

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (EIA) STUDY  
REPORT  
FOR THE PROPOSED ASBESTOS DISPOSAL SITE (LAND FILL) ON LR NO. 1885,  
SUNA WEST/WASIMBETE/BUHEMBU IN MIGORI COUNTY**



**SUBMITTED TO:**

THE COUNTY DIRECTOR OF ENVIRONMENT  
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY  
MIGORI COUNTY,

**SUBMITTED BY:**

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## **CERTIFICATION**

The EIA study report have been prepared with authority from the proponent for presentation to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulation, 2003 for the proposed Disposal of Asbestos Waste disposal site on L.R. No. 1885/Suna West/Wasimbete/Buhembu in Migori County. Information contained herein is based on information provided by the proponent's representatives, site observation, case references and various consultations. It is therefore an accurate and a truthful representation of all the findings at the time of the exercise.

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**PROPONENT**

## **EXECUTIVE SUMMARY**

The ECCL (Proponent) commissioned the undertaking of an Environment Social and Impact Assessment of a proposed landfill for disposal of Asbestos containing Materials (ACMs) to be located at their site at ECCL Buhembu in Migori County on LR No. 1885, Suna West/Wasimbete/Buhembu. The EIA was conducted during the Month of October 2020.

The proposed site is approximately 7 acres or approximately 3 Hectares and which is approximately 1.55kms from the human settlement. As at the time of this report, the firm had acquired the parcel from the owners who inherited it from their fathers. A copy of the title deed has been attached to this report. The facility to be set up shall occupy only 3 acres of land, where a pit, depending on the quantity of the asbestos to be disposed, shall be dug at a maximum depth of nine decimal five meters (9.5m) below the ground. A concrete lining/wall of 130mm shall be constructed all round before the asbestos materials are placed in the pit, covered by 130mm concrete cover, then pour the topsoil. The pit shall be considered full when the material reaches a mark of 1.5m below the ground level. The pits shall be dug when the materials are received on the site and the volume of excavation shall depend on the amount of the asbestos materials to be disposed. Other amenities to be provided at the site include jet wash area, sanitary facilities, car park, fence, and a lockable gate. The major potential risk of the project is exposure to the asbestos fibres to both the public and the workers which can be mitigated as proposed in the management plan by providing appropriate safety gear, training the staff on asbestos handling, wetting the asbestos prior to removal to the disposal site, transporting them in a licensed vehicle, disposing the asbestos immediately they arrive at the site, disposal of the material in underground concrete confinement, washing the vessels on the site, disposing the used Personal Protective Equipment on the site, undertaking medical surveillance on the staff among others. The positive impacts will be provision of the employment but the most significant is the provision of a site for safe disposal of the hazardous substance thus reducing the risk of exposure to the public and environment.

### **Objective of the Assessment**

This EIA study was conducted to determine the overall environmental impacts of the asbestos containing materials ACMs is likely to have on the environment during removal from the source, transportation to the disposal site and after disposal. The report, therefore, in addition to other environmental factors, illustrates impacts the project may have on the biological, economic, social and physical dimensions of the environment. Positive impacts have also been examined and evaluated to encourage enhancing them while mitigation measures have been suggested where negative impacts are predicted.

## **Key Findings and Methodology**

This study report has assessed the various positive and negative environmental impacts related to the proposed project. Development of the mitigation measures for the negative impacts identified was done after impact evaluation. Appropriate environmental management plan (EMP) to ensure effective environmental protection is also incorporated into the study report.

The methodologies used in undertaking the Environmental Impact Assessment included site visits, photographing, interviews, questionnaires, literature reviews and consultations with stakeholders such as neighbours and the wider public. Those individuals consulted welcomed the move by the proponent to have a safe asbestos disposal landfill alongside the existing modern incinerator with no objection. The potential environmental impacts during receiving, temporary storage and disposal of ACMs were assessed. The main potential environmental impacts include compromised air quality and soil contamination.

Consultants proposes to provide a facility that will offer solutions on safe disposal of asbestos from various entities that intend to dispose-off the asbestos roofing's within republic of Kenya but more specifically within the Nyanza region. The proposed site is located in Suna West, South West of Migori Town, about 22 kilometres from Migori Town.

## **Effects of Asbestos Exposure**

Asbestos is a naturally occurring mineral that once was lauded for its versatility, recognized for its heat resistance, tensile strength and insulating properties, and used for everything from fireproof vests to home and commercial construction. It was woven into fabric and mixed with cement. Asbestos was a perfect blend to make things better – except it was highly toxic, too.

The project is classified as high risk thus need for wider public consultation. The experts has enumerated several potential positive and negative impacts of the project and suggested how the negative impacts can be mitigated. The most important negative impact is the exposure of the asbestos materials to the public and workers which will be mitigated by proper handling and provision of appropriate PPE. Potential underground contamination will be mitigated by giving an allowance of 10m above water table and disposing of the material in underground concrete confinement.

- **Health Effects**

Today asbestos is a known cause of mesothelioma cancer, is banned in more than 50 countries Kenya being one of them and its use has been dramatically restricted in others.

Fibres embedded in lung tissue over time may cause serious lung diseases including asbestosis, lung cancer or mesothelioma. Smoking increases the risk of developing illness from asbestos exposure. Disease symptoms may take several years to develop following exposure.

The major health effects associated with asbestos exposure includes: Asbestosis:

- **Asbestosis**-- is a serious, progressive, long-term non-cancer disease of the lungs. Symptoms of asbestosis include shortness of breath and a dry, crackling sound in the lungs while inhaling. There is no effective treatment for asbestosis.
- **Lung Cancer**-- People who work in the mining, milling, manufacturing of asbestos, and those who use asbestos, and its products are more likely to develop lung cancer than the general population. The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains, hoarseness, and anaemia.
- **Mesothelioma**--this is a rare form of cancer that is found in the lung, chest, abdomen, and heart and almost all cases are linked to exposure to asbestos. This disease may not show up until many years after asbestos exposure.

