towards the east reaching about 1600 m ASL around Athi River at the north-eastern outskirts of the City. The project is located at an elevation of about 1655m ASL.

Climate

Nairobi's elevation strongly influences the City's climate. The temperatures in Nairobi are fairly uniform with coolest temperatures occurring from June to August, while the hottest temperatures typically occur from December to March. Nairobi has a bimodal rainfall regime with long and short rainy seasons in March-May and October-December respectively. Northeast monsoons are common during December to February, and southeast monsoons during June to August are associated with depressed rainfall conditions. The mean annual rainfall in Nairobi ranges between 800 mm and 1 300 mm per annum. More than 50 % of the total rainfall occurs during the long rainy season.

The mean monthly relative humidity varies between 36 and 55 per cent. The mean daily sunshine hours vary between 3.4 and 9.5 hours (CBS 2003). The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. The project site will therefore assume the climate of the larger Nairobi area.

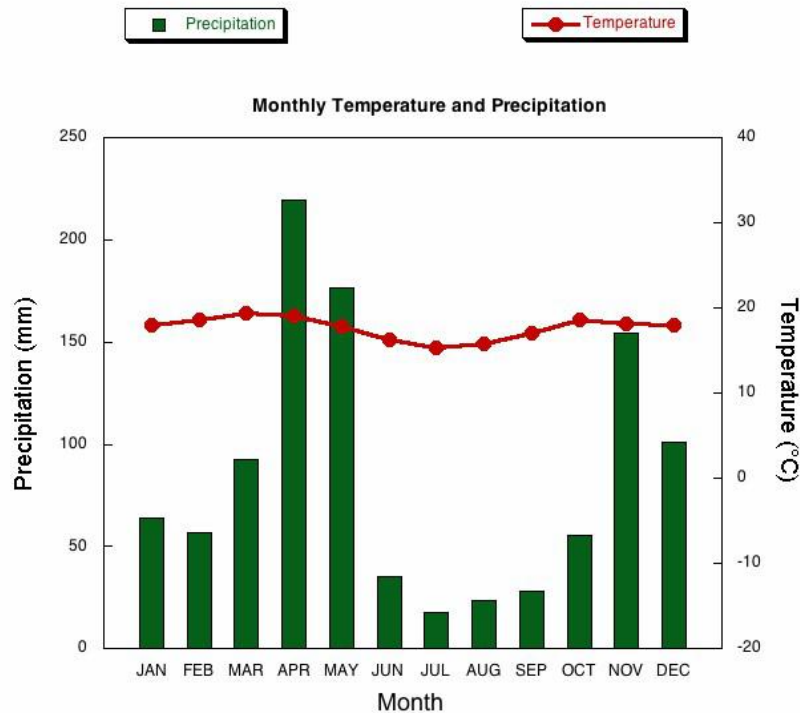


Figure 2: Nairobi monthly average temperature and rainfall

Source: <http://drought.unl.edu/archive/iclimographs/NairobiMetric.htm>.

Winds

The wind near the ground is very predominantly easterly throughout the year, generally between north-east and east from October to April, and between east and south-east from May to September. The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 25 mph are common from mid-morning to early afternoon; at other times of the year winds speeds are usually 10 to 15 mph. During the night the wind is usually light. In the squalls sometimes associated with thunderstorms, short-lived of up to 70 mph. have been known to occur.

Sunshine and Solar Radiation

Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to an annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average

daily sunshine in Nairobi is 4 hours. Often there are several days in succession when the sun fails to penetrate the thick stratocumulus cover, although on other days the cloud cover does break for a short period. There is about 30% more sunshine in the afternoon than in the morning, and it follows that westerly exposures receive more insulation than easterly ones.

Geology and Soils

Nairobi Metropolitan area lies within a volcanic setting that resulted from rift valley formation. The geology of the area comprises the Nairobi Trachytes extending from Dagoretti – Karen up to the east of Nairobi, and towards north of Kiambu and Githunguri; impermeable Nairobi Phonolites between the Nairobi National Park and Kiambu and resting directly on the Athi Series and the Kapiti Phonolites which are also overlain by the Athi Series. The Upper Athi Series formations mainly consist of sandy sediments; gravel, or pebble beds, tuffs and pyroclastic sediments. The CBD is covered by various forms of Trachyte, (Sag Gerson, 1991).

Soils in the area have developed on tertiary basic igneous rocks (olivine basalts and nepheline phonolites) and are mostly black cotton soils. These soils are imperfectly drained, very deep, dark grey to black, firm to very firm and are usually boulder and stony due to cracking clay. (Ministry of Roads, 2012). Soils around the site have been disturbed by human activities over a long period of time.

Ambience and Air Quality

Nairobi is faced with two major issues as far as the atmospheric environment is concerned: climate change and air quality deterioration. These are mainly the result of anthropogenic activity in the transport, energy and industrial sectors. The main sources of atmospheric pollution are vehicles, industries, emissions from the use of charcoal and firewood for energy, and other municipal sources such as suspended particulate matter from dust and the open burning of waste. The project area lies in Nairobi, an urban area, where the major sources of air pollution are as a result of industrial, construction, increased development activities and their related amenities

An illustration of the average total suspended solids (TSS) over parts of Nairobi as measured in 2001 is shown in figure 3-3 below. Areas were classified as having LOW (< 90 µg/m³ annual mean), MEDIUM (90 – 180 µg/m³) and HIGH (>180µg/m³) levels of TSP. LOW means that the TSP levels are below the WHO recommended mean value of 90 µg/m³; MEDIUM means that the WHO recommendation is exceeded by up to a factor of 2, while HIGH means that the WHO guideline is exceeded by more than a factor of 2. The results of this study showed that the levels of TSS were above WHO recommended levels in most parts of the city, including the location of the proposed project. Poor air quality has been identified as a contributing factor to the high rates of respiratory illnesses in Nairobi where, as of 2014, respiratory diseases were listed as the third highest cause of death

An air dispersion modelling will be conducted by the proponent following completion of this project. The results will be submitted to NEMA. The air quality is expected to be impacted by installation/construction, operation and demolition activities during the construction phase. However, implementation of the proposed recommended measures will keep the levels within the acceptable limits.

Noise Quality

The noise levels are well within the National Standards prescribed for an industrial area.

Flora and Fauna

The rapid urbanization witnessed in Nairobi has led to degradation and loss of most of its biological environment. The city was once referred to as “Green City in the Sun” because it had a landscape which was characterized by natural forests, labyrinthine riverine ecosystems, and wetlands. Despite rapid changes brought by urbanization, Nairobi has retained green spaces such as Nairobi National Park; Karura Forest, Ngong Forest, City Park, Ololua Forest and Nairobi Arboretum. Green spaces in Nairobi, both within the urban centre and the surrounding area, are under threat from urban expansion and environmental degradation. At present, around 5.3% of the built-up area in the city comprises public open spaces, which equates to a very small area per capita. According to a study by Kenya Forest Service (KFS, 2013) the national tree cover is about 7.2% while that of Nairobi City County is 7.6%; however, there is a national forest target of 10% of land area, and the major afforestation effort would have to be in community and private lands. There are numerous parks and forests close to the city that are home to many different species of wildlife and serve as recreational spaces as well. The proposed site is within an industrialized zone and has no natural vegetation within or in the neighbouring vicinity. However, the proponent intends to retain some portions of land for landscaping between built areas and at the boundaries of the property. A few bird species were noted but are none of the endangered species has been recorded within the area.

3.2: Social Environment

The social environment in the area consists of several business established enterprises, Industries and residential area. The interaction of these establishments with people in the area and outside the area is part of the functional Nairobi social environment. Currently the social environment around the area auger well with movement of people, goods and delivery of services due to the existing infrastructure such as roads, sewer lines, power lines and commercial buildings.

Demographics

According to the 2009 national Census, Nairobi County had a population of 3,134,265 people. The population increase is projected to be over 4,000,000 by the year 2017

and over 5,000,000 by the year 2030 according to Kenya Bureau of Statistics. With this data, it is clear that the project is in line with the demand of food commodity in the County and the larger Nairobi Metropolitan region.

Road, Railway Network and Airports

The current road network in the County is inadequate in terms of coverage to meet current and future demands as envisaged in the Vision 2030. There is heavy congestion on most of the City's roads especially during the morning and evening peak hours. The total road network covers 3,602 Km out of which 1,735 Km are tarmac while 1867 Km are earth roads.

Nairobi County hosts three airports; Jomo Kenyatta International Airport, Wilson Airport and Eastleigh Airport. Jomo Kenyatta International Airport (JKIA) is the biggest airport in East and Central Africa, and is the focal point for major aviation activities in the region.

The County has a railway network of 75 Km and a total of 10 functional railway stations which are: Embakasi, Makadara, and Nairobi main terminal, Dandora, Githurai, Kahawa, Kibra, Dagoretti, JKIA and Syokimau. The established Makadara and Imara Daima railway stations and expansion of Nairobi platform has improved public transportation in Nairobi and with-it socioeconomic development

Traffic of the regional towns is characterized by high intensity of walk trips, long trip lengths by vehicles, high share of work trips and high dependence on public transport modes, primarily the matatus (mini buses and light vehicles). In addition, there are light transport means including motor bikes and bicycles as well as pedestrian walking.

Health facilities within the Embakasi area comprises of public facilities sponsored by the central government or the Nairobi City County. There are also health facilities sponsored by religious organizations where services are offered at cost or private clinics that are distributed within the estate which is the vicinity of the project site.

Water, Sewerage and Sanitation

Most parts of Embakasi area are connected to Nairobi City Water Supply mains and the main sewerage reticulation system for the city that follows the natural drainage system that drains through the area. Approximately 97% of all properties along the railway line are on main sewer. The same neighborhoods are supplied with water from common stand pipes where the residents buy water for domestic use. Water is supplied by Nairobi City Water and Sewerage Company (NCWSC).

Garbage collection is in-adequate and there are mounds of un-collected garbage along the drainage corridors and along the railway line. A mound of un-collected garbage

that is generated from the neighborhood and the trading activities in the vicinity is evident along the project area.

Land use

Industrial and commercial land has dwindled in the last decade and many industries have been relocating to other counties particularly Machakos. The projected housing land requirement is estimated to be 250 Km². Land meant for urban agriculture has been on the decline as more of it is turned to residential use with the city relying on other counties for supply of food. Industries are largely concentrated in Industrial Area, Kariobangi South and Baba Dogo. Industries in Nairobi cover various sectors including chemicals and allied industries, food and beverages, pharmaceuticals and medical equipment, metals, textiles, building mining and construction, as well as agriculture and fresh produce. Most of the formal sector wage employment in Kenya is in public sector, banking and ICT.

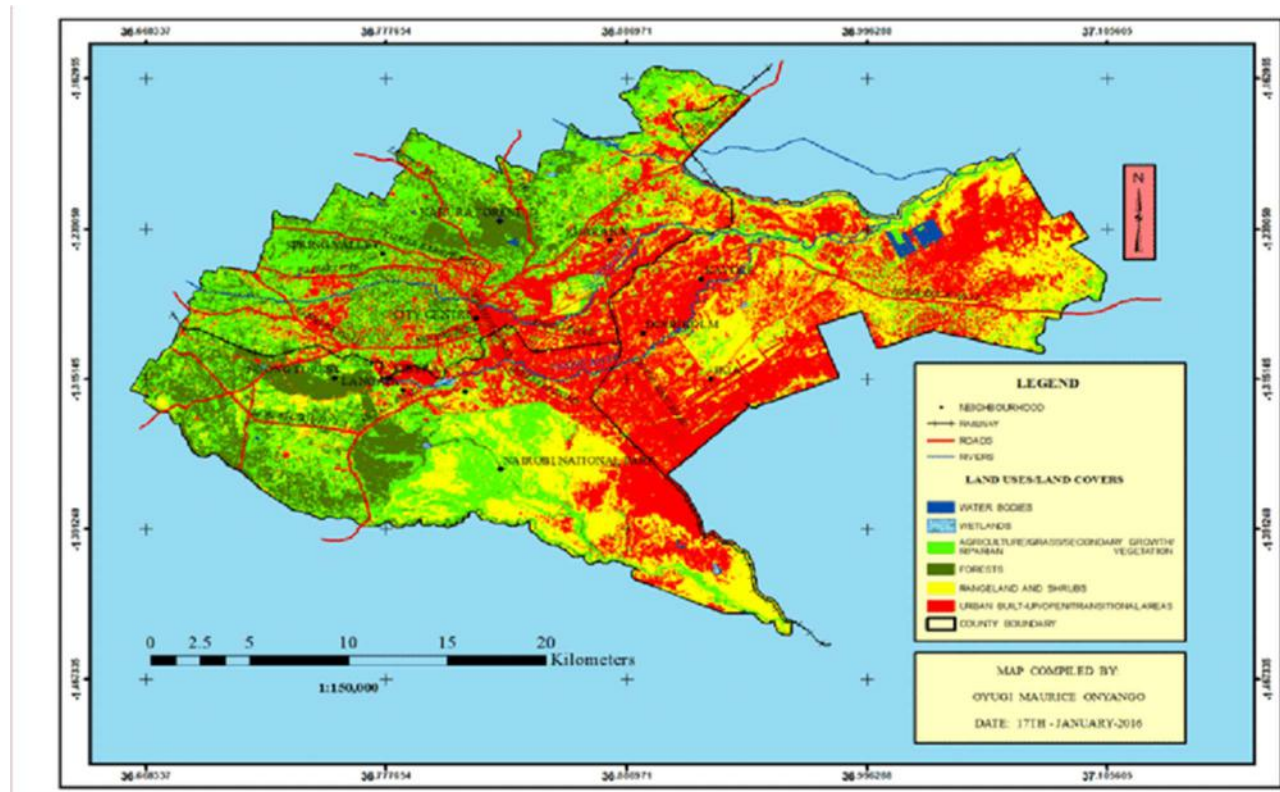


Figure 3: Land use in Nairobi County

Energy Access

The main sources of energy in Nairobi County are electricity, solar, liquefied petroleum gas (LPG), biogas, paraffin, charcoal and firewood. Lack of access to clean sources of energy is a major impediment to development due to health-related complications such as increased respiratory infections and air pollution. For instance, 63.2 % of the

population use paraffin as cooking fuel. Other sources of energy for cooking include LPG (20.2 %), charcoal (10.5 %) and firewood (1.8 %). About 68.2 % of households use electricity as a means of lighting 28.8 % use paraffin while 2.9 % and 1.7 % use grass and dry cells respectively.

There is adequate power infrastructure within the vicinity of the proposed site that can be reinforced by KPLC for the provision of the power requirements of the proposed project. The proposed project will also make provisions for installation of solar power to supplement the demand for electricity.

Economic outlook

Nairobi is the major commercial and industrial hub of not only the country but is also the regional and international headquarter for several commercial and public institutions that include multinational companies and United Nations agencies.

The informal sector covers economic activities at a small scale that are mostly unregulated, simple in its technological use, semi- organized and employs few people per establishment. However, according to the Kenya National Population and Housing Census 2009, there were roughly four times as many people self-employed in the informal sector compared with those in formal wage employment. Despite the range of opportunities available, roughly 60% of the population lives in densely populated slums (although estimates vary, and the figure may be higher). Therefore, Nairobi is characterized by significant inequalities in terms of housing, employment, and access to services.

4.0: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The law has made provisions for the establishment of the National Environmental Management Authority (NEMA), which has the statutory mandate to supervise and coordinate all environmental activities. The Environmental Management and Coordination Act, 1999 and Environment Management Coordination (Amendment) Act, 2015, and the Environmental (Impact Assessment and Audit) Regulations, 2003, are the legislation that governs Environmental Impact Assessment (EIA) studies.

Policies and legislation highlighting the legal and administrative requirements in Kenya particularly for environmental management, protection and assessment pertinent to this proposed Project are presented below:

4.1: Policy Framework

Applications of national statutes and regulations on environmental conservation suggest that the owner of any project has a legal duty and responsibility to discharge wastes of acceptable quality to the receiving environment without compromising public health and safety. This position enhances the importance of an EIA for the proposed project to provide a benchmark for its sustainable operation when it is finally commissioned. Tononoka Rolling Mills complies with government policy framework by the act of the proponent conducting EIA study before initiating any civil works on the project.

The Constitution of Kenya 2010

The Constitution of Kenya, promulgated into law on 27 September 2010, is the supreme law of the Republic: It provides the broad framework regulating present and future development aspects of Kenya and along which all national and sectoral legislative documents are drawn.

With regard to environment, **Section 42** inside the Bill of Rights of the Constitution, states that: every person has 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 and other measures; particularly those contemplated in Article 69; and to have obligations relating to the environment fulfilled under Article 70.