### **Social economic effects**

Asbestos is considered as one of the biggest occupational health risks faced by workers and the related diseases are reaching epidemic proportions in many parts of the world. Studies carried out in Canada, Australia and the UK indicate that death continues to be one of the worst consequences of exposure to asbestos which is the most common of cause of asbestos related diseases in the workplace.

Death due to asbestos may be as high as 100,000, assuming that the world labor force is about 2.7 billion (Takala, 2002). Experts suggest that the number of deaths from asbestos related diseases will rise in future.

The social and emotional impacts of people affected by asbestos disease and associated issues were demonstrated by Walker and LaMontagne in 2004. Workers' and community members' knowledge and awareness about asbestos grew as a result of increased deaths, fear of living with risk of the past exposure and experience with medical professionals. Living with asbestos related disease has been identified as capable of affecting identity by the conversion from being a healthy and independent person to being physically limited and reliant on family and others, this leads to feelings of anger, frustration, fear and uncertainty (Walker and LaMontagne (2004).

### **Mitigation measures**

The proposed project has an overall positive implication to the country, and especially for those with asbestos containing materials and the residents within the precinct of asbestos containing materials. The major threat to the environment and human health today is risks associated with waste management. Not all waste sources are capable of handling hazardous and toxic materials within the premises without compromising the health of their own workers or the neighbouring communities. The result of waste generators disposing wastes without appropriate equipment has been pollution of environmental resources and particularly water sources, air pollution, land contamination and even direct effects to human health. In this regard, therefore, the following are considered main benefits of the proposed land fill for disposal of asbestos containing materials.

### **Conclusion and Recommendation**

Environmental & Combustion Consultants Limited (ECCL), herein referred to as "the proponent" intends to create a landfill for disposal of asbestos materials within its licenced hazardous waste disposal company premises that will be compliant with the National guidelines on safe management and disposal of asbestos in an effort to create an asbestos free environment around the Country.

In a bid to safeguard the health and safety of all and the immediate environs while meeting the regulatory requirements stipulated in the Environmental Management and Co-ordination Act (EMCA) of 1999, the proponent has commissioned the EIA experts to conduct an Environmental and Social Impact study (EIA) for the proposed disposal site for asbestos waste.

Collection, transport, storage and disposal of asbestos wastes shall be in accordance with the provisions of the EMCA (Waste Regulations) and National guidelines on safe management and disposal of Asbestos Workers who are exposed to asbestos should be provided with training and informed about handling asbestos as well as its disposal.

Asbestos waste must be collected in suitable sealed packaging (e.g. heavy-duty plastic bags) with labels indicating that it contains asbestos, and removed from the place of generation as soon as possible, and stored safely. For large items, e.g. asbestos sheets, and boards, these should be wrapped and sealed in polypropylene, if necessary, with precautions to prevent any damage by sharp edges of the contents. Transport of asbestos waste should be done in a secure manner and in compliance with provisions concerning the transport of dangerous goods and hazardous wastes. Necessary measures should be taken during transportation so as no asbestos fibres or dusts are released into the air and no liquids which may contain asbestos are spilled.

Given the proponent's commitment to address all environmental concerns raised in this EIA study report through implementing the mitigation measures; the proposed landfill for disposal of asbestos is recommended for approval and issuance of environmental licence.

## **ACRONYMS**

ACM	Asbestos containing materials
ECCL	Environmental & Combustion Consultants Ltd
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
IWMF	Integrated waste management facility
NEMA	National Environmental Management Authority
MoPHS	Ministry of Public Health and Sanitation
TOR	Terms of Reference
UN	United Nations
UNEP	United Nations Environment Program
WHO	World Health Organization
WRM	Water Resource Management
WRMA	Water Resource Management Authority

## TABLE OF CONTENTS

<b>CERTIFICATION</b> .....	<b>ii</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>iii</b>
Objective of the Assessment .....	iii
Key Findings and Methodology.....	iv
Effects of Asbestos Exposure .....	iv
Health Effects .....	v
Social economic effects .....	v
Mitigation measures .....	vi
Conclusion and Recommendation .....	vi
<b>ACRONYMS</b> .....	<b>viii</b>
<b>TABLE OF CONTENTS</b> .....	<b>ix</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
1.0. Introduction.....	1
1.1. General Information on Asbestos .....	1
1.2. Asbestos Properties and Health Effects .....	2
1.3. Project Background.....	2
1.4. Objectives of the EIA.....	3
1.5. Project location .....	4
1.6. Terms of Reference .....	5
1.7. Scope of the Report.....	5
1.8. Data Collection Procedures .....	6
1.9. Reporting and Documentation .....	6
<b>CHAPTER TWO</b> .....	<b>7</b>
2.0. PROJECT DESCRIPTION AND PHYSICAL ENVIRONMENT .....	7
2.1. Introduction.....	7
2.2. Location and Size.....	7
2.3. Geographical Location.....	7
2.4. Population .....	7
2.5. Topography and drainage .....	8
2.6. Soil and Geology.....	8
2.7. Climatic Conditions .....	8

2.8. Land use .....	9
<b>CHAPTER THREE .....</b>	<b>10</b>
3.0. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK.....	10
3.1. Policy Framework .....	10
3.2. Regulatory Framework.....	12
3.2.1. Environmental Management and Coordination Act, 1999 section 91 (1-7).....	12
3.2.2. EMCA Regulations .....	12
3.2.2.1 Environmental Management Coordination (Waste Management) Regulations 2006....	12
<u>3.2.2.2. The EIA/EA Regulations .....</u>	<u>132</u>
3.2.2.3. Water Quality Regulations (Legal Notice No. of 2006).....	13
3.2.2.4. Noise Regulations (Legal Notice No. 61 of 2009).....	13
3.2.3. Public Health Act Cap 243.....	13
3.2.4. The Occupational Safety and Health Act, No. 15 of 2007 .....	14
3.2.5. The Factories and Other Places of Work (Hazardous Substances) Rules, 2007 .....	15
3.2.6. The Factories (Building, Operations and Work of Engineering Construction) Rules, Legal Notice No. 40 of 1984.....	15
3.2.7. The Local Government Act, Chapter 265 .....	15
3.3. Institutional Framework.....	15
3.3.1. National Environment Management Authority .....	15
3.3.2. County governments .....	15
3.3.3. Directorate of Occupational Safety and Health Services .....	16
3.3.4. Ministry of Public Health and Sanitation .....	16
3.3.5. Proponent’s knowledge and awareness of the relevant legislation.....	16
<b>CHAPTER FOUR.....</b>	<b>17</b>
4.0. PROJECT DESCRIPTION.....	17
4.1. Introduction .....	17
4.2. Site preparation, Asbestos removal and storage .....	17
4.2.1.Site preparation .....	17
4.2.2.Asbestos removal .....	18
4.2.3.Temporary Storage.....	19
4.2.4. Transportation .....	20

4.2.5. Disposal operations .....	20
4.2.6. Post – Disposal .....	21
<b>CHAPTER FIVE</b> .....	<b>22</b>
<b>5.0. COMMUNITY AND STAKEHOLDERS PARTICIPATION .....</b>	<b>22</b>
5.1. Introduction .....	22
5.2. CPP Methodology .....	22
5.3. Direct Interviews.....	22
5.4. Questionnaire Administration .....	22
5.5. Stakeholder Comments.....	23
<b>CHAPTER SIX .....</b>	<b>26</b>
6.0. ALTERNATIVES TO THE PROPOSED PROJECT .....	<b>Error! Bookmark not defined.</b>
6.1. Alternative Site.....	<b>Error! Bookmark not defined.</b>
6.2. Alternative disposal method.....	<b>Error! Bookmark not defined.</b>
6.3. No Action Alternative.....	<b>Error! Bookmark not defined.</b>
6.4. The proposed development alternative .....	<b>Error! Bookmark not defined.</b>
<b>CHAPTER SEVEN.....</b>	<b>28</b>
7.0. POTENTIAL ENVIRONMENTAL IMPACTS .....	28
7.1. Negative impacts .....	28
7.1.1. Loss of vegetation .....	28
7.1.2. Soil erosion and water logging .....	28
7.1.3. Dust emissions and exhaust emissions .....	29
7.1.4. Health and Safety .....	29
7.1.5. Ground water pollution .....	29
7.2. Positive impacts .....	29
<b>CHAPTER EIGHT .....</b>	<b>30</b>
<b>8.0. PROPOSED MITIGATION MEASURES .....</b>	<b>32</b>
<b>CHAPTER NINE .....</b>	<b>34</b>
9.0. ENVIRONMENTAL MANAGEMENT PLAN .....	34
9.1. Significance of EMP .....	34
9.1.1. Environmental Management Plan .....	35
<b>CHAPTER TEN.....</b>	<b>42</b>
10.0. CONCLUSION AND RECOMMENDATION .....	43

10.1 Conclusion.....	43
10.2 Recommendations .....	<b>Error! Bookmark not defined.</b>
<b>REFERENCES.....</b>	<b>44</b>
<b>APPENDICES .....</b>	<b>45</b>
<b>Figure 1: Showing the image satellite of the proposed site from Migari town.....</b>	<b>4</b>
<b>Figure 2: Photos of Eucalyptus trees planted around the firm .....</b>	<b>9</b>
<b>Figure 3. Photo of the proposed site for excavation of a land fill .....</b>	<b>18</b>
<b>Figure 4: Photos of stakeholders in a meeting on 27<sup>th</sup> August, 2020 .....</b>	<b>23</b>
<b>Figure 5: Photos of stakeholders meeting held on 27<sup>th</sup> October, 2020 .....</b>	<b>24</b>

# CHAPTER ONE

## 1.0. Introduction

### 1.1. General Information on Asbestos

Asbestos is a naturally occurring mineral fibres found in various rock formations. It is a collective name for a fairly diverse group of different fibres based on hydrated silicates. Different ratios of oxygen, hydrogen, sodium, iron, magnesium, and calcium elements account for several different types of asbestos, the most common ones being Amosite, Chrysotile, Crocidolite, Anthophyllite, Actinolite, and Tremolite.

Asbestos can be divided into two groups, Serpentine that contains only Chrysotile and is composed of only curly fibres that often form into bundles. It comprises 90% of the world production of asbestos and is considered by many to be the least hazardous. The other group is called Amphiboles that contains Amosite, Crocidolite, Anthophyllite, Actinolite and Tremolite. It is usually considered a greater hazard than Chrysotile due to its straight and sharp fibres formation. Amosite and Crocidolite have been used in relatively significant quantities, and in non-fibrous forms are referred to as grunerite and riebeckite respectively.

Asbestos was a popular fire-proofing material once used in thousands of commercial and consumer products. It wasn't until the late 1970's that the use of asbestos was banned after it was classified as a carcinogen. By that time, asbestos had been widely used in a large number of construction products and was already a potential source of great harm to those who came in contact with it. Buildings that were built or refurbished at a time when the use of Asbestos Containing Materials (ACMs) was prolific are likely to have ACMs. These materials included ACMs cemented water pipes and ACMs cemented roofing sheets amongst others.

ACMs were used in the construction industry until late 1970s and early 1980s after which it was discovered that they posed serious health risks. These ACMs especially the roofing asbestos cement roofing sheets were projected to have a life expectancy of between 30 to 50 years. These asbestos cemented roofing sheets still exist in roof structures many years after their life expectancy. Nonetheless, the presence of ACMs in itself does not constitute danger.

Potential risk to health is only present if such material is disturbed and damaged. It is also important to note that an isolated accidental exposure to asbestos fibres for a short duration is unlikely to result in the development of asbestos related diseases.

Activities such as dismantling, breaking, sawing, cutting, drilling etc. are the most likely to present risks and therefore must be managed accordingly.