Chapter 5 of the new constitution provides the main pillars on which the 77 environmental statutes are hinged and covers "Land and Environment" and includes the aforementioned articles 69 and 70. Part 1 of the Chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. Part 2 of the Chapter directs focus on the environment and natural resources. It provides for a clear outline of the state's obligation with respect to the environment. The Chapter seeks to eliminate processes & activities likely to endanger the environment.

Article 69 states that the State shall:

- Ensure sustainable exploitation, utilisation, 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 percent 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 on environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and,
- Utilise the environment and natural resources for the benefit of the people of Kenya.

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this Chapter. In conformity with the Constitution of Kenya 2010, every activity or project undertaken within the Republic of Kenya must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment.

Section 70 provides for enforcement of environmental rights thus:

1. If a person alleges that a right to a clean and healthy environment recognised and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.
2. On application under clause (1), the court may make any order, or give any directions, it considers appropriate —
 - a) to prevent, stop or discontinue any act or omission that is harmful to the environment; (b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or

- b) To provide compensation for any victim of a violation of the right to a clean and healthy environment.
- c) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

Essentially, the New Constitution has embraced and provided further anchorage to the spirit and letter of the Environmental Management and Co-ordination Act (EMCA), 1999, whose requirements for environmental protection and management have largely informed Sections 69 through to 71 of the Document. In Section 72 however, the new constitution allows for enactment of laws towards enforcement of any new provisions of the Supreme Law. The proposed project complies with the Constitution by proposing a framework in its ESIA on Social, Health, safety and environmental protection.

The Kenya Vision 2030

This national development blueprint for period 2008 to 2030 aims to transform Kenya into a middle-income country with a consistent annual growth of 10 % by the year 2030. The economic pillar aims to improve the prosperity of all Kenyans through an economic development programme, covering all regions of Kenya. The social pillar seeks to build a just and cohesive society with social equity in a clean and secure environment. The political pillar aims to realize a democratic political system founded on issue-based politics that respects the rule of law and protects the rights and freedoms of every individual in the society. Vision 2030 proposes intensified application of Science, Technology and Innovation to raise productivity and efficiency levels across the three pillars. It realizes the critical role played by research and development in accelerating economic development. Tononoka Rolling Mills production activities support the objectives of Vision 2030.

Sessional Paper No. 6 of 1999 on Environment and Sustainable Development

This policy advocates for consideration of the environment in developments, plans and programs; undertaking of an environmental impact assessment prior to implementation of a project and conformity of effluent treatment standards to acceptable health standards during operation phases. It additionally seeks to promote increased public awareness raising, appreciation of clean environment as well as the participation of stakeholders in the management of wastes within their localities. The company has established mechanisms for proper waste collection and disposal.

Sessional paper no 10 of 2014 on the national environment policy

This Policy proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various

policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal. On environmental quality and health, this policy states that life depends on a clean and healthy environment. It states that the government will; promote environmental health impact analysis as a component of EIA and EA for all development, enhance provision of occupational health and safety services and uphold capacity building in the field of health impact analysis. The company promotes wise use of resources and where possible, reuse or recycle some wastes. Proper management of wastes as well health and safety of occupants and employees is always upheld. It also complies with all environmental regulatory framework.

National Environmental Action Plan (NEAP)

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

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

National Adaptation Plan (2015-2030)

This plan is a critical response to the climate change challenge facing our country. The NAP is Kenya's first plan on adaptation, and demonstrates our commitment to operationalize the National Climate Change Action Plan by mainstreaming adaptation across all sectors in the national planning, budgeting and implementation processes. Our mainstreaming approach recognizes that climate change is a cross-cutting sustainable development issue with economic, social and environmental impacts. The NAP sets out Kenya's national circumstances, focusing on current and future climate trends, and describes the country's vulnerability to climate change. The NAP also elaborates institutional arrangements, including monitoring and evaluation processes. Priority actions are identified in 20 planning sectors for the short, medium and long term. This builds on the premise that all our socioeconomic sectors are vulnerable to climate change impacts, although the manifestation of these impacts may vary from one sector to the other.

Nairobi County Integrated Development Plan 2018-2022

The NCIDP recognizes the significance of having orderly urban planning and land use. The existing urban structure is inefficient, leading to traffic congestion and the

concentration of economic activities at the urban core. Therefore, the county commits to promoting spatial order for sustainable development by guiding development and inculcating environmental aspects into urban development. The facility has complied with land use zoning as provided by the Nairobi County Government.

4.2: Legal and regulatory framework

The Environment Management and Coordination Act (EMCA), 1999 and Environment Management Coordination (Amendment) Act, 2015

The EMCA is an act of Parliament that provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto (in line with Article 42 of the constitution), as well as providing the necessary mechanism to monitor that, which include environmental impact assessment, environmental auditing and monitoring as prescribed by Article 69 of the Constitution.

The Act further aims to improve the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment so as to enhance the national capacity for its effective management. In addition, the Act seeks to harmonize all the 77 sector-specific legislation touching on the environment in a manner designed to ensure protection of the environment. As the principal environmental legislation in Kenya, EMCA sets the legal framework for environmental management basically as follows:-

Part II of the Act states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment.

In order to ensure the achievement, part VI of the same Act directs that any proponent of a new project, activity or operation should undertake an Environmental Impact Assessment (EIA) and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue a license as appropriate; while projects already in place will undertake annual Environmental Audits (EA).

Section 58 of the Environmental Law requires that notwithstanding any approval, permit or license under this Act or any other law in force in Kenya, any person being a proponent of a project, shall before financing, commencing proceeding with carrying out, executing or conducting or causing to be financed, commenced, proceed carried out, executed or conducted by another person for any undertaking specified in the second schedule to this Act, submit a project report to the Authority in the prescribed form, giving the prescribed information.

Section 68 and 69 of EMCA requires all on-going projects to conduct an EA with a view to finding out if the processes and activities have any negative impacts on the environment and to propose any mitigation measures to counter such impacts. EA are further expounded in Regulation 35 (1) and (2) of Legal Notice 101 of June 2003.

The Proposed project falls under the requirement of this Act.

The Proponent has commissioned the environmental impact assessment study in compliance with the Act.

The Proponent shall be required to commit to implementing the environmental management plan laid out in this report, and other conditions for approval by NEMA prior to issuing of the EIA licence.

Environmental Impact Assessment and Audit Regulations, 2003

At the national level, Kenya has put into place necessary legislation that requires EIA be carried out on every new project, activity or programme (EMCA), and a report submitted to the National Environmental Management Authority (NEMA) for approval and issuance of relevant license. These Regulations provide procedures for conducting an EIA study and detail the parameters to be evaluated during the study. It also provides guidelines on conducting environmental audits and development of project monitoring plans. In particular, specifications of these guidelines indicate that no proponent should implement a project which can have a negative environmental impact. The proposed project is classified under Second Schedule of Legal Notice No. 150 (Environmental Management and Coordination Act (1999), and therefore is required to undergo Environmental Impact Assessment

In addition to the legal compliance above, the following legal aspects have also been taken into consideration.

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

The Waste Management Regulations (2006) are contained in the Kenya Gazette No. 69; Legal Notice No. 121. The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams.

The Regulations requires the Proponent to:

- Acquire valid EIA license from NEMA prior to engaging in an activity that can generate hazardous substance
- Segregates their waste (hazardous and non- hazardous) by type and then disposes the wastes in an environmentally acceptable manner.
- Contract a NEMA licensed waste handler to collect and disposed-off.
- Ensure waste is in a licensed disposal facility.
- Label hazardous wastes containers in accordance with the requirements provided in section 18 of the Regulation.

The Proponent shall ensure that the measures are observed during installation and operation of the proposed project to enhance sound environmental management of waste.

Environmental Management and Co-ordination Act (Water Quality) Regulation 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams,' springs, wells and other water sources). It is an offence under Regulation No.4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment

Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

Limited waste water will be generated as the process water will be recycled into the system. Subsequently, all the waste water will be channelled into the sewer line. Though the site has no stream or river, the proponent will ensure that appropriate measures to prevent pollution of underground and surface water resources are implemented throughout the project cycle.

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

Noise and Excessive Vibrations Pollution Control) Regulations, 2009 are contained in Legal Notice No. 61. The regulations define noise as any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment. The regulations prohibit any person from making or causing 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.

Article 13 2(d) of the regulations allows for construction work at night for public utility construction, construction of public works, projects exclusively relating to roads, bridges, airports, public schools and sidewalks, provided noise generated is not caused within a residential building or across a residential real property boundary where such noise interferes with the comfort, repose, or safety of the members of the public. The second Schedule of the Regulations provides for the maximum permissible level of noise at construction sites.

Under section 15, the Regulations require the Proponent during EIA studies to:

Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from construction or demolition;

Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction or demolition noise or vibration impacts, incorporate the needed abatement measures in the plans and specifications.

It is anticipated that the proposed project will generate limited noise and/or vibration during the construction phase that will originate from the construction equipment, vehicles and the workers as limited excavations will be undertaken at the site. It is therefore recommended that the construction team adheres to mitigations measures in EMP to reduce noise propagation in the project area. Should the emitted noise exceed 75 dB (A) beyond the property boundary during the construction phase the proponent should apply for a permit as per the provisions of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009.

Air Quality Regulation, 2014

This regulation is referred to as “The Environmental Management and Coordination (Air Quality) Regulations, 2014”. The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air.

It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set.

The Regulations prohibits the Proponent from:

Acting in a way that directly or indirectly cause or may cause air pollution to exceed levels set out in the second Schedule to the Regulations

Allowing particulates emissions into the atmosphere from any source not listed in the six schedules of the Regulations. Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed those stipulated under second Schedule.

Allowing (during construction and demolition) emission of particulate matter above the limits stipulated in second Schedule

Causing or allowing stockpiling or storage of material in a manner likely to cause air pollution

Causing or allowing emissions of oxides of nitrogen in excess of those stipulated in the eleventh Schedule of the Regulation

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in the EIA document e.g. incorporating air pollution control technologies in an effort to comply with the provisions of these Regulations on abatement of air pollution.

The provisions of this Act will be applied by the Proponent in the management of the project where the contractor will be required to adhere to the provisions of this regulation.

National Sand Harvesting Guidelines, 2007

These Guidelines apply to all sand harvesting activities in Kenya to ensure sustainable utilization of the sand resource and proper management of the environment. Among key features, the guidelines empower respective CECs to regulate sand harvesting within areas of jurisdiction implying that, sand should only be sourced from approved sites and by approved dealers.

The project will commit to the fulfilment of the guidelines.

The County Government Act 2012

The County Government Act of 2012, which has been adapted to the Constitution's State and County structure in relation to devolution, declares the County Integrated Plan to be central to the County's administration and prohibits any public spending outside of the plan. The Act clarifies that the County Integrated Plan to be broken down into the economic plan, physical plan, social environmental plan and spatial plan. Also, the Act states that in order to harmonise and facilitate development each County shall formulate the following Plans:

- County integrated development plan
- County Sectoral action plans
- County spatial plan
- Cities and urban areas plan and Acts as stipulated by Urban Areas and Cities Act, NCC Solid Waste Management Act.

The Act also stipulates that the County Government will be responsible for functions stipulated in article 186 and assigned in the Fourth Schedule of the Constitution which includes control of air pollution, noise pollution, other public nuisances and outdoor advertising.

The Proponent will ensure the project will be compliant with County Government Act 2012 by controlling all forms of pollution. Additionally, an Environmental Management plan has been provided in the EIA report with measures for mitigating potential environmental pollution anticipated from the development of the project.

Occupational Safety and Health Act OSHA, 2007

The Occupational Safety and Health Act, 2007, is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces. The Act applies to all workplaces and workers associated with it; whether temporary or permanent. The main aim of the Act is to safeguard the safety, health and welfare of workers and non-workers in workplaces, and for matters incidental thereto and connected therewith.

Part II of the Act provides the General Duties that the Occupier must comply with respect to health and safety in the workplace. Such duties include undertaking S&H risk assessments, S&H audits, notification of accidents, injuries and dangerous occurrences, etc. A number of sections under this part shall be applicable to the proposed project.

Part III of the Act provides the administrative framework for supervision of the Act.

Part IV deals with the enforcement provisions that the DOSHS has been provided with under the Act. It discusses the instances when Improvement and Prohibition Notices can be issued as well as the powers of OSH officers. This part of the Act will be mandatory for the Occupier to comply with for the proposed project.

Part V of the Act requires all workplaces to be registered with the DOSHS. This part will be applicable for the proposed project as the Occupier will have to apply for registration of their project with the DOSHS on completion of the construction and installation phase and before the operational phase of the project.

Part VI of the Act gives the requirements for occupational health provisions which include cleanliness, ventilation, overcrowding, etc. This part of the Act will apply to the Occupier especially during the operational phase of the project.

Part VII of the Act contains provisions for the safe operation of machinery and includes all prime movers and transmission equipment. Further, this part includes the safe operation of cranes, chains, ropes, lifting tackles, pressure vessels and their statutory examination by DOSHS Approved Persons. This part of the Act will apply to the Occupier during the operational phase of the project.

Part VIII of the Act contains provisions for general safety of a workplace especially fire safety. This part of the Act will apply to the proposed project during the design, construction and operational phases respectively of the project.

Part IX of the Act deals with Chemical Safety. This will be applicable to the proposed project as it will handle and transport hazardous materials. The Occupier will be required to have MSDS sheets for all chemicals handled in the workplace including labeling all receptacles containing such hazardous materials.

Part X of the Act deals with the General Welfare conditions that must be present during the operational phase of the project. Such conditions include first aid facilities, supply of drinking water, sitting facilities, sanitary facilities etc.

Part XI of the Act contains Special Provisions on the management of health, safety and welfare. These include work permit systems, PPE requirements and medical surveillance. All sections of this part of the Act will be applicable to the proposed project during the operational phase.

Part XII of the Act deals with Special Applications such as platforms erected over water and workplaces where steam boilers or hoists and lifts are used. This part of the Act may not be applicable to the proposed project.

Part XIII of the Act stipulates the various fines and penalties associated with noncompliance of the Act. It includes those fines and penalties that are not included in other sections of the Act and will be important for the Occupier to read and understand the penalties for non-compliance with S&H provisions.

Part XIV of the Act is the last section of the Act and contains miscellaneous provisions which are not covered elsewhere. Most of the sections under this part of the Act will be apply to the proposed project and it in the interest of the Occupier to read, understand and ensure compliance with it.

Some of the important subsidiary legislation which is applicable to the proposed project is described below.

Subsidiary legislation under OSHA

L.N. 31: The Safety and Health Committee Rules 2004

These rules require that an Occupier formalize a Safety and Health (S&H) Committee if there are a minimum of 20 persons employed in the work place. The size of the S&H Committee depends on the number of workers employed at the place of work.

For the Proponent and Contractor, the Occupational Safety and Health Act and the S&H Committee Rules 2004 are important as they require compliance with the following measures:

- Posting of an Abstract of the Factories and Other Places of Work Act in key sections of each area of the factory or other workplace;
- Provision of first aid boxes in accordance with Legal Notice No. 160 of 1977;
- Ensuring that there are an appropriate number of certified first aiders trained by an approved institution and that the certification of these first aiders is valid;
- Provision of a General Register for recording amongst other things all incidents, accidents and occupational injuries;
- Appointment of a S&H Committee made up of an equal number of members from management and workers based on the total number of employees in the company;
- Training of the S&H Committee in accordance with these rules;
- Appointment of a S&H management representative for the Proponent;

The S&H Committee must meet at least quarterly, take minutes, circulate key action items on bulletin boards and may be required to send a copy of the minutes to the DOSHS County office.

Appropriate recordkeeping including maintenance of all current certificates related to inspection of critical equipment such as cranes, air compressors, lifts, pulleys, etc. Such inspections need to be undertaken by a competent person certified by the Director of the DOSHS.

L.N. 24: Medical Examination Rules 2005

These rules provide for Occupiers to mandatorily undertake pre-employment, periodic and termination medical evaluations of workers whose occupations are stipulated in the Second Schedule of the Act and the First Schedule of the Regulation. The workers are to undergo medical evaluations by a registered medical health practitioner duly registered by the DOSHS.

Material Safety Data Sheets (MSDSs) for chemicals used in the construction and operational phase are studied for toxicological and epidemiological information. If any of these products' present negative impacts to human health, the workers exposed to the chemicals will be required to undergo medical examinations in accordance with the above Rules.