## **1.2. Asbestos Properties and Health Effects**

ACMs or products have no health risk whatsoever when used in the normal course of events. A health risk exists solely when asbestos fibres are released into the air and is inhaled. Even then, it appears that most people exposed to relatively small amounts of asbestos do not develop any health-related problems. Nevertheless, numerous health studies conducted independently in many parts of the world prove conclusively that the chances of developing serious respiratory illnesses, including lung cancer are greater in those exposed to airborne asbestos fibres. However, scientific evaluation of all the available human data provides no evidence for a „safe“ level of asbestos exposure, thus any quantity should be considered potentially dangerous. Those at high risk are those constantly exposed. The tragedy in dealing with asbestos linked diseases is that they only manifest themselves years or tens of years after the exposure, in essence, those exposed to asbestos fibres today are being „poisoned“ without being aware of it. Fibres embedded in lung tissue over time may cause serious lung diseases including asbestosis, lung cancer or mesothelioma. Smoking increases the risk of developing illness from asbestos exposure. The major health effects associated with asbestos exposure includes asbestosis, lung cancer and mesothelioma.

Since many of these diseases have a latent period stretching beyond 20 years following the initial exposure to asbestos, many cases are not diagnosed and only very few patients survive. The American Cancer Society in 1983 reported that less than 9% of lung cancer patients survive five or more years after diagnosis. Since we cannot cure the diseases caused by asbestos and normally cannot even diagnose the disease until many years after exposure, the only correct course of action to take is prevention. Any level of ACMs inside a building or anywhere else constitutes a hazard and presents risk to human health.

This Environmental Impact Assessment (EIA) is to provide information on the potential negative and positive environmental and social impacts of the project.

It also aims to make recommendations for the mitigation of the potential negative impacts and enhancement of the positive ones.

## **1.3. Project Background**

ECCL is the market leading Company that specializes on the management of Industrial and hazardous wastes. It owns and operates thermal treatment plants in Kenya with the main centralized integrated waste management Facilities (IWMF) at Stony Athi, Nairobi and a new one with the latest incineration technology at Buhembu in Migori County.

ECCL has professionally trained personnel who characterize, segregate, safeguard and package different streams of hazardous wastes appropriately for road transportation to its centralized IWMFs at Stony Athi and Buhembu in Migori. The firm owns and operates the largest fleet in the country of specialized hazardous waste transportation trucks which are NEMA licensed to transport waste from any part of the country to its centralized IWMFs.

This site is not for a one-off disposal but rather a site that can accommodate several tons of the asbestos containing material.

#### **1.4. Objectives of the EIA**

Environmental Impact Assessment is a planning tool now generally accepted as an integral component of sound decision-making. The purpose of Environmental Impact Assessment is to give the environment its due place in the decision-making process by clearly evaluating the environmental consequences of the proposed activity before action is taken.

The main objective of this study report is to Identify potential environmental impacts of the proposed project and develop Environmental Management Plan with recommended measures to enhance the positive impacts and mitigate the negative impacts. This is in a bid to protect the environment and minimize risk to workers and public from asbestos fibres.

Specific objectives are.

- To ensure environmentally sound disposal of asbestos
- To comply with Environmental Management and Coordination Act (EMCA) Waste Management Regulations, 2006 and National guidance on safe management and disposal of asbestos
- To ensure safe removal, handling, packaging and transportation of asbestos.
- To create and raise awareness on hazards of asbestos.
- To identify the possible consequences positive or negative, of the proposed project on the environment
- To determine appropriate mitigation measures to avoid or reduce the adverse impact

### 1.5. Project location

At the time of the initial assessment to ascertain the proposed site location, is on a 7.70Ha piece of land situated in Migori County Suna west Buhembu on Plot No. SUNA WEST/WASIMBETE/1885. The family Owned land is where ECCL a NEMA licenced waste disposal plant (Modern incinerator) is operated.

Electricity is the main source of energy supplied by the Kenya power grid running adjacent to the proposed site. In addition, the proponent has employed the use of power generator to cater for the internal power needs in the station whenever supplementation is required especially during power outages.

The main road access to the facility is an all-weather marram road leading to a gate to the proposed site. The proponent has plans to improve the road to the site to ensure accessibility and safe delivery of materials taking into consideration of the envisaged increased traffic flow. The site is expected to be designed such as to ensure optimal utilization of space, ensure minimal waste, easy and safe movement for trucks and other machines including transport vehicles. At full operations the landfill is expected to support safe disposal of large quantities of asbestos waste from the entire Country. Spills, emissions and friable materials will be contained in the premises.



Figure 1: Showing the image satellite of the proposed site from Migari town

## **1.6. Terms of Reference**

The EIA/EA team as stipulated under the Environmental Management and Coordination Act were commissioned by the proponent to undertake Environmental Impact Assessment (EIA) for the proposed project and to prepare a project report for further review by the National Environmental Management Authority (NEMA) and subsequent authorization to implement the project.

The terms of reference are:

- i. Description of the nature of the Project
- ii. Description of the project location including the physical areas that might be affected by the project activities.
- iii. Description of the guidelines to be observed during removal, transportation and disposal of the asbestos.
- iv. Description of materials to be used, product and by products including waste that will be generated and the method of disposal.
- v. Identification of potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project.
- vi. Formulation of an Environmental Management Plan which will enforce the recommended mitigation measures against any negative environmental impact brought about by the project
- vii. Submission of the project report to NEMA for review.

## **1.7. Scope of the Report**

The scope of this Environmental Impact Assessment, therefore, covered:

- The baseline environmental conditions of the area
- Description of the proposed project,
- Provisions of the relevant environmental laws
- Identification and discussion of any adverse negative impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Provision of an environmental management plan outline.

### **1.8. Data Collection Procedures**

The data collection was carried out through questionnaires/standard interview schedules, use of checklists, observations and photography, site visits and desktop environmental studies, where necessary in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

### **1.9. Reporting and Documentation**

The Environmental Impact Assessment Report from the findings was compiled in accordance with the guidelines issued by NEMA and submitted to NEMA for review. The Consultant ensured constant briefing of the client during the exercise.

## **CHAPTER TWO**

### **2.0. PROJECT DESCRIPTION AND PHYSICAL ENVIRONMENT**

#### **2.1. Introduction**

This section describes the major elements of the project area environment, encompassing the physical, biological and social environment as well as the condition of the proposed project site. The information presented in this section is based on observation of the project area by the consultant as well as information from secondary literature.

#### **2.2. Location and Size**

Migori is a county in southern part Nyanza. Migori town is the capital of the county. The town is located 63 km south of Kisii and 22 km north of the Tanzanian border. The Kenya National census of 2019 indicated that Migori County had a population of 1,116,436. Migori is connected by road to the Masai Mara national park, but the road is in poor condition. Migori town is immediately after Awendo, (where the Sony Sugar Company is situated), Oyani, Stella and Kakrao areas. The road to Isebania is well tarmacked from Kakrao to Mwanza in Tanzania.

#### **2.3. Geographical Location**

The Migori town is located in Migori County and is found between latitude 0°024' and 00 40" S and longitude 340 and 340 50" East. It borders Homabay County to the North, Kisii County and Trans Mara District to the East, Kuria and Republic of Tanzania to the South and Suba district to the West. The total area of the district is 1,167 Km<sup>2</sup> including 475km<sup>2</sup> of Lake Victoria. Operational data on county have not been published thus most of data in the report is based on previous district data apart from those updated through the 2009 census (which has also based its results on boundaries enacted before establishment of the counties). The district is further divided into eight administrative divisions as listed namely; Rongo, Awendo, Uriri, Suba East, Suba West, Nyatike, Karungu and Muhuru. Lake Victoria occupies 475 Km<sup>2</sup> and its shoreline runs along Muhuru, Nyatike, and Karungu divisions with Nyatike having the largest portion of it.

#### **2.4. Population**

Migari County is largely cosmopolitan with influx of population from across the Country due to the emerging employment and business opportunities. The area has three three constituencies namely Suna East, Suna West and Uriri. The County's total population is 1,116,436 according to the Kenya National census of 2019. Within the project area, inhabits are mostly Dholuo speaking people, Abasuba community, Abagusi, Abaluhya, Indians, Arabs and Somali people. Migori town is already

experiencing spillover development and growth as a result of its expansive and vast swathe of land that is still available for commercial, residential and farming purposes.

## **2.5. Topography and drainage**

Altitude ranges from 1,135m above sea level (asl) at the shore of Lake Victoria to 1700m asl. The high-altitude area has several undulating hills and plains stretching for about 20-70km. Some of the hills include Nyatike which is about 4,625m, Ogengo 4300m, God Sibuoche 1475m, God Kwer 1420m and Nyabisawa 1489m.

The main rivers in the project area are the Kuja, Migori and Riana. Other rivers found in the area include Ongeche, Oyani and Sare. River Migori and Ongeche join Kuja River which has a potential for electricity generation both for industrial and domestic purposes. The Rivers can support irrigation for horticultural production but at their downstream they often cause flooding to the communities there

## **2.6. Soil and Geology**

Soils here vary greatly according to the prevailing parent material. In higher regions, soils are dark red clays which are fertile and well drained. In the Kavirondo Gulf, soils are sandy loam formed from sedimentary rocks. Alluvial deposits of eroded material from uplands are common along flood plains of rivers such as Nyando, Yala, Nzoia, and Kuja. In plains such as the Yala and Kano plains, peat swampy soils and black cotton soils dominate. Volcanic soils interspersed with fertile peat swampy soils are found in the uplands. Soils in these regions are generally productive. Rock formation is mainly granites. The soils vary in texture from one area to another. Volcanic soils are found to the north of river Migori, black cotton soil found in Karungu division and they contain adequate nutrients and are suitable for agriculture. Along river valleys and lakeshores are poorly drained soils of heavy clays that can only support pasture.

## **2.7. Climatic Conditions**

The elevation is roughly 1500 metres above sea level at Kakrao descending by 100 m above the sea level (asl). Rainfall is in two seasons like in most of Kenya and the highest rainfall is between March and May. Average rainfall is approximately 1200mm and above, but the rainfall patterns according to neighborhood. The soils are well drained and tend to be loamy. This favors the cultivation of tobacco, sugarcane, maize, beans, coffee, groundnuts and vegetables.

Rainfall varies, ranging from 1308 to 2316mm annually, with the short rains occurring between March and May and long rains occurring between August and November. Climate is a mild inland equatorial type, modified by relief, altitudes and proximity to the lake. Nyatike, Karungu and Muhuru divisions have comparatively harsher climatic conditions than the rest of the district. The lake shore division's experiences unreliable and poorly distributed rainfall.

The temperature ranges between 170c and 200c with the highest temperature in February and lowest in August. The district experiences a high humidity and a potential evaporation of 1800-2000mm per year

## **2.8. Land use**

The proposed site is located in Buhembu ECCL premise in Migori County on LR No. 1885, Suna West/Wasimbete/Buhembu. It is a bare piece of land approximately 7 acres. The surrounding area of the proposed disposal site has no residential areas, no farms nor any shopping centre within. The nearest shopping center is Buhembu shopping center which is approximately 2 KM away. The land for the proposed project belongs to ECCL as per the attached evidence of ownership. The proposed disposal site is about twenty-six kilometres from the Migori Town, off Migori-Sirare Road. There is no visible river or water body within the proposed site.