L.N. 25: Noise Prevention and Control Rules 2005

These rules were promulgated for work related noise exposures on March 10th 2005 and apply to workplaces in Kenya. The regulation is applicable to the project as there will be noise potentially generated by construction equipment that may exceed the permissible noise levels given below; however, duration is expected to be low as

minimum excavation will be done. The regulation sets the permissible level for noise in any workplace as follows:

- ✓ 90 dB(A) over an 8-hour TWA period over 24-hours; and
- ✓ 140 dB (A) peak sound level at any given time.

In addition to the above the regulation sets community noise levels emanating from a workplace as follows: 50 dB (A) during the day; and 45 dB (A) at night.

If noise levels exceed the above permissible levels, the Occupier is required to develop, rollout and implement a written hearing conservation program which should include the following sections as a minimum:

- ✓ Noise Survey;
- ✓ Education and training;
- ✓ Engineering noise control methods;
- ✓ Hearing protection requirements;
- ✓ Posting of notices in noisy areas;
- ✓ Audiometric testing methods and frequencies for those exposed to high noises;
- ✓ Annual program review.
- ✓ The Proponent is to ensure that any equipment brought to a site in Kenya for use
- ✓ Shall be designed or have built in noise reduction devices that do not exceed 90dB (A).

The supplier has indicated noise characteristics of the machine or equipment as 50 dB (A). It is expected that during the construction phase of the project, there may be plant and equipment that exceeds the threshold levels of noise stipulated under the Rules. The contractor and their subcontractors to ensure that their equipment is serviced properly and/or use equipment that complies with the threshold noise values given above. It will be however limited period as no major construction activities is scheduled.

L.N. 59: Fire Risk Reduction Rules, 2007

These rules were promulgated by the Minister for Labor on April 16th 2007 and apply to all workplaces. The rules apply to the proposed project in several ways as described below.

Regulation 5 requires Proponents to ensure that fire resistant materials are used for construction of new projects. A number of minimum specifications of materials are provided in the regulation.

Regulation 6 requires that all flammable materials to be stored in appropriately designed receptacles.

Regulation 7 requires that all flammable storage tanks or flammable liquid containers be labeled with the words “Highly Flammable” in English or Kiswahili.

The regulation requires a Proponent to consult the product’s MSDS for appropriate labeling requirements.

Regulation 8(3) requires a Proponent to have spill prevention; response and countermeasures plan (SPRCC). This is important for the proposed project given the nature of the project and products to be handled by it.

Regulation 16 requires Proponents to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected 6-monthly by a competent person and the Proponent is required to keep records of such inspections.

Regulation 17 requires Proponents to clearly delineate fire escape exits. The regulation provides for the minimum standards to be applied in marking out all fire escape exits.

Regulations 20 – 23 require Proponents to have trained firefighting teams within their premises. The above regulations provide for the minimum number of fire team members based on the total number of employees that may be present at any given time within the Proponent’s premises. Each of the fire team members must undergo a training course in firefighting to be provided by a DOHSS approved institution. The DOSHS may develop a curriculum for this training including the minimum number of contact hours required.

Regulation 22 provides a description of the functions of a firefighting team.

Regulation 23 requires Proponents to mandatorily undertake fire drills at least once a year.

Regulations 24, 26 and 27 refer to the communication system to be employed by Proponents for alerting staff. All premises must have properly marked assembly points and suitable means of alerting workers about a fire.

Regulation 27 specifically requires Proponents to display “No Smoking” signs wherever flammable vapors may be present.

Regulation 28 requires Proponents to install fire detection systems in their premises. Such systems must be connected to audible and visual flashing devices and the system must be maintained regularly to ensure its integrity at all times.

Regulations 29 – 31 refer to the installation and maintenance of firefighting systems in workplaces. Fire extinguishers are to be mounted at least 60cm above ground while a fire hose reel must be located within a radius of 30m. The firefighting system shall be maintained annually by a competent person and records maintained by the Proponent. Fire extinguishers shall be hydrostatically tested once every 5 years. Any

fire extinguisher that does not pass a hydrostatic test or is damaged mechanically shall be put out of service.

Regulation 31 provides the types of firefighting appliances required for different flammable and combustible materials and the minimum distances between firefighting appliances that must be maintained.

Regulation 32 requires Proponents to color code all their pipelines according to the product being conveyed by them. All fire water pipes will be colored in red. Additionally this regulation provides for the color coding to be adopted for fire extinguishers.

Regulation 33 requires Proponents to have adequate fire water storage capacity.

As a minimum this regulation requires Proponents to have at least 10m³ of dedicated fire water storage capacity.

Regulation 34 requires Proponents to develop, rollout and implement a comprehensive written Fire Safety Policy. This policy should contain a Fire Safety Policy Statement signed by the CEO, a Fire Safety Policy Manual and a brief summary of the Fire Safety Policy of the company.

Regulation 35 requires a Proponent to notify the OSH County office of a fire within 24 hours of its occurrence and a written report sent to the Director of DOSHS within 7 days.

Regulation 36 requires Proponents to undertake annual fire safety audits by a DOSHS registered fire safety auditor and submit a report to the DOHSS within 14 days. The definition of a fire safety audit includes a fire risk assessment. The cost of undertaking fire safety risk assessments and fire safety audits shall be borne by the Proponent.

L.N. 60: Hazardous Substances Rules, 2007

These rules were promulgated by the Minister of Labor on April 16th 2007 and apply to the Proponent as they are expected to handle chemicals that can potentially expose their employees to hazardous substances.

The Rules state that the Proponent shall ensure that where chemicals come into contact with employees, the exposure limits set out in the First Schedule of the Regulations are not exceeded. Where employees may be exposed to two or more chemicals in the workplace the Proponent shall work out the combined exposure using the narrative given in the Second Schedule of the Regulations. The Minister of Labor is empowered to change the exposure limits given in the First Schedule of the Regulations.

It is the responsibility of the Proponent to ensure that all employees exposed to chemicals in the workplace are protected adequately from exposure to hazardous

substances that may be present in them using the hierarchy of hazard control methods. Such methods include elimination of the chemicals, substitution of the chemicals with less hazardous ones, engineering controls, administrative controls, use of PPE and emergency response planning.

Regulation 12 – 15 requires Proponents to have a Hazard Communication program implemented at their workplace. The Proponent is required to maintain an inventory of all MSDSs for the chemicals stored in their workplace. As a minimum the MSDS shall comply with the format indicated in the Third Schedule of the Regulations and will be disclosed fully to the employees handling the chemical by the Proponent. All unused, obsolete or expired chemicals must be disposed of in an environmentally sound manner. All containers containing chemicals must be labeled appropriately as indicated in the MSDS for that chemical. Training of employees on the hazards associated with handling chemicals safely in the workplace will be provided at the Proponent's cost.

Regulation 16 requires the Proponent to monitor chemical exposure levels in the workplace annually by engaging a DOSHS registered Air Quality Monitor. The cost of the exposure monitoring survey will be borne by the Proponent.

Regulation 19 requires Proponents that use hazardous chemicals in the workplace to subject those employees exposed to medical examinations in accordance with the requirements of Legal Notice 24: The Factories and Other Places of Work (Medical Examination) Rules 2005.

Work Injury Benefits Act, 2007

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. An employee is a person who has been employed for wages or a salary under a contract and includes apprentice or indentured learner.

The Proponent will put in place adequate measures to minimise work related injuries. However, in the event injuries to workers, occur, the Proponent will adhere to the provisions of this Act.

The Public Health Act (Cap. 242)

The Public Health Act provides for the protection of human health through prevention and guarding against introduction of infectious diseases into Kenya from outside, to promote public health and the prevention, limitation or suppression of infectious, communicable or preventable diseases within Kenya, to advice and direct local authorities in regard to matters affecting the public health to promote or carry out research and investigations in connection with the prevention or treatment of human diseases. This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health.

Part IX **section 115** states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into Public Street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

This provision is supplemented by Section 126A that requires local authorities to develop by-laws for controlling and regulating among others private sewers, communication between drains and sewers and between sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter.

Part XII (prevention and destruction of mosquitoes) **Section 136** states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in the manner provided by this Act. The operations and activities of the proposed project can be detrimental to human and environmental health and safety in the absence of appropriate measures. For example, waste, dust, noise and air emission generated from activities and process of the proposed project can directly or indirectly have adverse impacts on human and environment. The Act prohibits the Proponent from engaging in activities that cause environmental nuisance or those that cause danger, discomfort or annoyance to inhabitants or is hazardous to human and environmental health and safety.

The proponent will therefore observe the public Health act to mitigate on the negative environmental health and safety to the public.

Climate Change Act 2016

The Act places duties on the national government and county governments to mainstream climate change responses into development planning, decision making and implementation and to respond in various other ways to climate change. The Act sets out principles of climate change planning and implementation of measures. It also provides with respect to public participation and access to information and intergenerational and gender equity in all aspects of climate change responses. It mandates the National Environmental Management Monitoring Authority, on behalf of the National Climate Change Council to monitor, investigate and report on compliance and the assigned climate change duties; regulate, enforce and monitor compliance on

levels of greenhouse gas emissions as set by the Council under this Act. The proponent has committed to undertake activities in line with the principles of climate change mitigation as required by the Act.

Energy Act 2006

It is the primary legislation in Kenya that contains provisions for the management of the energy sector. It contains several HSE provisions for the environmentally sound management of the energy sector. The Act delegates the Energy Regulatory Commission right to regulate the production, transportation, storage and use of all petroleum products in the country. Section 95 (1) states that: "Petroleum imported or produced locally for use in Kenya, petroleum products, equipment, facilities and installations shall conform to the relevant Kenya Standard: Provided that where no such standard exists, the relevant international standards approved by the Kenya Bureau of Standards shall apply." In addition, the act provides that: "A person who offers for sale in Kenya or transports or stores petroleum meant for use in Kenya shall ensure that the specifications of such petroleum is in accordance with subsection (1)" The act ensures that a person who engages in petroleum business shall comply with the relevant Kenya Standards and in the absence of such standard, any other standard approved by the Commission from time to time on environment, health and safety in consultation with the relevant authorities and in conformity with the relevant statutes touching on environment, health and safety standards.

In the event of a fire, explosion, oil spill, injury or fatality occurring in the course of operating a petroleum facility or transportation of petroleum, either by accident or through negligence, the operator or person transporting petroleum shall forthwith clean up the polluted or damaged environment, at his own expense, to the satisfaction of the Commission and other relevant authorities. It is the duty of The Commission to ensure that, at any given time, the operator of a facility or a transporter to show that he is in compliance with the provisions of this act.

The Petroleum Act 2019

The Act includes specific provisions regarding the storage of petroleum products to ensure safety and regulatory compliance. It mandates that all facilities involved in the storage of petroleum products must be licensed and adhere to stringent safety standards. The Act requires operators to maintain facilities that minimize the risk of accidents and environmental contamination. This includes the design, construction, and maintenance of storage tanks and associated infrastructure to prevent leaks and spills. Furthermore, the Act stipulates regular inspections and audits of storage facilities to ensure compliance with safety regulations and to address any potential hazards promptly.

The Act requires all petroleum operations, including storage, to comply with national environmental laws and regulations. It emphasizes the need for environmental impact

assessments (EIAs) before the commencement of any petroleum-related activities to identify and mitigate potential environmental risks. Operators must implement measures to prevent pollution and manage waste effectively. The Act also mandates the development of emergency response plans to address environmental incidents such as oil spills. Continuous monitoring and reporting on environmental performance are required to ensure adherence to environmental standards. Additionally, the Act promotes the rehabilitation of sites affected by petroleum operations to restore them to their original condition or to a state that supports sustainable use.

The Physical Planning Act (Cap. 286)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Building Code By-Laws

The By-law of Building code 3 (1) states ‘A person who erects a building or develops land or changes the use of a building or land, or who owes or occupies a building or land shall comply with requirements of these by-laws’. By-law 5 states that a person who intends to erect a building or materially change the use of a building or part of a building shall furnish the council in the manner provided in Part A of the First Schedule to these By-laws. Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers. The code also prohibits construction of structures or buildings on sewer lines.

The proposed project will adhere to the provisions of the Act.

4.3: Institutional Framework

EMCA 1999 INSTITUTIONS

The EMCA, 1999, make provisions for creation of environmental administrative structures under MENR. The institutions that have been created under the Act for environmental management in Kenya are:

- *NEMA* - the principal government authority established under MENR to exercise general supervision and coordination over all matters relating to the environment in Kenya.
- *NEC*- The apex body under the Act charged with the responsibility of developing the national environmental policy in Kenya as well as to set annual environmental goals and objectives.
- *PCC* - formed to investigate environmental complaints against any person, submit their findings/recommendations to the *NEC* and to submit periodic reports of its activities to the *NEC*.
- *SERC*- established to advise the *NEMA* on the criteria and procedures for the measurement of environmental quality in Kenya. Environmental quality relates to air quality, wastewater quality, waste quality, noise quality, land use quality, etc. Additionally, the *SERC* is required to recommend to the *NEMA* minimum environmental quality standards for all environmental parameters for which subsidiary legislation is or has been promulgated.

5.0: PROJECT IMPACT AND MITIGATION MEASURES

The key objective of an EIA is to predict changes (adverse or beneficial, whole or partial) in the ecological and socio-economic environment resulting from a proposed development project or activity as well as recommend mitigation measures to minimize, eliminate or offset those aspects that will adversely impact on the environment.

Impact Identification and Prediction

The type, scale, and location of the proposed project determined the scope of impact identification. Both direct and indirect impacts on the environment and local community, as well as residual impacts, were considered during the impact assessment. The extent of impact includes the project site, specific project activities at certain times, and potentially affected areas beyond the project site. The duration of the impact was also taken into account, whether it pertains to specific activities or the entire occupancy period of the project. Thus, impacts were classified as short-term, medium-term, long-term, or permanent. The impact could partially or entirely affect biodiversity, such as destroying only a small part of a habitat, disrupting ecological processes, or affecting a small population of species. Therefore, the magnitude of an impact was evaluated based on the proportion of the environmental entity affected. The probability of the impact occurring was determined by the frequency of the activity and the frequency of the impacts.

5.1 Positive Impacts

The development of this project will have a number of significant positive impacts both locally and nationally.

5.1.1 Design phase

Creation of Employment and Business opportunities

The design phase of the project will create employment and business opportunities for various professionals/consultants who will be involved in the planning stages of the project. They will include: project managers, engineers, architects, building economists, land surveyors, quantity surveyors, environmentalists, economists, urban planners among others. These professionals may be employed directly in the project or be consultants whose services will be procured.

Generation of Income and Source for Government Revenue

Income generated from the consultancies and services undertaken will provide income which will be taxed and generate revenue for the state. In addition, fees levied for the submission of plans to the local authorities and state agencies for approval and application for services will generate revenue that is used to meet the various

governmental goals and objectives. These include NEMA, NCC, KPLC and NCWSC amongst others.

Additionally in order to operationalize the proposed project financial resources will have to be mobilized and these will be injected into the economy. These resources will amount to the total project costs and it will be used for the services involved in the design and planning of the project and also acquiring the raw materials of the project.

Environmental opportunities

The design phase of the project will also present opportunities for green/sustainable designing of the project, which support the minimization of environmental impacts whilst fortifying the project to achieve its intended objectives. The integration of solar power and improvement of pollution control systems will go a long way in ensuring sustainable production. It's at this stage that the opportunities which will enable the project achieve a sustainable development are discovered, explored and integrated into the project.

5.1.2: Construction phase

Creation of Employment

The activities involved in the erection, maintenance and management of the proposed houses will generate employment i.e. employees involved in the production, sale and transportation of the building's materials, construction of the buildings, maintenance of the building and management (caretaker, domestic staff etc.). Security services, cleaning and waste collection are also some of the services that will benefit indirectly. Other employment opportunities that will be created will include for workers involved in the civil and interior works of construction such as engineers, masons, foremen, machine operators, interior designers, electricians, masons etc.

Market for goods and services

To facilitate the construction activities goods and services including raw materials, plumbing services, electrical fittings, transport landscaping and finishing. It therefore offers a market for these goods and services promoting the primary and secondary sectors involved in their procurement such as: quarrying and brick production; furniture and carpentry; glass production; plant and gardening; tarmac, asphalt and bitumen; chemicals; building contractors; electric fittings; plumbing fittings and water infrastructure etc.

Increased population

The influx of labor force into the area and subsequent people/workers to service them or provide them with goods such as food will be another positive impact of the proposed project. This is taken as positive since the population increase if sustainable

will create additional market for goods and services offered in the area, increase the amount of mobilized capital and also increase the social capital in the area.

Increased Economic Activities and Revenue

The construction phase of the project will also increase the economic activities in the region, and revenue for the central and county government through taxes, through businesses that will be formed to service the increased population. These services include health, food and nutrition, transport and recreation that the workers taking part in the construction will require from time to time.

5.1.3: Operational phase

Production efficiency

The proposed project is aimed at increasing production capacity and improving processes. This will increase the proponent's return on investment and meet demand for steel products within the ever-growing construction industry in Kenya. This will in turn attract more high-income investors into the region as well as more middle-income groups as settlers.

Creation of Employment Opportunities

The proposed project will create employment in three tiers, with the first being the staff that will be primarily involved in its implementation, supervision and maintenance. The second tier will be staff for the businesses that will be formed in the commercial and retail area and those involved in these businesses supply and value chains. The third tier of employment creation will be for the people who will take the opportunities presented to service the increased population and the population's amenities.

Through these three tiers the project will create employment for high level staff, middle level staff and low-level staff in line with all development policies in the country and county. Also, through the third tier and low-level staff, the project will inadvertently create jobs for locals since this has always been the case with projects of similar nature due to the fact that the locals are readily available and have the shortest access time to the site. It is also important to note that all these employees will be taxed and generate revenue for the taxman thereby contributing to more state implemented development projects.

Reduced reliance on import products

The various steel products will be locally available for both local and export markets within the region. This will have an overall impact on reducing the country's trade deficit therefore conserving the country's foreign exchange reserves and consequently strengthening its financial position.

Increased Economic Activities and Government Revenue

The project will also increase the economic activities that will be carried in the area through those that will be primarily as a result of: the project's internal and ancillary activities; its supply chain; its value chain, and those that will be formed as a result of the project to support its occupants. The latter includes businesses that may form around the project site such as shops, kiosks and transport.

All these businesses activities will be taxed and generate revenue for the central government in addition to providing a market for their supply and value chains.

Stimulation to Urban Development

Cumulatively with other developments in the area the project will lead to turning the area from a lower tier urban area to at least a middle tier urban area. This has benefits of increasing the quality of life and revenue generation from increased activities. It is predicted that the project will increase the viability of the area to develop more residential areas and commercial establishments since it will increase the market and labor available, and the socioeconomic status of the region.

5.1.4: Decommissioning phase

Creation of Employment and Business Opportunities

The decommissioning phase and its activities will create business for the contracting company that will be charged with pulling down the structure and transporting the resultant materials/debris. Moreover, on shut down moving companies will also benefit from being contracted to move equipment and materials from the different businesses and residential units in the project. All these income streams will be taxed and generate income for the central government. The decommissioning activities will create employment and job opportunities for the different professionals involved in them. These include: engineers, demolition experts, landscaper and gardeners, foremen, supervisors, masons, truck drivers and crane operators amongst others.

Income Generation

Decommissioning the project will create recyclable materials and equipment such as: stones, bricks, metals, furniture, switchboards, pumps, machinery etc. may be sold for income albeit cheaper than new ones they will generate taxable income for the proponent. It is also possible that the materials may be donated and used for development projects (schools, hospitals etc.) in much needed areas. This will assist in promoting development where its mostly needed and generally improve the quality of life in those areas and cumulatively in the country. The land may also be resold to be used for other activities; this might yield more income as land value often appreciates over the years.

Environmental Conservation and Restoration

The recycling of the waste to be used as raw materials in other construction process reduces the demand for raw materials. This in turn reduces the potential impact to the environment that would have been felt if the demand of the raw materials hadn't reduced. The space could also be restored to its original state before development or utilized to increase vegetation cover in the area.

5.2: Negative Impacts

5.2.1 Construction phase

Loss of Flora and Faunal Habitats

Vegetation has a great effect on the general and localized environment and normally can modify microclimate. Usually, the flora creates a good environment for habitats thus the two may go together more often than not. In consequence, de-vegetation during construction may result to negative effects on the fauna by creating a disturbance.

The vegetation is important in as food and habitat for various animals. It also assists in maintaining the structure of the soil by holding the particles together. This enables the soil microorganisms to flourish as their habitat; the soil is stable. This in turn allows the organisms easily convert the dead leaves and plants to humus which helps enrich the soil as well as preventing soil erosion. For this project, there exists no natural vegetation as it is in a built-up area zoned for industrial use. The few bird species in the area will be affected mostly during the construction phase due to increased movements.

Changes in Surface and Sub-Surface Hydrology

The built areas will increase run-off while reducing percolation of water into the ground and thereby also changing the sub-surface hydrology. The wastes from the construction activities also pose a threat to the quality of water that will be drained from the site through run-off and this may pollute aquifers rivers nearby.

Changes in soil characteristics

Several changes in the characteristics of the soil may result due to the excavation and compaction of soil for the foundation. The excavation may lead to losses in the accumulated soil carbon and this is known source of GHGs i.e. CO₂. Additively this excavation can also alter the soil's structural stability and reducing its structural integrity.

Compacting the soil to lay the foundation, erecting temporary structures, and also from the heavy vehicles (trucks, tractors etc.) can reduce the soil's percolative ability and thereby **increasing run-off** either on the specific routes or large area. Together

with the laying of foundation and erecting of ancillary structures, this will further lead to **changes in surface and sub-surface hydrology** by changing the flow and recharge rates at the project site.

Emission of Air pollutants

The works involved in this phase of this project will also emit various air pollutants which can have both negative effects on both human and environmental health. One of these is dusts from the soil excavation, decommissioning of existing structures, carving of bricks and movement of trucks on loose top soil after the land has been cleared. Excavations and the use of cement and sand among other like materials are bound to increase the dust and particle levels in the air around the development area. Such effects should be avoided through the use of dust screens. Workers at the site should also be provided with protective clothing to avoid negative health effects

Engines burning fossil fuels (vehicular and generators) will emit oxides of Carbon, Sulphur and Nitrogen, and these also pose risks to human and environmental health on top some of them being GHGs such as (CO₂).

Welding operations will also emit gases and fumes such as ozone, chromium particularly in its hexavalent state (Cr⁶⁺), nickel (potential carcinogens), cadmium and lead¹⁰, whilst others include: NO_x, NO₂, CO, CO₂, O₃ from mild and stainless steel welding⁶. The health effects of exposure to these fumes can include irritation of the upper respiratory tract (nose and throat), tightness in the chest, wheezing, metal fume fever, lung damage, bronchitis, pneumonia or emphysema. While particulate welding fume is usually fairly easy to see, gaseous fumes are invisible

Generation of Noise

The construction activities and processes will also generate noise above the ambient levels of the area. One of the sources of this noise would be from the trucks' and equipment moving in the area either undertaking the civil works or ferrying materials, wastes and equipment to and from the project site and these will form the mobile sources of noise during this phase. Some point sources of noise will include civil works which will be operation specific or localized at the site due to the scope of the activities. This category of noise will include activities such as excavation, hammering, sawing, grinding; moving of material to and from storage and also the use of generators. One of the risks of the noise would be to the surrounding areas where they may create a nuisance or disturbance. Whereas at the site the loud noises pose a risk to the workers and site personnel since loud noises increase the risk of ear damage and deafness.

Increased Pressure on Utilities

The processes and activities involved in the construction of the project would place added pressure on infrastructure services and utilities such as roads, water, drainage

and energy. This may contribute to service disruptions since the utility and service requirements of this stage are intensive. This impact is made more probable due to the challenges faced in the county to provide these services and compounded by the growth of the population.

Increased Heavy Traffic

Access roads leading to the site area will serve the additional vehicles used for the transportation of materials, equipment and staff to the site. Heavy trucks not have the risk of causing accidents due to their limited maneuverability but also place added pressure on the roads and can lead to deterioration of roads.

Population Influx

During the construction phase there will be an influx of people mainly working in the development. There will also be an increase of population due to the opportunities presented in providing goods and services to primary population increment for the construction activities and employees. This secondary increase will mainly entail retailers of foodstuffs and other commodities. Waste from such commodities might pollute the area if a designated dumping place is not allocated. The population will increase since the opportunities will be open to both local and people from other areas and thereby increasing the population.

This increase in population will create pressure on utilities as well as present social risks through the interaction of people. It may present a security risk since people with ill intentions may see an opportunity in the belongings of those attracted by the project for economic reasons.

Generation of Waste

The construction phase will also lead to generation of construction wastes from the civil works and operations on the materials involved in the processes. These wastes include: plastics, metal shavings, wood shavings, food wastes, plants, gases (Carbon, Nitrous and Sulphurous Oxides), fumes (from glues and other hydrocarbons), stone shavings, ceramics, bricks, glass, cardboard, soil, cement, asphalt, sand, concrete, paper, paints, sealants, adhesives, fasteners, construction effluent (grey water).

This phase will also lead to generation of waste heat through its run-off (water used for cooling) and the electric and diesel machines used in the construction activities. The waste heat can contribute cumulatively with other projects/activities in the area to change the microclimate, while waste heat in run-off can lead thermal pollution if it eventually drains into rivers and streams.

This type of waste poses risks to both human and environmental health and thus the proposed project would require an adequate waste management strategy, occupational health and safety strategy, and hazardous material safety plan. Some environmental

impacts would include soil contamination, water and air pollution, whereas health risks include: breathing complications and respiratory diseases, cancer, skin disorders, poisoning etc

Health and Safety Risk

Several OSH risks will occur from the activities, processes, materials and equipment involved in the construction phase of the project. Potential risks include exposure to dust, injuries from accidental falls, poor handling of heavy materials, fire and toxic substances.

5.2.2: Operational phase

Increased Pressure on Available Utilities

The expected expansion of production activities and the associated activities would place more pressure on infrastructure, utilities and social amenities in the area during the operational phase of the project. There could be also a need for increased labor input which could also exert extra pressure on existing facilities and resources.

Security Concerns

The proposed project will increase production and trade activities attracting a variety of people to the region either as residents, business people, suppliers, visitors and customers. The variety of economic and social activities will also attract a new workforce, generate income and increase both the economic and social capital in the area. This underscores a need for enhancing security systems and protocols within the company.

Increased waste generation.

Several waste streams will be anticipated during the operation phase both as liquid and solid. Increased production and labor will imply increase in waste quantities. The wastes anticipated from the refining unit include metallurgical slag, refractory waste and general waste. Descaling waste and scrap materials will be used as raw materials in the existing induction melting furnaces plant. An integrated waste management system will be implemented to manage wastes from all work areas.

Generation of Noise

The activities of this phase of the project will also generate noise and these will be from various point sources such as the rolling mill, the melting shop, diesel generators, mobile machinery and also any repair works that may be carried as necessitated by the project's operations. Mobile sources of noise will mainly include cars and the trucks that will be ferrying goods to the project. Although the noise levels emitted during this stage will be less than during the construction the exposure will be

longer as the operational phase involves routine processes occurring over a longer period until decommissioning.

Air Quality

Steel rolling mills can significantly impact air quality due to the emission of various pollutants during the production process. These facilities often release particulate matter, sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), and heavy metals into the atmosphere. Particulate matter can result from the grinding, cutting, and welding processes, contributing to respiratory issues and other health problems in the surrounding communities. Sulfur oxides and nitrogen oxides can lead to the formation of acid rain, which negatively affects both ecosystems and human-made structures. Moreover, the release of VOCs and heavy metals can contribute to smog formation and pose serious health risks, including cancer and neurological damage. Effective mitigation strategies, such as the installation of advanced filtration systems, regular monitoring, and adherence to strict environmental regulations, are essential to minimize the air quality impacts of steel rolling mills.

Health and safety risks

Occupational hazards are likely during the operation phase. The hazards will vary according to the nature of the working place and exposure period. The impact assessment will contain the company's health and safety plan for all the workplaces and ensure the consequent audits make the same considerations for compliance.

5.2.3: Decommissioning Phase

Excessive Noise and Vibration

There will be a considerable increase in noise owing to the demolition process. This will be a short-term impact and will be felt throughout the demolition process. The main sources of noise will include: cars and trucks; the civil works of pulling down the project's-built structures and machinery (especially if explosives are used), and mechanized equipment that will be used in the processes involved in this project phase.

Generation of Demolition Waste

The decommissioning phase of the project will create demolition wastes which share similar characteristic with construction wastes and therefore similar risks. The only two main differences are that: (1) demolition waste can easily be accounted for before the empty building shell is pulled down, and (2) if explosives are used, they will form part of the waste. The offices will give rise to electronic waste especially if the equipment is defunct or will have no alternative use elsewhere.

Waste in form of debris and pieces of metal and wood will arise. Thus, creating a need of disposing off of the waste and all the disadvantages associated with waste mismanagement will arise such as spread of diseases. It is hoped that this phase will be implemented only under unavoidable circumstances for instance aging of the building and/or pertinent rights arising.

Increased human and vehicular traffic

For the processes of these phase materials from the buildings and equipment will have to be ferried to and from the site through the use of heavy trucks and tractors/bulldozers and these will increase the amount of heavy traffic in the area. Although it is expected that at the time when the project will be decommissioned there will be substantial developments in infrastructure. The number of debris arising from this project site will be quite significant leading to an increase in both human and vehicular traffic.

Occupational Health and Safety Risks

The decommissioning phase will have several safety risks from the civil works involved, equipment, materials and processes. This may be added to if explosives are used and although their use is not known for now, an assessment has been made assuming or incorporating their use since they present a cost-effective way of demolition, which is safe when controlled.

Emission of Air Pollutants

The process of demolition and transportation of waste from the site will generate significant amounts of dust especially if it occurs during the dry season. The processes, material and equipment involved in this stage of the project and their wastes will also emit air pollutants either: as gases such as oxides of C, N and S from the burning of fossil fuels in engines, or particulate matter from cuttings and breakages of steel, glass, shavings, bricks and movement of soil. These will pollutants will pose risks to both human and environmental health such as air pollution, water pollution, soil contamination, respiratory diseases, skin disorders and irritations

5.3: Summary of Impacts

Table 3: Summary of project impacts

Positive Impacts		Negative Impacts
Design Phase		
i.	Creation of employment and business opportunities	N/A
ii.	Income generation	
iii.	Green opportunities	
Construction Phase		

<ul style="list-style-type: none"> i. Creation of Employment ii. Market for goods and services iii. Increased population iv. Increased Economic Activities and Revenue 	<ul style="list-style-type: none"> ▪ Loss of biodiversity ▪ Changes in Surface and Sub-Surface Hydrology ▪ Changes in soil characteristics ▪ Emission of Air pollutants ▪ Excessive Noise and Vibrations ▪ Increased Pressure on Utilities ▪ Increased Traffic ▪ Generation of Construction Waste ▪ OHS Risks
Operation Phase	
<ul style="list-style-type: none"> i. Employment opportunities ii. Production efficiency iii. Reduced reliance on import products iv. Increased economic activities and government revenues v. Stimulation of urban development 	<ul style="list-style-type: none"> ▪ Increased pressure on available utilities ▪ Security concerns ▪ Increased waste generation ▪ Noise and vibration ▪ Air emissions ▪ Occupational health and safety
Decommissioning Phase	
<ul style="list-style-type: none"> i. Employment opportunities ii. Income generation iii. Green opportunities; waste reuse, environmental restoration, rehabilitation and conservation opportunities. 	<ul style="list-style-type: none"> ▪ Excessive noise and vibration ▪ Demolition waste ▪ Increased human and vehicular traffic ▪ Occupational health and safety risks ▪ Air quality impacts

6.0: IMPACT MITIGATION

Mitigating the impacts of the proposed project involves implementing a comprehensive suite of strategies aimed at minimizing environmental and health risks. Firstly, advanced filtration and scrubbing systems should be installed to capture particulate matter and gaseous pollutants, thereby reducing emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), and volatile organic compounds (VOCs). Regular monitoring and maintenance of equipment are crucial to ensure these systems operate efficiently. Additionally, adopting cleaner production technologies and practices, such as using low-emission fuels and optimizing energy consumption, can further reduce the environmental footprint. Noise pollution can be mitigated by incorporating sound barriers and maintaining machinery to minimize operational noise levels. Water pollution controls, including the treatment and recycling of wastewater, should be established to prevent contamination of local water bodies. Engaging with local communities through transparent communication and involving them in monitoring efforts can foster community support and ensure that the mill's operations are aligned with local environmental standards. Finally, comprehensive environmental impact assessments (EIAs) and continuous environmental management plans (EMPs) should be in place to identify potential risks and ensure ongoing compliance with environmental regulations.