ECCL-Buhembu participates in the greening of the environment through tree planting exercise. This is a vigorous tree planting initiative which was introduced with aim to involve all employees and nearby community into tree planting. The main objectives of the project are;

- To conserve the water catchments
- To prevent soil erosion
- The trees have got medicinal value
- Rehabilitate area that had been cleared



**Figure 2: Photos of Eucalyptus trees planted around the firm**

## **CHAPTER THREE**

### **3.0. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK**

#### **3.1. Policy Framework**

Laws governing environmental protection and conservation in Kenya are derived from the constitutional statutes and the ratified international conventions. These laws regulate the establishment and operation of development projects such as milling factories, bakeries, shopping complexes and associated activities, which may impact negatively on the environment, human health and socio-economic well-being of the people who interact with such projects.

Kenya is today faced with grave environmental problems and challenges. Among these are land degradation, loss of biodiversity and pollution of the environment (air, soil and water). The situation is aggravated by lack of awareness and inadequate information in the public domain on the consequences of their actions on the environment. There is also limited involvement of the local communities in the participatory planning and management of their environment and natural resources and the environment in general. The Government of Kenya has put in place a wide range of policy, institutional and legislative arrangements to address the causes of environmental degradation in the country.

Until the enactment of the Environmental Management and Coordination Act (EMCA) 1999, Kenya did not have a consolidated legislation for the protection and management of the environment. It had about 77 statutes that touched on various aspects of environmental management. Some of the legislative instruments have been in place for many years and are duplicated in other legislations. Environmental protection and sustainable use of natural resources have also been stated in all development plans since independence. The sessional papers and presidential directives have also emphasized the need to conserve the environment and manage the natural resources sustainably. Lack of consolidated legislation offered inadequate protection for the environment due to the absence of legal and institutional framework. Today, the National Environment Management Authority (NEMA) coordinates all environmental activities in Kenya.

It is a legal requirement for any new development and existing projects to undergo EIA and EA respectively following the enactment by parliament of the Environmental Management and Coordination Act No. 8 of 1999 and gazettelement of Legal Notice No. 101 of 2003 by the Minister of Environment. Under this legal provision development projects are required to undergo EIA process

whose report is later submitted to NEMA for approval and awarding of a license after demonstrating that the possible negative environmental impacts of a given project will be effectively mitigated. For the proposed residential cum commercial development, the key legislative and regulatory requirements relate to proper management of the environment as well as health and safety aspects. The legislative and legal frameworks would therefore seek to address the issues that include among others;

- Environmental Management and Co-ordination Act, 1999
- Environmental Management and Co-Ordination (Amendment) Act, 2015
- Environmental management and coordination (water quality) regulations, 2006
- Environment (Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Co-Ordination (Waste Management) Regulations, 2006
- National Guidelines on Safe Management and Disposal of Asbestos
- Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
- The Public Health Act (Cap 242)
- The Physical Planning Act, 1996
- The County Government Act (2012)
- Occupational Health and Safety Act, 2007 and its subsidiary legislations
  - Fire Risk Reduction Rules of 2007,
  - Safety and Health Committee Rules of 2004,
  - Medical Examination Rules of 2005, and
  - Noise Prevention and Control Rules.
- Energy Act, 2006
- The Petroleum Act (Cap 116)
- Building code

## **3.2. Regulatory Framework**

### **3.2.1. Environmental Management and Coordination Act, 1999 section 91 (1-7)**

The purpose of this Act aims at improving the legal and administrative co-ordination of the diverse Sectorised initiatives in the field of environment so as to enhance the national capacity for its effective management. To administer the Act, two major institutions have been established. They include the National Environmental Council (NEC) and the National Environmental Management Authority (NEMA). It has several Regulations that are discussed in the proceeding sections.

The EMCA, 1999 requires the Authority to categorize hazardous wastes on the recommendation of Standards Enforcement and Review Committee (SERC) and to issue guidelines and regulations for the management of each category of hazardous wastes. The categorization has been done under the EMC (Waste Management) Regulations, 2006, while these guidelines provide for safe management of asbestos and its wastes.

### **3.2.2. EMCA Regulations**

#### **3.2.2.1. Environmental Management and Coordination (Waste Management) Regulations, 2006**

Asbestos has been classified as hazardous waste under the Waste Management Regulations, 2006

Every person who generates toxic or hazardous waste shall treat or cause to be treated such hazardous waste using the classes of incinerators prescribed in the Third Schedule to these Regulations or any other appropriate technology approved by the Authority.

Any leachate or other by-products of such treated waste shall be disposed of or treated in accordance with the conditions laid down in the license or in accordance with guidelines issued by the Authority in consultation with the relevant lead agency.

In issuing a license for the disposal of waste, the Authority shall clearly indicate the disposal operation permitted and identified for the particular waste

*Compliance: The proponent has complied with the regulation and is in the process of seeking approval to dispose the waste*

#### **3.2.2.2. EIA/EA Regulations (Legal Notice No. 101 of 2003)**

The EIA/EA Regulations are meant to operate under Sec. 58 of EMCA. It makes it illegal for anyone to undertake developments without an EIA license.

#### **Compliance to the proposed project**

- Acquisition of EIA license to commence project development.

- Provide procedures and modalities on the preparation of the EIA/EA reports/ studies

### **3.2.2.3. Water Quality Regulations (Legal Notice No. 120 of 2006)**

Water quality regulations were gazetted as a legislative supplement mainly to address the challenges of pollution of water sources and conservation. The regulation provides guides for water use and conservation as well as effluent standards for discharge.

#### ***Compliance***

- *The asbestos to be disposed off in underground concrete confinement as per the NEMA guidelines on disposal of asbestos.*
- *Since the asbestos remains will be disposed onto the ground then a hydro geophysical survey shall be done to ensure there is no underground contamination of water.*
- *Monitoring activities will follow the guide values provided in the asbestos guidelines*

### **3.2.2.4. Noise Regulations (Legal Notice No. 61 of 2009)**

These Regulations were gazetted to manage noise pollution to levels that do not cause nuisance to the public. The proposed construction activities will however have a potential for the production of noise above the acceptable limits. Generally, construction sites generate noise that is above 85 dB (A).