6.1: Construction Phase

Table 4: Anticipated impacts in the construction phase

Potential Impact	Proposed Mitigation
Loss of vegetation and biodiversity	<ul style="list-style-type: none"> -Do not site project in environmentally-sensitive area e.g. watershed, wetland and riparian land. -Clear vegetation only when and where necessary. -Comply with land use plans and approved designs. -Resurface and re – vegetate exposed bare areas preferably by using natural indigenous vegetation. Scientific evidence should be put in consideration to avoid introduction of invasive species.
Modification of micro- climate.	<ul style="list-style-type: none"> -Development to be restricted to approved density, building line, land coverage, land ratio and zoning plan. -Careful layout and orientation of structures to respect wind and sun direction -Minimum use of reflective building material and finishes for roof, walls and pavements -The flow of storm water to be harmonized with neighborhood and directed to well-designed drainage channels
Change in surface and sub-surface	<ul style="list-style-type: none"> -Identify a well-drained area identified for parking, servicing and maintenance of the construction plant and equipment.

hydrology	<ul style="list-style-type: none"> -Appropriate disposal procedures for oils and lubricants should be observed -Drainage channels should be provided during construction to minimize any possible water logging. -A segregated drainage system should be provided where the water that is contaminated with oils is not allowed to drain in to the open storm drains. - Contaminated water should be directed into the oil-water separator from where it should be treated before it is released to the rest of the drainage system.
Health and Safety Concerns	<ul style="list-style-type: none"> -Provide appropriate PPEs to the construction workers. -Maintain updated firefighting and detecting infrastructure. -Awareness training to construction and installation workers and staff on safety precautions. -Secure the construction area from unauthorized persons by ensuring that access is confined to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. -Maintain a first Aid kit on site and train the workers on its use -Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required. -Put up appropriate safety signage.
Air Pollution from dust	<ul style="list-style-type: none"> -Service and maintain machines in good working condition -Use standard fuel and lubricants -Ensure water sprinkling on bare surface including access roads to arrest dust emission. -Provide all construction staff with appropriate personal protective equipment (PPEs) such as dust masks, overalls, helmet, dust coats, safety boots and goggles. -Ensure that all construction workers make proper use of the PPEs provided at all the time they are on site.
Noise and Vibrations	<ul style="list-style-type: none"> -Maintain regular servicing of machines to produce less noise. -Construction and installation work undertaken during day hours -Use of human labor where appropriate rather than machines where applicable -Switch off machines not in use. -Use of noise mufflers for noise attenuation.
Traffic related	<ul style="list-style-type: none"> -Use reflective signature to direct traffic to designated areas.

impacts	<ul style="list-style-type: none"> -Sensitize drivers to observe speed limits -Develop and implement a traffic marshal plan for the construction site -Provide sufficient parking/ holding area for traffic delivering and collecting materials from the construction site. -Liaise with traffic police if temporary closure of road is required
Increased waste generation	<ul style="list-style-type: none"> -Waste segregation -Proper waste disposal techniques - Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant. -Bins/receptacles shall be placed at strategic locations within the site as collection centres to facilitate separation and sorting of the various types of wastes. These bins shall be placed with clear markings e.g. plastics, paper and others, to receive different solid waste materials. -The contractor and proponent shall work hand in hand with private refuse handlers that are already on the ground and local council to facilitate sound waste management. -Reuse or recycle where applicable

6.2: Operation Phase

Table 5: Anticipated impacts in the operation phase

Potential Impacts	Proposed mitigation measures
Waste generation	<ul style="list-style-type: none"> -Manage materials responsibly by applying principle of reuse, recover and recycle. -Segregate the waste at source -Maintain waste disposal records. -Contract a NEMA licensed waste handler -Prepare a Solid Waste Management Plan, which should contain an inventory of the types and quantities of waste to be produced. -The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste should be adopted.

	<p>-An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes.</p> <p>-The Proponent should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices.</p>
<p>Health and Safety Concerns</p>	<p>-Form a Health and Safety Committee to monitor these issues and concerns.</p> <p>-Enhance a health and safety policy and emergency response procedures and inform all staff in the processing plant</p> <p>-Conduct regular fire drills, fire training and general awareness and ensure firefighting equipment are serviceable.</p> <p>-Place clear signage strategically located</p> <p>-Provide appropriate PPEs and enforce their usage</p> <p>-Conduct regular and scheduled medical examination of the employees</p> <p>-Provide First Aid Kits for emergency purposes</p> <p>-Carry out training of staff in EH&S monitoring and evaluation.</p> <p>-The proponent should recruit H&S person during construction.</p> <p>-Confine access to restricted work sites (including those with operation mechanical and electric equipment) to authorized persons</p>
<p>Noise Pollution</p>	<p>-Carry out baseline noise mapping</p> <p>-Adhere to the national standards set out by the EMCA noise and vibration regulations (legal notice No. 61 of 2009)</p> <p>-All noisy plant machinery will be housed in sound proof structures where applicable.</p> <p>-Roller bearing to be used ensure that the noise levels do not go beyond 70 dB (A)</p> <p>-Insulation against noise should be applied where applicable.</p> <p>-Provide appropriate PPEs</p>
<p>Air Pollution</p>	<p>Concern is the emission from the induction furnace flue gas emissions from the induction furnaces will be</p>

	<p>directed through the bag filter as the air pollution device with the appropriate stacks of 30-40 meters stack height area recommended.</p> <p>Regular monitoring of emissions as required by EMCA air quality regulations</p> <p>Dog house technique in melting section will have benefits in safety, environmental control, operational efficiency, noise reduction, and ease of maintenance.</p> <p>-Fit stacks with wet scrubbers for pollution control</p>
Oil spills or leakages	<p>-Fit hoses with quick-acting leak-proof cock or with an approved nozzle</p> <p>-Train and supervise employee to ensure minimal spillage of fuel.</p> <p>-Use of approved fuel tanks and monitor fuel quantities to detect leakages.</p> <p>-To prevent any leaks from getting into the environment, the tanks should be properly treated.</p> <p>-The underground tanks must satisfy the national standard and be corrosion free.</p>
DECOMMISSIONING PHASE	<p>-Constitute a decommissioning team and inform relevant authorities</p> <p>-Due diligence decommissioning survey (audit) will be undertaken and submitted to NEMA for approval at least three months prior to the exercise.</p> <p>-Dispose of all wastes responsibly</p> <p>-Rehabilitate the degraded soil and natural flora.</p> <p>-Recycle, reuse or recover demolition materials where appropriate</p> <p>-Use of covered transport vehicles to avoid waste getting being blown off</p>

6.3: Analysis Of Project Alternatives

Regulation 18(1) of Legal Notice 101 specifies the basic content of an Environmental Impact Assessment subsequent to which, subsection (I) requires an analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies. This section analyses the project alternatives in terms of site, technology and no project option. The study will examine alternatives to the project including an assessment of the impacts of all the alternatives examined and the no-action alternative. This examination of project alternatives will incorporate the use history of the overall area in which the site is located and previous uses of the site itself.

6.3.1: Site Option Analysis

The proposed site is adequate and provides all the necessary infrastructure and accessibility for the project activities. Besides the project proponent already owns the land where the project is to be located. At the moment, the proponent does not have an alternative site. Sourcing for a new location implies purchasing another piece of land elsewhere. Looking for land of the similar size and market location and completing official transactions might take over one year, with no guarantee that the land would be available, and if such land is available, its cost might be beyond affordable for the proponent. The proponent will have to restart the planning, design, and approval of the project afresh. The proponent will need to re-engage professionals like EIA lead/audit experts and physical planners to assess the viability of the new site. As at now, the proposed development will blend easily with the current development trend as it is already zoned for industrial use.

6.3.2: Analysis of Alternative Technology

All the alternative options analyzed have implications, which make the current design option proposed by the proponent to be more viable. The proposed project design parameters indicate that it will be more efficient because it will produce more for less. the dog house technique in the melting section of a rolling mill provides significant benefits in terms of safety, compliance to air quality standards, environmental control, operational efficiency, noise reduction, and ease of maintenance. The analysis concludes that:

- The alternatives to the design are likely to reduce the returns to investment that the proponent would have realized if the existing design remains.
- The alternatives are likely to reduce the variety of products proponent intends to provide and therefore reducing competitiveness in the market.

Additionally, the proposed project will be constructed using modern, locally and internationally accepted materials that meet the Kenya Bureau of Standards requirements to achieve public health, safety, security and environmental aesthetic requirements. The technologies available include use of traditional material which is

represented by concrete structures, wood and steel. Some of these may not be desirable from a cost and durability perspective, e.g. steel frame. The proposed technology will be the most economical and environmentally-sensitive.

6.3.3: Waste management analysis

Tononoka Rolling Mills has implemented a series of strategies designed to minimize environmental impact and enhance resource efficiency. One key approach is the treatment and recycling of process water. The mill section has a filtration and purification systems to remove contaminants from wastewater, enabling its reuse in cooling and other processes. This not only reduces the demand for fresh water but also minimizes the discharge of pollutants into local water bodies. Additionally, the process adopts closed-loop water systems that ensure that water is continuously reused within the facility, significantly cutting down on both water consumption and effluent generation. Regular monitoring and maintenance of these systems is done to ensure their effectiveness and compliance with environmental regulations.

Table 6: Waste Management Plan

Project Phase	Type of waste	Management
Construction Phase	Packaging waste: cartons, cement bags, polythene bags, empty plastic containers	-Recycled where applicable -Sorted and collected by a NEMA licensed waste handler
	Rejected construction material	-Returned to supplier
	Damaged or unused stones or concrete boulders	-Levelling of uneven access roads
	Steel, metallic spare parts and cable off cuts	-Sorted and re used as raw materials for the production of billets
	Wood offcuts	-Sold to recyclers
	Excavated soils	-Will be used during landscaping and any excesses will be carted away for proper disposal at a designated location.
	Storm water	An appropriate storm water drain will be maintained throughout the project cycle.
Operation Phase	Scrap	Re used in manufacturing products
	Other manufacturing by-products	Sold to recyclers or disposed by a licensed handler

For solid waste management, the company has adopted integrated strategies focused on waste reduction, recycling, and safe disposal. Implementing efficient scrap segregation processes allows for the recovery and recycling of steel scraps, reducing the need for raw materials and minimizing waste. Slag, a by-product of the steelmaking process, is collected by a licensed handler. The company also collaborates with NEMA and adheres to waste management regulations ensure that all practices meet sustainability standards, promoting a cleaner and more sustainable operation. The existing waste management system is most effective and the company is constantly researching better ways of repurposing other wastes within the provisions of existing laws.

6.3.4: The No Project Alternative

The No Project option in respect to the proposed project implies discontinuation of the project proposal hence the status quo is maintained. The result is the site being retained in its existing form. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions and improves existing pollution control mechanisms. The direct charging casting option significantly reduces the demand for energy.

This option will however have the greatest implications on the socioeconomic environment as the numerous benefits to be gained from the expansion of the steel production would not be realized. In addition, the proponent will be curtailed in providing adequate space as per the requirements of Legal Notice No.15 of 2007.

The No Project Option is the least preferred from the socio-economic and environmental perspective due to the following factors:

- Exposure to fugitive emissions in the melting shop
- The economic status of the direct and indirect users will remain unchanged,
- No employment opportunities will be created during the construction,
- Staff will be exposed to occupational hazards and there will be no opportunities to improve production technologies.

From the analysis above, it becomes apparent that the No Project alternative is not attractive to the local people, employees, and the Government of Kenya.

7.0: ENVIRONMENTAL HEALTH AND SAFETY

7.1: Introduction

Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. It is therefore essential that the proponent and contractor ensure the safety and wellbeing of the workers, the passersby and any other person who may be directly or indirectly associated with the project. The main hazards and risks of accidents in the construction site can be categorized and described in the following way:

- i. Risks of slips, trips and falls
- ii. Risks related to instability
- iii. Risks related to traffic
- iv. Risks related to construction machinery
- v. Risks related to electricity
- vi. Risks related to gasfire and explosions

After identification of these major risks and the stages when they are likely to occur, efforts should then be focused on how to alleviate these dangers before they happen.

7.2: Principles of EHS

The principles of environmental health and safety involve three main actions:

- I. **Risk identification and assessment** - This shall involve identifying the various hazards and risk at the site that have the potential to occur, all the people who may be at risk such as employees, cleaners, visitors, contractors, the public, etc. as well as determine whether a control program is required for a particular hazard.
- II. **Risk communication** – Risk communication refers to the exchange of real-time information, advice and opinions between workers and people facing threats to their health, economic or social well-being. The ultimate purpose of risk communication is to enable people at risk to take informed decisions to protect themselves and their loved ones. Risk communication uses many communications techniques ranging from media and social media communications, mass communications and community engagement. It requires a sound understanding of people’s perceptions, concerns and beliefs as well as their knowledge and practices.
- III. **Risk Management**- This involves actions implementing risk evaluation decisions, monitoring, re-evaluation and prioritizing, and compliance with legal requirements that safeguard health and safety at construction sites The OHS personnel shall be required to determine if existing control measures are adequate or if more should be done

This HSE Management Plan (HSEMP) is guided by both national HSE/OSH legislation and GIIP, which should always be made available in the project, these include:

National Legislation

- EMCA of 1999 revised 2015, and its subsidiary legislations
- OSHA of 2007
- The Public Health Act of 2005
- The Physical Planning Act, Cap 286
- The Energy Act of 2005
- The Kenya Water Act of 2016

Good international Industry Practice (GIIP)

- The World Bank General EHS Guidelines, April 30,2007
- The IFC Performance Standards of Environmental and Social Sustainability of 2012
- Performance Standards 1, 2, 3, 4 & 6.
- The WHO Guidelines on indoor and outdoor Air Pollution

7.3: Construction Safety, Emergency Procedures and Action Plan

Tononoka Rolling Mills Ltd has an Environmental Health and Safety meeting comprises of 15 members representing every department and sections that formulates EHS plans and procedures. The EHS meetings are conducted on quarterly basis. The proponent through an all-inclusive process should develop an Emergency Preparedness and Response Plan as part of the HSEMP and through which the project will stay ahead of risks presented by both man-made and natural hazards that have the capacity to turn into disasters. The proponent and his contractors should do this by first identifying all hazards pertinent to the project and its site in line with the risks register but with specific difference being that these hazards will have greater potential of turning into a disaster.

This should also be done in line with national policies on disaster management such as the National Disaster Management Response Plan of 2009, and involve all key players in disaster management nationally. This stakeholder involvement will enable the EPRP to be cross sectoral and multidisciplinary and the proponent should lead the process. Additional recommendations to ensure the health and safety of the workers and general public should include the following:

- Create a culture of safety within construction by planning, creating and supporting ongoing OHS awareness campaigns that promote the importance of workplace occupational health and safety with industry stakeholders as well as consumers.

- Increase safety knowledge in the construction site by promoting awareness of the top construction sector hazards (trips and falls from heights, motor vehicle incidents, struck by objects, machinery) and how to control these hazards through new and improved information channels
- Support the role of the supervisor in creating and maintaining a culture that fosters worker participation in identifying and mitigating workplace hazards.
- Create a strategy for continuous health and safety learning for the construction workers e.g. by conducting regular training sessions and drills on how to handle emergencies and accidents at site.
- Identify, review and enhance health and safety content of apprenticeship training standards to keep abreast with any new methods that are effective in promoting site safety.
- Provide suitable and well maintained Personal Protective Equipment (PPEs) to all the workers and visitors and ensure they are utilized at all times and in the right manner. These include safety boots, helmets, gas masks, gloves and goggles.
- Place visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.
- Enclose or isolate hazardous parts of machines or sites within the construction site to minimize exposure.
- Prepare and maintain emergency response equipment such as fire extinguishers and first aid kits in readiness for use when need be.
- Encourage reporting of safety incidents as soon as they occur at the site, so as to enable a quick action to alleviate the extent of the damage.
- Comply with the provision of the Occupational Safety and Health Act, (OSHA), 2007

7.4: Risk Register

During all phases of the project, the proponent and their third parties where applicable such as contractors, should develop a risk register of all HSE risks in the project. This identification of risks can be done through an aspects-impacts register or log, which links the project's aspects to impacts and ranks the level of risk by analyzing its probability and likely consequences. Importantly, the risk register should also take into perspective the level of public concern over the risks involved and identified, as a matter of good practice.

As a matter of policy and good practice the proponent should ensure third parties have adequate skills in risk management and systems are put in place to manage all risks. Linked to the risks register are the remedial actions which reduce or avoid the risk where possible. The proponent through either the HSE manager and/or engineers should always seek to avoid risks early enough through design and planning but this is not possible they should develop the requisite remedial actions or plans to legally

acceptable standards (such as EMCA of 1999 and OSHA of 2007) and Good International Industry Practice standards.

7.5: Medical Program and Insurance

The proponent and his contractors should also ensure the medical program is maintained for the project's staff on induction, during the job and include rehabilitation where appropriate and commensurate to the risks that the staff will be exposed to. This program should include regular check-ups to ensure the project's staff are medically and mentally fit to undertake their duties. It should also form part of training through an ergonomic and social curricular that will also include facilitations for lifestyle improvement and raise knowledge on diseases such as HIV/AIDS, STIs and other infectious illnesses.