#### ***Compliance to the proposed project***

- *Ensure compliance with the set noise level limits for the site especially during construction and occupational phases.*
- *The proponent should ensure that employees are not exposed to noise levels above 85 dB (A) and in such cases provide suitable personnel protection equipment (ear protective devices).*

### **3.3.3. Public Health Act Cap 242 Sections 11-13 –**

This is an act of parliament to make provision for securing and maintaining health. Section 13 states that it shall be the duty of every health authority to take all lawful, necessary and under its circumstances reasonably practicable measures for preventing the occurrence or dealing with any outbreak, or prevalence of any infections, communicable or preventable diseases or conditions to safeguard and promote the public health and to exercise the powers and perform the duties in

respect of the public health conferred or imposed on it by this act or by any other law.

The Public Health Act Cap 247, Section 3 gives provisions for use of poisonous substances. It refers to regulations for protection of persons against risk of poisoning, imposing restrictions or conditions on the importation, sale, disposal, storage, transportation or use of poisonous substances. This Act also requires persons concerned with importation, sale, disposal storage, transportation or use of poisonous substances to be registered and licensed and provides measures

for detecting and investigating cases in which poisoning has occurred.

The Public Health Act Sec 126 A, empowers municipal councils, urban and area councils to make by laws for all or any of the following matters with regards to buildings for –

Controlling the construction of buildings and the materials to be used in the construction of buildings;

Preventing the occupation of a new or altered building until a certificate of the fitness thereof for occupation or habitation has been issued by such local authority.

To compel owners to repair order to demolish unsafe, dangerous or dilapidated buildings.

The Act further gives the municipal Urban or area councils power to require removal or alteration of work in certain cases the local authority may by notice to the owner either require him to pull down or remove the work, or if he so elects to comply with any other requirements.

*Compliance: The proponent has complied with the act and has planned to assist by elimination of asbestos waste by offering the disposal site.*

### **3.3.4. The Occupational Safety and Health Act, No. 15 of 2007**

The purpose of the Occupational Safety and Health Act (OSHA) is to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces and to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. Though not explicitly provided, the act and the rules made there under have various sections on hazardous materials that apply to Asbestos.

The OSHA stipulates that an employer shall not require or permit his employee to engage in the manual handling or transportation of a load which by reason of its nature is likely to cause the employee to suffer bodily injury. It also states that any person supplying, distributing, conveying or holding in chemicals or other toxic substances shall ensure that they are packaged, conveyed, handled and distributed in a safe manner so as not to cause any ill effect to any person or the immediate environment.

*Compliance: The proponent is expected to observe safety and healthy procedures during demolition, transportation and disposal of asbestos wastes.*

### **3.3.5. The Factories and Other Places of Work (Hazardous Substances) Rules, 2007**

Asbestos has been listed as a hazardous substance and its threshold limit values given, therefore these rules apply to all workplaces where asbestos is present.

### **3.3.6. The Factories (Building, Operations and Work of Engineering Construction) Rules, Legal Notice No. 40 of 1984**

The Factories (Building, Operations and Work of Engineering Construction) Rules, Legal Notice No 40 of 1984, rules 20 and 21 prohibit any inhalation of dust and fumes. In any building operation or work of engineering construction where dust or fumes likely to be injurious to the health of persons employed are given off, all reasonably practicable measures shall be taken to prevent the inhalation of dust or fumes by the person employed by ensuring adequate ventilation or providing suitable respirators at the place where the operation or work is carried on.

### **3.3.7. The Local Government Act, Chapter 265**

Section 160 (a) of The Local Government Act, Chapter 265 empowers every municipal council (now County government), town council and every urban council to establish and maintain sanitary services for the removal and destruction of, or otherwise dealing with, all kinds of refuse and effluent and, where any such service is established, to compel the use of such service by persons to whom the service is available.

Section 201(1) – (4) expands the jurisdiction of local authority to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of the health, safety and well-being of the inhabitants of its area or any part thereof and for the good rule and government of such area or any part thereof and for the prevention and suppression of nuisances. The by-laws so made may control, regulate, prevent, prohibit or compel certain activities to be undertaken and prescribe offences in case of contraventions.

## **3.2. Institutional Framework**

### **3.3.1. National Environment Management Authority**

The Authority is established to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment. Its mandate includes implementation of Legal Notice no.

121 on Environmental Management and Coordination (Waste Management) Regulations, 2006 which stipulates the disposal of Hazardous waste such as asbestos.

### **3.3.2. County governments**

The County governments are charged with the responsibility of providing guidance, supervisory and monitoring services of County governments in matters of infrastructure development and service delivery including solid waste.

### **3.3.3. Directorate of Occupational Safety and Health Services**

The department is mandated to implement all rules pertaining to the protection and prevention of workers from occupational hazards and ensure safe working environment. The Directorate implements the OSHA, 2007 and various rules made there under.

### **3.3.4. Ministry of Public Health and Sanitation**

The mandate of MoPHS is to support the attainment of the health goals of the people of Kenya by implementing priority interventions in public health, guided by the strategic framework provided from the medium-term Plan 2008-2012 and the wider health sector. The ministry is involved in prevention of communicable and non-communicable diseases, health promotions, and curative services at all levels.

The department of environmental health and sanitation aims to reduce disease burden arising from environmental pollution, by preventing disease transmission from general environmental health pollutants.

### **3.3.5. Proponent's knowledge and awareness of the relevant legislation**

The proponent is aware of the requirements by NEMA to conduct an Environmental Impact Assessment and submit a project report on the same to the authority. It is on this basis that he contracted the consultant to conduct the EIA for the proposed project. The proponent is aware of the Public Health requirements regarding the responsibility in ensuring a clean, habitable and safe working environment.

## **CHAPTER FOUR**

### **4.0. PROJECT DESCRIPTION**

#### **4.1. Introduction**

Asbestos is not harmful to the environment per se, but nonetheless represents a major threat. Being a health hazard, asbestos-containing materials and asbestos have to be disposed off with care after its removal so as to avoid exposure to it. It is to be noted that it is the handling of asbestos, which represents the most risks, not so much its disposal.