The proponent and his contractors should additionally ensure adequate facilities and services are in place which promote employee rest, relaxation and rejuvenation. This may include rest and recreational areas, provision of clean water, undertaking stress relieving activities such as games, counselling and peer chats among others.

Importantly and as legally required the proponent and his contractors should provide a medical/insurance cover for all staff. The cover should in the least be able cover for all injuries, illnesses and incidents that may occur on the job and follow up with rehabilitation that at least returns the employee(s) to their initial state before the occurrence where possible. It should be noted that although the proponent may provide insurance, it should be mitigation based by firstly promoting the actions of the HSEMP which when followed all risks will well managed

7.6: Grievance Redress System

The proponent has also developed a Grievance Redress System (GRS) that is accessible to all stakeholders internal and external. The GRS always seeks to address grievances through legally acceptable methods and as fast as possible whilst not preventing any complainants from seeking other legally acceptable methods to justice. Such a GRS is made available to staff on recruitment and to members of the public either through government agencies/offices through grievance application forms, and internally by establishing procedures for investigation and quick redress that will be recorded and tracked

The GRS is monitored through indicators of its efficiency and effectiveness of solving the grievance and producing lessons learnt through which corrective actions can be undertaken to improve the project's health and safety strategies. Additionally, as part of monitoring and review all grievances should be reported to the relevant authorities and the corrective actions taken, to ensure the system is credible and transparent. The process is culturally appropriate, transparent and non-coercive

8.0: CLIMATE CHANGE VULNERABILITY ASSESSMENT

8.1: Overview

Scientific evidence shows that our climate is changing. However, there are significant uncertainties in the magnitude, frequency and spatial occurrence – either as changes to average conditions, or extreme conditions. Climate change impacts will affect social and ecological systems in complex and broad-ranging ways as technological, economic, social and ecological changes take place across regions, groups and sectors. Many of these impacts, such as impacts on ecological systems, have cascading effects on social, economic and health outcomes. In 2015, Kenya’s total greenhouse gas emissions were 93.7 MtCO₂ e, which accounted for less than 0.1% of the global emissions recorded in the year. In order to respond to climate change, more vigorous actions are required to mitigate emissions of greenhouse gases (GHGs) and to adapt to unavoidable consequences that are increasing vulnerability around the world.

Steel is the foundation of human industrialization and plays a crucial role in supporting economic construction and social development. However, the iron and steel sector leads in CO₂ emissions among heavy industries and holds the position of the second-largest energy consumer in this category. This sector directly contributes around 2.6 gigatonnes (Gt) of carbon dioxide (CO₂) annually, accounting for approximately 7% of the global energy system's total emissions. The GHG emissions in steelmaking are generated as one of the following: (1) process emissions, in which raw materials and combustion both may contribute to CO₂ emissions; (2) emissions from combustion sources alone; and (3) indirect emissions from consumption of electricity (primarily in furnaces and in finishing operations such as rolling mills). Hot rolling, for instance, requires considerable amounts of heat, typically generated by burning fossil fuels. The realization of the need for lowering the carbon footprint from this sector necessitates a holistic approach that encompasses the advancement of low-emission technologies, the enactment of forward-thinking policies, and the responsiveness of markets. It is expected that the GHG emissions will increase significantly for the duration of the project. This is a direct and permanent impact. With regards to this proposed project, climate change considerations have been made during impact assessment at different stages. This assessment is done in accordance to the provisions for the preparation of a study report as laid out by the Legal Notice 31 of 2019 EMCA Amendment to the Second Schedule and the Climate Change Act 2016 and subsequent amendments (2023).

8.2: Determining Vulnerability of the project area

Vulnerability is a function of the exposure, sensitivity and the ability to cope with and/or adapt to climatic changes. At the project level, the project activities are not likely to be directly affected by any shifts in climate but the activities could contribute to higher carbon emissions if not well monitored. Additionally, increased productivity will increase vehicular movement which also increases exhaust emissions.

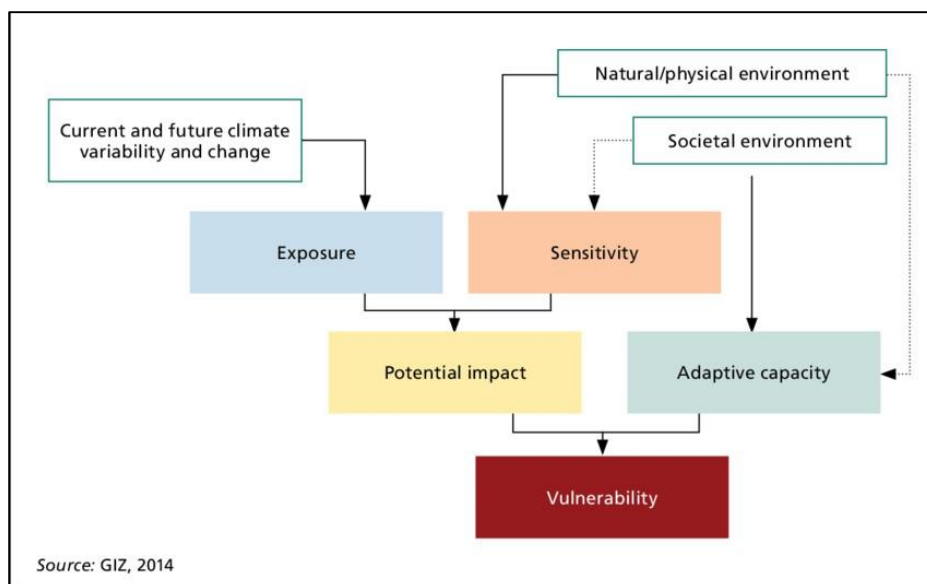


Figure 4: Components of the Vulnerability Assessment

Using the DPSIR framework, an assessment of the climate vulnerability of the project area and its larger geographical extent can be determined by identifying the drivers, pressures, State, Impact and Response to climate change.

From historical and statistical studies, long-term driving forces (D) such as urbanization, population consumption demands, and economic growth promote the development of the local steel industry, while the side effects generated by the steel industry's production processes create pressures (P) on the natural environment like air pollution and resource consumption, leading to changes in the state of the steel industry (S) by either increased production or importation. The sustained changes in the state of the steel industry (S), in turn, have impacts (I) on human society, prompting human responses (R) in regard to technological or policy shifts leading to changes in the state (S) either steel availability or shortage with their responses. The responses need to be crafted to minimize the impact of the drivers and pressures on ecosystems and maximize the welfare of human beings by adaptation and mitigation phenomenon.

In this regard, collection of data for this EIA was undertaken both for *climate* and *biodiversity* in the area. While it is not explicitly the responsibility of the project to mitigate biodiversity loss if it is not directly affecting this trend, it is part of a larger responsibility to helping maintain the environmental and social integrity within the area of impact, and the plants and animals therein. After all, once species become extinct, it is impossible to reclaim them.

8.3: Considerations for the ecosystem

The project proponent will endeavor to adhere to the EMP provided herein and recommendations provided for impact mitigation in order to reduce impact on

biodiversity through sustainable use of natural resources, responsible waste management and reduction of greenhouse gas emissions. The machines to be installed have to be well maintained at all times, have to follow manufacturer's guidelines and integrate cleaner production mechanisms during the operation phase. At the same time, the project cycle is expected to include a component for rehabilitating any damaged natural environment at the end of the construction phase. The proponent should also explore technologies for carbon capture and storage within the milling process to reduce global warming potential.

8.4: Vulnerable populations

While it is a common practice to identify which populations will be adversely affected by project impacts, this assessment goes further to determine what the cumulative effects of both project impacts and climate change will mean for populations within the project area. Mitigation strategies provided in the earlier sections account for immediate effects. Ordinarily, the immediate neighbors of the project area are affected by the project activities in throughout the project life-cycle. However, the cumulative impacts of the project might span beyond the locality especially atmospheric changes in temperature and composition. Therefore, the public participation component might further inform the mitigation measures to include any environmental and social concerns that might not be easily identified by the expert through observation. Nevertheless, impact management is required and this can be done together with the annual environmental audits.

8.5: Monitoring effectiveness of mitigation measures

The proponent will continuously make incremental investments in process improvements to decrease energy intensity, reduce carbon emissions, increase material efficiency and promote the circular economy. However, monitoring the effectiveness of these measures will go a long way towards ensuring continuous adaption with emerging issues. Monitoring will take into account the local climate impacts in the long and short-term; For this reason, the proposed project has integrated the following considerations in the design as long-term strategies;

- Development to be restricted to approved density, building line, land coverage, land ratio and zoning plan.
- Careful layout and orientation of structures to respect wind and sun direction
- Climate smart design ensuring minimum use of reflective building material and finishes for roof, walls and pavements
- The flow of storm water to be harmonized with neighborhood and directed to well-designed drainage channels
- Use of an electric furnace as opposed to blast furnaces

- Careful estimation of the risks and formulation of a contingency plan;
- A direct charging continuous casting. The existing mechanism is energy intensive as the hot billets have to be cooled, transported by trucks and fed to the reheating furnace before rolling. The new design makes use of a conveyer to feed hot billets directly to the roughing stand.
- An elaborate pollution control system with improved a dog house emission capture system and bag house filtration.
- Installation of solar panels on the roofs of proposed structures.
- Water is used in a closed loop system.
- Annual energy, environmental, OSH audits, air quality measurements for the entire facility in compliance with the existing legal framework.
- Continuous collaboration and consultation with local leadership, neighborhood and relevant authorities through an established communication system.

It is also worth noting whether the project might hamper necessary adaptation measures in the future. In this regard, the proposed developments do not aggravate the consequences of climate change as it uses efficient technology with pollution control mechanisms while also recycling raw materials as much as possible. Also, if need be, it can easily be decommissioned without leaving so much damage behind. The company is also exploring options to reuse most of their by-product to create other products. The study report will provide a detailed EMMP with climate action plan for the facility.

8.6: Future considerations

Technology advancement

Many steelmakers are already digital leaders, adopting technology to improve defect recognition, process safety and quality assurance. But there is a potential to make greater use of digitization to quantify, monitor, record and assess processes to enhance sustainability performance and reporting. Digital solutions can also help improve productivity by optimizing energy consumption, minimizing waste and controlling emissions. Blockchain technology for instance offers the potential to verify the sustainability quotient of steel value chains, giving end users reliable data to assess their net carbon impact. It can also help create more agile supply chains, while cloud computing can allow central command and control centers to oversee geographically dispersed mine-to-metal value chains.

9.0: STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION PLAN

Stakeholder engagement is a broad, inclusive and continuous process between the project and those potentially impacted that encompasses a range of activities and approaches in the entire life of the project. The proponent has continuously upheld the utility of public involvement as required by law; not only in this project but also in all previous projects undertaken within the same area.

Part 2 of EMCA 1999, consist of General principles: (a). principle of public participation in the development of plans, policies and processes for the management of the environment; (b) involving the community to employ their cultural and traditional social principle of managing the environment and natural resources provided it is not repugnant to the justice and morality and not inconsistent with the law. The EMCA and its supporting legislation set out requirements for public disclosure and consultation in tandem with the EIA process. Tononoka Rolling Mills Ltd should comply with the applicable legislation during the EIAs, preparing community disclosure fact sheets, disseminating other information through *barazas* and other stakeholder meetings, and responding to concerns through official public meetings and the development of its policies, Framework ESMP and specific management plans.

Upon receipt of the EIA study report from any proponent under section 58, the authority shall cause to be published in each of two successive weeks in the gazette newspaper circulating in the area or proposed area of the project once in each of the two successive weeks in a notice which state among others: a summary description of the project, the place where the project is carried out, the place where the environmental impact assessment study, evaluation or study report evaluation or review report may be inspected.

9.1: Stakeholder Engagement plan

The approach to stakeholder consultation used an Informed Consultation & Participation (ICP) process for affected communities. This will be supported by a series of community engagement meetings across the neighborhood of the project area, which will be designed and undertaken by the social expert in conjunction with the environmental expert.

The scoping exercise instigated a two-tier approach to stakeholder engagement, with stakeholders categorized as either affected or interested parties. The approach to engagement will involve community level participation for local group representatives, individual neighbors and local administration and; county-level stakeholder meetings for both state and non-state actors like churches, schools, businesses.

Results and findings are attached in this report. The exercise focused on identifying and engaging stakeholders at all levels to inform them of the proposed project and to

receive comments and feedback from local stakeholders for consideration within the EIA process. The stakeholder involvement was done through the following means:

- Informing the stakeholders through notices in print and audio media
- Conducting meetings with the public on arranged dates in liaison with local authorities
- Conducting public presentation(s) on the findings of the EIA to inform, solicit and discuss comments from the public on the proposed development if necessary.
- Summarizing the issues identified during the public participation process
- Discussing public input that can be incorporated into the proposed project design; and environmental management systems

1) Affected Parties

Affected parties include local communities, community members and other parties that may be subject to direct impacts from the proposed projects. Affected parties are generally located within the Project's defined area of influence but may be elsewhere (e.g. people who outside of project area but have personal or business interests that may be directly affected by the development of the project).

Affected parties include 2 sub-groups:

a) Directly affected:

- Communities, groups and individuals displaced physically and/or economically by the Project, including any vulnerable or marginalized stakeholders.

b) Indirectly Affected:

- Residents, businesses, County officials and administrators who may be indirectly affected by employment opportunities, influx and the related pressure on resources and services;

Government officials, including Municipal Administration of the in the project area, village administrations, environmental protection authorities;

- Community-based groups and non-governmental organizations (NGOs) that represent local residents and other local interest groups, and act on their behalf; and
- Employees, their representatives and contractors of the project

2) Interested Parties

The projects' stakeholders also include parties other than the directly affected communities: Individuals/groups/entities that may not experience direct impacts from the Project but who consider or perceive their interests as being affected by the project and/or who could affect the project and the process of its implementation in some way. These Interested parties may include:

- Residents of the other settlements within the project area, who can benefit from employment and training opportunities stemming from the project;
- Civil society groups and NGOs on the regional, national and local levels that pursue environmental and socio-economic interests and may become partners of the project. Organizations within this group are likely to be located outside the project's Direct Area of Influence;
- Business owners and providers of services, goods and materials within the project area that will be involved in the project's wider supply chain or may be considered for the role of project's suppliers in the future;
- Government officials, permitting and regulatory agencies at the National and County levels, including environmental, technical, social protection and labor authorities.
- Mass media and associated interest groups, including local, county and national printed and broadcasting media, digital/web-based entities, and their associations.
- Other notable projects in the region;
- Politicians at national / regional / local levels;
- Lenders to the Project; and
- Academics and other interest groups

9.2: Stakeholder Identification

Project stakeholders are defined as individuals, groups or other entities who: (i) are impacted or likely to be impacted directly or indirectly, positively or adversely, by the Project ('affected parties'); and (ii) may have an interest in the Project ('interested parties'). They include individuals or groups whose interests may be affected by the Project and who have the potential to influence the Project outcomes in any way.

Cooperation and negotiation with the stakeholders throughout the Project development often also require the identification of persons within the groups who act

as legitimate representatives of their respective stakeholder group, i.e. the individuals who have been entrusted by their fellow group members with advocating the groups' interests in the process of engagement with the Project. Community representatives may provide helpful insight into the local settings and act as main conduits for dissemination of the Project-related information and as a primary communication/liaison link between the Project and targeted communities and their established networks. The legitimacy of such representatives may stem both from their official elected status and their informal and widely supported standing within the community that allows them to act as focal points of contact in Project's interaction with its stakeholders.

For some stakeholder groups, verification of their representatives (i.e. the process of confirming that they are legitimate and genuine advocates of the community they represent) is an important task in establishing contact with the community stakeholders.

For this project area, examples of legitimate stakeholder representatives include and are not limited to:

- a) Elected officials and local administration officials (Chiefs, Members of Parliament and County Assemblies)
- b) Leaders of the Residence associations and community Grievance Redress Committees-Nyumba Kumi leaders
- c) Non-elected leaders that have wide recognition within their community, such as chairpersons of local initiative groups, committees, local cooperatives etc.;
- d) Leaders of community-based organizations, local NGOs, and youth and women's groups;
- e) The elders and veterans within the affected community;
- f) Religious leaders, including those representing traditional faiths;
- g) Teachers and other respected persons in the local communities, etc.

Identification Criteria

The following criteria, adjusted to take account of local specific conditions, are proposed to be used for the identification of stakeholders:

- i. Liability: project implementation or on-going operations may result in legal, financial or other liabilities of the proponent to a social group;
- ii. Influence: a social group may be able to substantially influence project implementation or ongoing operations;

- iii. Partnership: there are opportunities for building partnership relations between the project developer and a given social group in the framework of the project implementation or ongoing operations;
- iv. Dependency: project implementation may significantly affect a given social group, in particular, it may affect vital interests of its representatives if they are dependent on the project on-going operations in economic or financial terms;
- v. Representation: a social group may have a right to represent interests with regard to a project or on-going operations, and this right is legitimated through legislation, custom and and/or cultural specifics;
- vi. Expressed interest: a social group and/or individual may express interest to a project or ongoing operations, and this group is not necessarily directly affected by the planned or current activities

9.3: Project Stakeholders

Table 7: Project Stakeholders

Stakeholders	Relevance	Interests
Residents	May face disruptions from construction activities	Project impacts/benefits, mitigation measures
Business Owners	May face business disruption from construction activities	Project impacts/benefits, business support, mitigation measures
Commuters (public roads and access routes)	May face traffic disruptions from construction activities	Project impacts/benefits, traffic disruption, mitigation measures
County Government (Departments and regulatory agencies)	Construction occurring within the locality. Responsibility to provide approvals and local permits	Local planning issues, project benefits/impacts, social and economic development. Statutory requirements are met and project delivered in line with approvals
National Government (department and agencies)	Responsible for national planning approvals i.e. NEMA	Statutory requirements are met, project delivered in line with approvals
Institutions (schools, churches, research, health etc)	Facilities located in close proximity may be affected by construction	Project impacts/benefits, construction management, mitigation measures and changes to access
Media	Intermediaries for informing the general public about the planned project activities and for information disclosure on proposed	Project updates

	project	
Special interest groups	May be affected by construction activities and shape broader public discussion about the project	Project impacts/benefits relating to each group's specific interest area
Project partners	Financiers, contractors, professional experts ensuring delivery of project	Accountable for delivery of project, technical advice and implementing mitigation measures from the construction activities
Project employees and project contractors	Technical understanding of the range of problems associated with the proposed project including Health and Safety issues	

9.4: Stakeholder Analysis

A sound community relations approach to engagement with stakeholders, builds on in-depth and structured analysis of stakeholders. It also allows the proponent to determine which stakeholder groups to prioritize within the stakeholder engagement/community relations strategy. For example, influential stakeholders who are significantly impacted by the Project typically make good partners for the proponent to work with, while stakeholders with limited influence who are significantly impacted are best approached through an empowerment or rights protection perspectives, as they may not have the capacity to represent themselves properly.

Similarly, interested parties can be a low priority for community relations efforts, but their capacity to exert high influence over the Project, means that they need to be kept informed and involved, while building strategies to reduce any inappropriate demands that they place on the Project. This analysis involves mapping stakeholder using the following three key determinants:

- The stakeholder's projected level of interest in the project;
- The Project's potential impact on the stakeholder; and
- The stakeholder's degree of influence / power on or value to the Project.

By plotting influence together with impact/interest on a matrix and taking due account of further criteria such as expertise (i.e. knowledge to contribute and legitimacy) and the stakeholders' willingness to engage, the relative needs of key stakeholders in terms of the level and type of consultation and engagement are determined and can therefore be properly planned.

Table 8: Stakeholder Analysis Criteria

	Impact/Interest Axis	Influence/Power Axis
High	<p>The stakeholder will experience a high degree of impact as a result of the Project (e.g. resettlement, complete loss of livelihood, loss of pasture / water, etc.).</p> <p>OR: The project is directly related to stakeholder’s institutional field of interest and/or responsibilities</p>	<p>The stakeholder has decision-making powers regarding whether the project will go ahead or not and/or about the adequacy of the ESIA process and/or proposed mitigation strategies.</p>
Medium	<p>The stakeholder will experience some degree of impact but impacts can be managed and/or mitigated.</p> <p>OR:</p> <p>The project or aspect thereof has some relevance to the stakeholder’s institutional field of interest and/or responsibilities</p>	<p>The stakeholder can influence the scope and timing of the ESIA and/or proposed mitigation strategies</p>
Low	<p>The stakeholder will experience very few effects as a result of the project.</p> <p>OR:</p> <p>The project has limited relevance to the stakeholder’s institutional field of interest and/or responsibilities</p>	<p>The stakeholder has very little control over the project</p>

For this project, most of the stakeholders will experience medium to low impact especially during the construction phase. Fortunately, each of the impacts can be mitigated within the required timelines. During the operational phase regular monitoring will ensure the negative impacts of the project are eliminated or kept to a minimum.

Vulnerable groups

A significant factor in achieving inclusiveness of the engagement process is safeguarding the participation of vulnerable individuals in public consultations and other engagement forums established by the project. Compared with any other groups due to their vulnerable status, it may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project. Vulnerable groups identified in the project area include:

- a) Female headed households: In addition to the disadvantages of gender, such women often have restricted access to income generating activities due to family commitments;
- b) Elderly: The aged and infirm are less likely to receive an income and may rely upon their families for support (however their age may confer an elevated status in traditional governance systems and decision making);
- c) Physically / mentally sick and disabled: The lack of government services in the local area deprives such stakeholder of institutional support and services to encourage their social and economic participation in the community.

9.5: Engagement strategies

Effective stakeholder engagement is crucial in the Environmental Impact Assessment (EIA) process to ensure comprehensive and inclusive decision-making. It is useful to have continuous engagement, where stakeholders are involved from the initial stages of the project through public meetings, workshops, and consultation sessions that allow stakeholders to voice their concerns, expectations, and suggestions. By fostering transparent communication, project developers can build trust and address potential issues proactively. Additionally, utilizing diverse channels such as social media, traditional media, and community bulletin boards ensures broad outreach and participation, especially to include marginalized and vulnerable groups who might otherwise be overlooked.

For this project, these meetings will be scheduled at various times and locations to accommodate different stakeholders, including those in remote or underserved areas. Facilitators will use interactive techniques such as focus groups, open forums, and Q&A sessions to encourage active participation and ensure that diverse viewpoints are heard. Providing clear, jargon-free information about the project and its potential impacts helps stakeholders make informed contributions, fostering a more inclusive dialogue.

Online platforms such as social media channels and virtual meetings These tools allow stakeholders to access information, submit comments, and participate in discussions at their convenience. Surveys and online questionnaires can also be employed to gather input from stakeholders who may not be able to attend in-person events. Additionally, an email service will be availed for inquiries and feedback ensuring continuous access to project information and response mechanisms. Prioritizing stakeholder engagement will achieve more sustainable and socially acceptable development.

Stakeholder analysis is pertinent in determining the method of engagement for each group of stakeholders.

Table 9: Stakeholder Engagement Methods

Stakeholder Category			Engagement		
	Communication Strategy	Information Disclosure	Consultation	Participation	Negotiation/Partnership
Residents and business owners in the project area	General meetings, face to face interviews, share minutes, email and social media	In-depth	General meetings	individual	Individual choice
Vulnerable Groups	Face to face interviews, share minutes and reports, posters, general meetings, social media, email	In-depth	meetings	individual	Individual choice
Land owners around the project area	Posters, general meetings, minutes and report sharing.	General	Posters, meetings	Representative	County Government
Government stakeholders	NEMA public circulation, email	Newspapers, adverts	Meetings and letters	Lead agencies	Lead agencies
Other interested parties, project partners and national population	NEMA public circulation, email, post.	National Gazette notices	Lead agencies	Lead Agencies and NEMA	Government

The type and nature of such measures will vary according to circumstances and may consist of any combination of the following:

- Ensuring the legitimacy of any designated representatives for vulnerable groups;
- Respecting traditional decision-making governance;
- Engaging separately with women and men whenever pertinent;
- Subsidizing travel and/or subsistence expenses of vulnerable stakeholders attending engagement events; and
- Focusing any mitigation on sustainable livelihood development for such groups

9.6: Notification Methods

The Notifications will be delivered in English, Swahili and local languages as appropriate. It will be designed to ensure that adequate notice and information is provided, so that affected and interested parties are aware of and able to attend these meetings if they so wish. Notice will be given to stakeholders in compliance with the statutory requirement of 7 days as a minimum. Notifications will be implemented using a combination of letters, email, posters in strategic locations and radio advertisements as appropriate.

The key notification methods that will be used for different types of stakeholder meetings are summarized below:

- ✓ National level workshops: formal letters, emails and telephone follow-up;
- ✓ County level workshops: formal letters, emails and telephone follow-up; and
- ✓ Community *Barazas*: posters in strategic places such as marketplaces, chief's offices or churches/mosques; radio advertisements on local radio stations and verbal announcements from chiefs in other local forums.

The process of notification for community-level engagements was done through printed notices across various neighborhoods.



Figure 5: Public Participation Invitation Notices at various locations

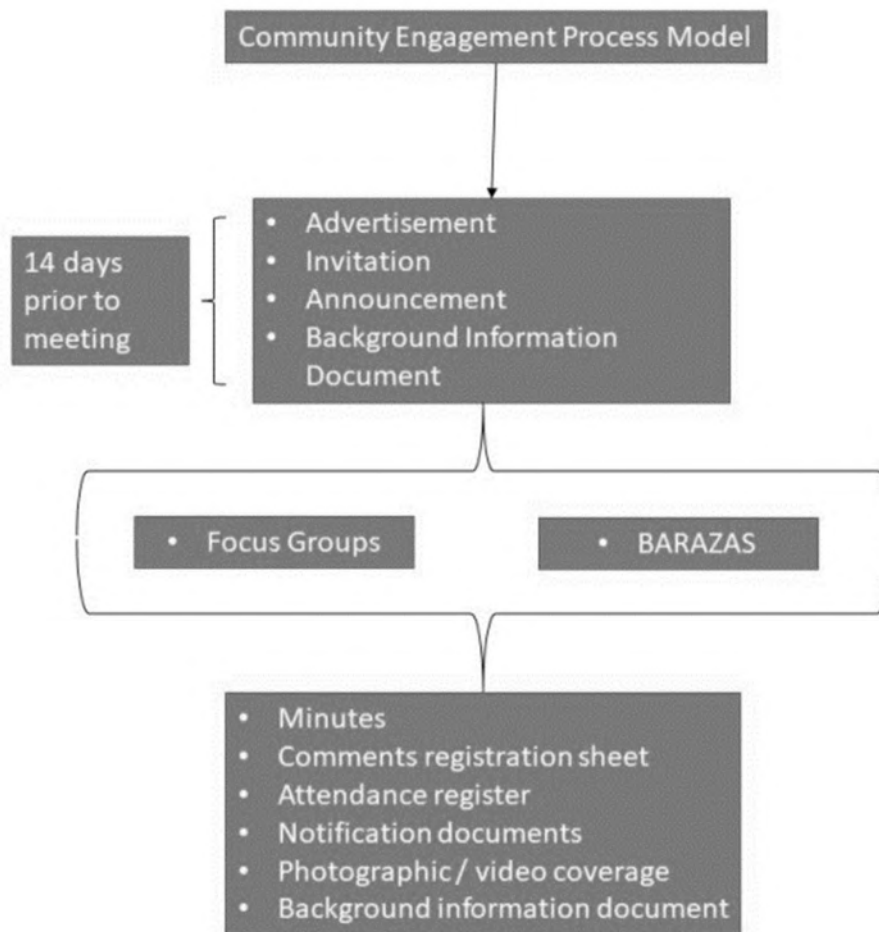


Figure 6: Community Involvement Model

9.7: Documentation of Stakeholder Engagement

Records will be made of all notification exercises as well as all stakeholder engagements (workshops, meetings etc). These meeting minutes will form an appendix to the Stakeholder Engagement Report that will form part of the EIA report. Records of the meetings will include (as appropriate):

- ✓ Register of attendance;
- ✓ Comments sheets;
- ✓ Photographic/video coverage; and
- ✓ Minutes of meeting

9.8: Public Participation

Public participation and community consultation has been taken up as an integral part of social and environmental assessment process. Public participation has been viewed as a continuous two-way process, involving promotion of public understanding of the processes and mechanisms through which developmental problems and needs are investigated and solved. Consultation was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. It assisted in identification of the problems associated with the project as well as the needs of the population likely to be impacted.

The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on ESIA for the purpose of achieving the fundamental principles of sustainable development. Public consultation was carried out in this Project with the objectives of minimizing probable adverse impacts, and to achieve speedy implementation of the project by creating awareness amongst the community on the benefits of the project.

The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the proposed development.
- To encourage and provide for people's participation in project development.
- To obtain new insight and site-specific information, and to appropriating possible mitigation measures based on local knowledge of the communities
- To facilitate and open and inclusive approach to consultation that provided timely and transparent information to the stakeholders;
- To provide an opportunity for stakeholders to provide feedback on the project raise their concerns;
- To aid project planning and development of mitigation measures and monitoring plans to address issues raised.

In that regard, two stakeholder consultation and public participation meetings were held and the findings are attached in the Annexes.



Stakeholder Meeting at Davana Hotel with local leadership

Invitation letters and Minutes attached*



Public Participation at the project location

Minutes and attendance list attached*



10.0: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

10.1: Significance of ESMP

ESMP involves the protection, conservation and sustainable use of the various elements or components of the environment. The ESMP for the proposed project provides all the details of project activities, impacts, mitigation measures, time schedules, costs, responsibilities and commitments proposed to minimize environmental impacts. The main activities include monitoring and evaluation and environmental audits during implementation and decommissioning phases of the project. Environmental monitoring and audits are essential in projects life span as they are conducted to establish if project implementation has complied with set environmental management standards for Kenya as spelt out in EMCA 1999 and the Environmental Impact Assessment and Audit Regulations 2003. In this project, environmental monitoring and audit will be conducted to ensure that identified potential negative impacts are mitigated during the project's life span.

10.2: ESMP Matrix

The matrix summarizes the environmental, social monitoring and management plan for the proposed project. It also describes parameters that can be monitored, and suggest how monitoring should be done, how frequently, and who should be responsible for implementation and monitoring. The estimated costs for the various mitigation measures have been provided where possible. It will be noted that most of these measures will be part of the project's operational costs.

The ESMP guidelines apply to all other project experts especially contractors. The project contractors will mostly be responsible for the implementation of the construction phase ESMP. The contractors will identify responsibilities and organization required to implement the accountabilities of the construction phase ESMP. The construction phase ESMP will apply to all contractors and sub-contractors. The contractors will also be responsible for developing and implementing site-specific induction for all construction workers. This induction will include all EHS hazards and their control measure. The contractors will ensure that all workers in their employ are trained and competent and hold the appropriate certification for the tasks that they will be undertaking.

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with are outlined in Table 10.



Table 10: ESMP Matrix

Environmental/ Social Impact	Proposed Mitigation	Responsibility	Monitoring Parameter	Monitoring Frequency	Estimated Cost (Kshs)
CONSTRUCTION PHASE					
Loss of vegetation and biodiversity	Do not site project in environmentally-sensitive area e.g. watershed, wetland and riparian land. -Clear vegetation only when and where necessary. -Comply with land use plans and approved designs. -Provide signs marked do not Walk/Park on the grass -Resurface and re-vegetate exposed bare areas preferably by using natural indigenous vegetation. Scientific evidence should be put in consideration to avoid introduction of invasive species.	Proponent Project Engineer Project Architect	Percentage of vegetation cover of the total property size	Continuous	Within project cost
Modification of Micro – Climate	Careful layout and orientation of the plant and buildings to respect microclimate: wind and sun direction. -The project will use minimum reflective building materials and finishes for roof, walls and paving. -Harmonize site drainage design with neighboring premises	Proponent Project Architect	Observation	During planning phase of the project	Within Project cost
Noise and Excessive	-Complying with the EMCA noise regulation Legal Notice 61	Proponent	Amount of noise	Continuous	30,000

Vibration	<p>including:</p> <ul style="list-style-type: none"> -Observe normal working hours during noisy construction works (0800 to 1700) hours -Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures -Sensitize drivers to avoid unnecessary gunning of vehicle engines -Ensure regular servicing of engines and other machines shall be adhered to -Workers to wear ear muffs if working in noisy work areas. 	Contractors	generated (dB)		
Changes in soil characteristics	<p>Apply soil erosion control measures including:</p> <ul style="list-style-type: none"> -Control earthworks through cascading gabions and distribution channels for storm water - Design to incorporate existing drainage pattern and avoid disturbing the same -Control speed and operation of construction vehicles. -Sprinkle water on excavated areas. -Maintenance of construction equipment. -All bare areas should be landscaped after -Contractor should have a designated area where machinery servicing and maintenance is 	Proponent Contractors	<p>Quality of landscaping</p> <p>Amount of run-off i.e. flow rate of run-off</p> <p>Oil stains</p>	Continuous	Included in the BoQ under Drainage Structures

	<p>carried out and that is protected from rain water.</p> <p>-All oil products should be stored in a site store and handled carefully</p>				
Disruption of Public Utilities	<p>Design to incorporate existing public utilities and avoid disturbing the same</p> <p>-Contractor to generate utility management plan</p> <p>-Contractor to minimize damage to public utilities</p> <p>-Employing water conservation techniques and using the required amounts of water to prevent wastage.</p> <p>-Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible.</p> <p>-Providing proper sanitary facilities for construction workers.</p> <p>-Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.</p> <p>-Liaise with relevant authorities to communicate to affected persons in case of interruptions and work on prompt restoration of services</p>	<p>Contractor</p> <p>Proponent</p> <p>County Government</p> <p>Relevant government agency</p>	<p>Down time of utilities affected</p> <p>Complaints from the local residents</p>	Daily	Provisional sums for utilities
Increased generation of waste	<p>-Following EMCA regulations on Waste Management, Legal Notice 121 including:</p> <p>-Using waste minimization</p>	<p>Proponent</p> <p>Contractor</p>	-Disposal methods of solid waste from the	Weekly	Approx. 50,000 weeklies

		<p>techniques such as buying required quantities in bulk.</p> <ul style="list-style-type: none"> -Identifying all sources of wastes, and ensuring wastes are handled by licensed personnel -Making available suitable facilities for the collection, segregation and safe disposal of the wastes. -All construction materials left over at the end of construction should be used in other projects or sold -Ensure proper handling and storage of construction materials to reduce damage -Accurately estimate the sizes and quantities of materials required to reduce amounts left -Excavated waste should be re-used or backfilled. -Recycle or re use where applicable -All vehicles carrying waste shall have properly fitted side- and tailboards, and the materials being transported shall be covered. 		<p>site</p> <ul style="list-style-type: none"> -Complaints on health and safety aspects related to construction activities -Site cleanliness -Amount of waste/debris on-site -Presence of well-maintained receptacles and central collection points 		
Air/ pollution	Dust	<ul style="list-style-type: none"> -Ensure strict enforcement of on-site speed limit regulations -Avoid excavation works in extremely dry weathers if and where possible -Sprinkle water on graded access routes whenever necessary to reduce dust generation by construction vehicles -Enclosing the structures under construction with dust proof nets. -Using efficient machines with low 	Contractors Proponent	<p>Observation: Dust levels particulate Matter</p> <p>Exhaust fumes from the vehicles</p> <p>Maintenance levels of plant and</p>	Daily and random	20,000 per month over the construction period

	<p>emission technologies for the ones that burn fossil fuels.</p> <ul style="list-style-type: none"> -Regular maintenance and services of machines and engines. -Use of clean fuels e.g. unleaded and de-sulphurized fuels. -Exposed stockpiles of e.g. dust and sand, will be enclosed, covered, and watered daily, or treated with non-toxic soil binders. -All trucks hauling soil, sand and other loose materials shall be covered. -Provide all workers with PPEs and enforce their use -Excavation and grading activities will be suspended when wind speed exceeds 25 mph. -Avoid open burning of waste. 		equipment		
Surface drainage	<ul style="list-style-type: none"> -Surface run off and roof water will be harvested and stored in underground reservoir for re-use. -Storm water management that minimizes impervious area increases infiltration by use of recharge areas, and use of retention, and/or retention with graduated outlet control structures, will be used. -Maintain internal and immediate external drainage systems clear all the times -Dig channels for water runoff into underground water reservoirs. 	<p>Contractor Proponent Relevant government agencies</p>	Inspection of drainage	Continuous	50,000

	<ul style="list-style-type: none"> -Compact loose soils and apply binding materials. -Undertake roof catchment harvesting to reduce volumes of storm water. -Install siltation traps within the drainage design to collect silt and sediments ensuring that they do not end up in adjacent aquatic areas - Proper decommissioning of the sanitary facilities shall be carried out once construction is complete 				
Increased Traffic	<ul style="list-style-type: none"> -Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site -Ensuring all drivers for the project comply to speed regulations. -Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations. -Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use -The contractor ensures proper driving discipline by its employees, and sanctions those in breach. -Ensure all excavated sites, embankments, and dangerous locations are protected with proper safety barriers, tape and warning 	<p>Contractor</p> <p>Area traffic police</p>	<p>Observation</p> <p>No. of traffic incidences</p> <p>Flow of traffic</p>	Continuous	Part of project cost

	<p>signs.</p> <ul style="list-style-type: none"> -Maintain a log detailing every violation and accident on site or associated with the project work activities, including the nature and circumstances, location, date, time, precise vehicles and persons involved, and follow-up actions with the police, insurance 				
Public and Occupational Health and Safety	<ul style="list-style-type: none"> -Enforce speed limits for vehicle accessing the construction site -Ensure the general safety and security at all times by providing day and night security guards -Adequately lighting within and around the at night premises. -Provide all workers with the necessary protective gears -Ensure all workers are in protective gears all the time when on site -Place fire extinguishers in strategic areas within the deport -Designate and mark smoking areas -Workers to be trained as fire marshals -Fire escape routes to be shown clearly -Provide enough first aid kits within the project site -Train workers in administering first aid -Ensuring all potential hazards such as movable machine parts are labelled. 	<p>Proponent Contractor NEMA County Government of Nairobi County Public Health Officer</p>	<p>Number of incidents/ accidents</p> <p>Availability of PPEs</p> <p>Visibility and clarity of signage and alerts</p> <p>Efficiency and presence of fire-fighting equipment</p> <p>Number of fire assembly points</p>	Continuous	100,000

	<ul style="list-style-type: none"> -Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment -Ensuring there is security in and around the site to control the movement of people. -Providing safe and secure storage for equipment and materials in the site. -Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. 				
OPERATION PHASE					
Increased Pressure on utilities	<ul style="list-style-type: none"> -Implementing water conservation techniques. -Using only the required amounts of water during normal operations. -Creating awareness through signs of conservation of water and electricity. -Using natural light during the day for lighting purposes. -Using machines and equipment with a high level of power efficiency in the station and servicing them as often as required to maintain their efficiency. -Using clean and efficient energy in the kitchens for cooking purposes. 	Proponent Kenya Power NCWSC	Number of complaints from neighbors Leaks or breakages	Daily	Within maintenance cost
Increased waste generation	<ul style="list-style-type: none"> -Reuse of materials, thus avoiding disposal 	Proponent	Amount and type of	Weekly	Within operation cost

	<p>-Special controls will be imposed to regulate storage, labeling, transport and disposal of lubricants and other oily wastes (chemical wastes).</p> <p>-Segregate at source</p> <p>-Slag can either be sold to construction industry or disposed in approved landfill/dumpsite.</p> <p>-All vehicles carrying waste shall have properly fitted side- and tailboards, and the materials being transported shall be securely covered.</p> <p>-All works areas shall be cleaned of general litter and refuse daily.</p> <p>-General refuse and litter shall be stored in enclosed bins or compaction units separate from construction or chemical wastes.</p> <p>-Refuse shall not be burned</p> <p>-General refuse may be generated by food service activities on site, so reusable rather than disposable dishware shall be used if feasible.</p> <p>-Resource recovery will be encouraged once the project takes off so as to shrink waste stream and recover non-recyclables.</p> <p>-A NEMA licensed waste handler will be engaged to collect solid waste generated.</p>	<p>County Government</p> <p>NEMA</p> <p>County public health</p>	<p>waste generated per day</p> <p>Complaints from affected neighbors</p>		
Excessive Noise	<p>-Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment.</p>	Proponent	Reported incidences	continuous	50,000

	<ul style="list-style-type: none"> -Using equipment with low noise ratings or noise reduction technologies such as for the generators -Timely maintenance of machinery -Adhere to permissible noise levels -Noise surveys - Display warning signs and notifying other users of noise-prone work areas -Conducting all noisy activities during the day when permissible levels are higher 				
Soil impacts	<ul style="list-style-type: none"> -Spill kit should be available at site and drip trays are to be provided. -Install leak detectors for all fuel storage tanks to check on leaks -Develop an oil spill contingency plan -Bund all fuel storage tanks to prevent accidental spills -Regular cleaning of oil sumps and storm water drains -Revegetate bare areas with appropriate grass species 	Proponent	Soil stains Vegetation cover	Routine	Within operation cost
Increased surface run off leading to flooding, from paved grounds and expansive roofs	<ul style="list-style-type: none"> -Surface run off and roof water will be harvested and stored in underground reservoir for re-use. -Storm water management plan that minimizes impervious area increases infiltration by use of recharge areas, and use of retention, and/or retention with graduated outlet control structures, will be used. 	Proponent	Inspection Reported leaks Stagnant ponds of water	Routine	Within operation cost

	<ul style="list-style-type: none"> -Maintain internal and immediate external drainage systems clear all the times -Dig channels for water runoff into underground water reservoirs. -Compact loose soils and apply binding materials. -Undertake roof catchment harvesting to reduce volumes of storm water. -Stone pitching 				
Increased water demand	<ul style="list-style-type: none"> -Metering water use -Regular inspection of pipes to detect leaks -Recycle water during processing -The cooling water for steel rolling, oxygen station, air compressor station and equipment can be recycled in a closed loop -Maintain internal and external drainage systems clear all the times -Provide Roof catchment harvesting 	Proponent	<p>Meter reading</p> <p>Reported leaks</p>	Routine	Within operation cost
Increased Energy Demand	<ul style="list-style-type: none"> -Undertake annual energy audits -Use green energy -Enhance energy efficiency in production 	Proponent Kenya Power EPRA	<p>Meter Reading</p> <p>Energy Audits</p> <p>Alternative power sources</p>	Annually	Within Operation cost
Water resources pollution	<ul style="list-style-type: none"> -Treat effluent before releasing to sewer -Regular effluent testing -Regular inspection of drainage for leakage -Sanitary facilities will be kept clean always, through regular washing/cleaning. -Provision of adequate and 	<p>Proponent</p> <p>County Government</p> <p>WRA</p> <p>NEMA</p>	<p>Inspection</p> <p>Complaints</p> <p>No. of leakage incidences</p>	Routine	100,000

	<p>appropriate sanitary facilities for the workers during construction phase</p> <ul style="list-style-type: none"> -Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns 				
Air quality	<ul style="list-style-type: none"> -Explore cleaner production mechanisms - All vehicles, generators and other equipment used during the construction will be appropriately tuned and maintained in good working condition in order to minimize exhaust emissions. -Operation will be vented through vertical stacks to safe heights in order to minimize dispersions at ground level. -Dog house furnace hood for effective emission capture -Quarterly stack emission measurement -Adequate ventilation will be provided to the occupants of the facility. -Indoor air quality will periodically be checked to ensure it meets international standards for safe and healthy indoor air quality such as of OSHA -conduct air dispersion modelling for ambient air quality -Comply with air quality regulations 	<p>Proponent</p> <p>NEMA</p> <p>DOHS</p>	<p>Air emission measurement</p> <p>Dispersion modelling</p> <p>Complaints</p> <p>Visible smoke</p>	Quarterly	500,000

<p>Public and occupational health and safety</p>	<ul style="list-style-type: none"> -Train the workers in firefighting and subject them to frequent fire drills and designated fire assembly point -Place sand filled buckets in strategic places -Clear label fire exit points -Ensure block electric wiring is done by qualified electrician who is licensed by Kenya power -Provide adequate ventilation for all workplaces - Provision of PPEs to all and replacing the PPEs on wear and tear. -Placing readable signs alerting people of flammable hazardous petroleum materials. -Providing fire-fighting equipment and maintaining them to ensure they are fully functional. -Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use map. -Putting in place and ERP and ensuring all people in the project are aware of it and the procedures to follow commensurate to the level of emergency. - Safe and adequate storage for hazardous and flammable substances and controlling access to them. -Monitoring the movement, 	<p>Proponent Contractor County Public health department DOSHS</p>	<p>Number of incidents/ accidents per monthly Number of drills per Year</p>	<p>Continuous</p>	<p>200,000</p>
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	handling and management of wastes to ensure they safely managed and don't present any EHS risks.				
Security Concerns	<ul style="list-style-type: none"> -Control entry and exit to the property -Contract reputable security firm -Implement best practice standard operating procedures for the establishment -Ensure the integrity of the perimeter wall remains uncompromised -integrate ICT and upgrade systems with changing circumstances 	<ul style="list-style-type: none"> Proponent Police 	<ul style="list-style-type: none"> No. of incidences Inspection 	Continuous	Within operating costs
DECOMMISSIONING PHASE					
Demolition of existing structures	<ul style="list-style-type: none"> -Apply for demolition permit from relevant authorities before commencing the demolition -Engage a registered private contractor to carry out the demolition -Provide workers with PPE -The demolition exercise to be limited to day time only -Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009 	<ul style="list-style-type: none"> Project proponent -Contractor -NEMA inspectors 	<ul style="list-style-type: none"> Demolition approvals Observation Complaints from neighbors 	Daily	500,000
Air Pollution	<ul style="list-style-type: none"> -Dust suppression with water sprays on dusty areas -Careful screening of construction site to contain and arrest 	<ul style="list-style-type: none"> -Proponent -Contractor -NEMA inspectors 	Observation	Daily	100,000

	<p>construction related dust</p> <ul style="list-style-type: none"> -Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission 				
Noise and excessive vibration	<ul style="list-style-type: none"> -Demolition activities to be restricted to daytime (8am to 5pm) -Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures -Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. -Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009 	<p>Proponent</p> <p>Contractor</p> <p>County Government</p> <p>NEMA inspectors</p>	<ul style="list-style-type: none"> -Complaints -Observation 	Routine	250,000
Public and occupational health and safety	<ul style="list-style-type: none"> -Cordone off the demolition area -All workers to wear PPEs e.g. helmets, safety boots and ear muffs -All workers will be sensitized before demolition begins, on how to control accidents related to construction. -Accordingly, adherence to safety procedures will be enforced. -All workers will be adequately insured against accidents 	<p>Proponent</p> <p>Contractor</p>	<ul style="list-style-type: none"> -Observation - Number of incidences 	Daily	500,000
Solid waste	<ul style="list-style-type: none"> -Segregation at source -Secure stockpiling of demolition waste for safe disposal -Cover trucks hauling waste from the demolition site -Comply to EMCA waste management guidelines 	<p>Proponent</p> <p>Contractor</p> <p>County Government</p>	<p>Inspection</p> <p>Waste tracking</p>	Daily	200,000

	-Avoid burning of waste -Resource recovery	NEMA inspectors			
Liquid waste	-Decommissioning of plumbing infrastructure should be systematic to avoid spills -Contain hazardous chemicals to avoid contamination of surface and underground water resources	Proponent Contractor	Inspection	Daily	200,000
Loss of vegetation and landscape changes	- Put in place an appropriate re-vegetation programme to restore the site to its original status -During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; -Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; -Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	Proponent Contractor	Inspection	At the end of the demolition exercise	300,000
Security Concerns	-Restrict access to demolition site -Employ additional security as appropriate	Proponent Police	Inspection	During the entire demolition exercise	500,000



11.0: CONCLUSION AND RECOMMENDATIONS

The proposed development shall bring with it numerous positive impacts including increase better pollution control mechanisms, efficient production that ensures better utilization of resources, improved health and safety of employees, creation of employment opportunities, improved businesses in the project area especially for various suppliers and increase in revenue to both the county and national governments among others as outlined in the report.

The negative environmental impacts that will result from establishment of the project which include increase in traffic along the access roads, air and noise pollution, increased water demand, strain to existing infrastructure among others can however be mitigated.

The proponent has a well written environmental and OHS policy and is committed to put in place various mitigation measures to mitigate the negative environmental, safety, health and social impacts associated with the proposed development. It is recommended that in addition to this commitment, the proponent should focus on implementing the measures outlined in the ESMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.

It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

REFERENCES

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10. Kenya gazette supplement Acts Occupational Safety and Health Act, 2007. Government Printer, Nairobi
11. Kenya gazette supplement Acts County Government Act, 2012. Government printer, Nairobi
12. Nairobi Integration Development plan, 2014
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ANNEX: ATTACHMENTS

The attached documents include:

- Architectural drawings
- NCC plan approval receipts
- Copies of land title deeds and survey plans
- Company KRA PIN certificate
- Project BoQ
- Public Participation Letters of Invitation
- Public participation questionnaires
- Attendance registers
- Minutes of stakeholder engagement meetings
- Copy of TOR approval
- Expert License
- Copies of submission forms
- Payment invoice
- NEMA Payment receipt
- CD copy of the project