ECCL referred herein as the proponent intends to set up an asbestos disposal site (land fill). The site shall be used to disposal asbestos from potential clients at a fee. The site shall be fenced off to limit any access to unauthorized persons. The site, having been identified as ideal, shall only be commissioned once the license has been granted. This site is not for a one-off disposal but rather a site that can accommodate several tons of the asbestos material. Once approached by a client ECCL management on the need to dispose of its asbestos, the firm will calculate the space that might be required depending on the quantity of the asbestos available from the clients. Thereafter, ECCL will excavate the space for that specific disposal up to 9.5M below the ground. After excavation, the firm shall construct concrete wall on the excavated pit to ensure that the asbestos leachate does not go into the underground water. After lining the pit with concrete, the asbestos material shall be placed on the constructed pit to up to one metre below ground level, then covered. The pit shall be marked with visible marks indicating what has been disposed, the source and the words 'danger'.

#### **4.2. Site preparation, Asbestos removal and storage**

This chapter outlines the steps necessary for the proponent to ensure, as far as is practicable, the prevention of contamination by asbestos from any workplace; to ensure that asbestos containing materials are stored, labelled, handled and disposed of appropriately.

##### **4.2.1. Site preparation**

The proposed site for the disposal of asbestos materials has been chosen within the expansive 30-acre piece of land belonging to ECCL. The proposed site is located within the company premises, approximately 200m from ECCL main plant. The site is approximately 1.5 km away from the nearest residence away from residential areas and approximately 3km from rivers and springs hence possibility surface water pollution is minimal..

ECCL proposes to develop disposal cells which will be lined with a 1,000-gauge HDPE liner and impervious cement to ensure that the cells are leak proof. Once each cell is filled up, ECCL will seal it with an impervious cement slab. The site will be fenced all round and labelled appropriately to warn off third parties. The site entry/exit will be locked and manned at all times as guided by the National guidance on management and disposal of asbestos. Disposed Material will be one metre below ground level.



**Figure 3. Photo of the proposed site for excavation of a land fill**

#### **4.2.2. Asbestos removal**

The proponent will ensure that the following precautions are observed when removing asbestos materials from buildings or other structures:

- Secure the site to prevent unauthorized persons and to restrict movement
- Wet the asbestos sheets before removal. If asbestos sheets should begin to crack or crumble, immediately wet the cracked or broken areas with the pintsize spray bottle or garden pump sprayer. NB. Breakage releases asbestos fibres.
- Remove pieces of asbestos sheets by pulling any fasteners (nails, screws, rivets) or cutting fastener heads so as to minimize breakage. If necessary, carefully lift asbestos sheets with pry tools to expose the fasteners' heads.
- Do not slide asbestos sheet over each other.
- Carefully lower removed asbestos sheets to the ground. Do not throw or drop it.
- Care should be taken not to stand or sit on the asbestos sheets to avoid breakage.

- The site is to be demarcated into three sections so as to avoid cross-contamination. The sections are, the clean zone, intermediate zone and the dirty zone.
- The workers removing the asbestos must have the appropriate Personal protective equipment which must be removed as they enter the shower room immediately after removal of the asbestos. PPE is to include, full face masks, Chemical Suits, Chemical Gloves and Safety Shoes.

#### **4.2.3. Temporary Storage**

If the asbestos must be stored before disposal and or transportation for disposal, they must be stored in such a way that its containers are secure from accidental or deliberate damage, access by staff and the public.

Temporary storage refers to the time between removal and final disposal of asbestos waste. The duration for temporary storage of asbestos waste should not exceed thirty (30) days from the time of removal. The temporary site should be within the premises where the asbestos is being removed.

The removed bulky asbestos, such as roofing sheets, beams, joists, and studs, should be stacked and wrapped, into stacks which can be easily loaded into the transportation vessel, in a plastic sheet of a minimum of 500-gauge double wrapped and secured with tape and labelled.

Any debris (broken pieces) should be collected in a sealed polythene woven bag or any other air-tight container. The bags should then be wrapped, into stacks which can be easily loaded into the transportation vessel, in a polythene sheet awaiting final disposal.

The bags should be considered full when half full and should be tightly sealed or when filled up to a level where the open neck can be twisted tightly, folded over into a "gooseneck," and the ends sealed to the side of the bag with heavy plastic tape such as duct tape. Care should be taken to ensure that sharp pieces do not puncher the bags/ wrappers Removed asbestos sheets should not be allowed to lie about the site where they may be further broken or crashed by machinery or site traffic.

The storage area must have restricted entrance and locked or secured on a 24-hour basis.

Warning label ("Asbestos hazard area, keep out") and danger signs should be affixed to each wrapped stack or storage area using English, Swahili and Local language.

#### **4.2.4. Transportation**

The proponent is expected to observe the following precautions during the packaging and transportation of the asbestos wastes:

- ✓ The waste transporting vessel must be lined with a 500 gauge double wrapped plastic sheet with every seam sealed with a tape and covered.
- ✓ The transportation vessel should be labelled "Danger - Contains Asbestos Fibres. Cancers and Lung Disease Hazard"
- ✓ The bags and stacks should be gently loaded into transportation vessel. The goosenecks should not be used as handles for carrying the bags, because that might unseal the ends or tear the bags. Tossing the bags into a waste transporting vessel must be avoided because of the risk of rupture
- ✓ The asbestos waste should be transported to a prepared disposal site that is authorized by NEMA
- ✓ The vehicle transporting the asbestos waste should be licensed as per the EMCA (Waste Management) Regulations 2006 and must be accompanied by a tracking document. The waste shall be transported to the disposal site in an enclosed vehicle or container, capable of being washed without lodgement of debris and fibres, and secure from escape of fibres to the atmosphere
- ✓ The proponent should ensure that all persons involved in handling and disposal of asbestos are trained in emergency operating procedures. These procedures shall include how the waste is to be handled, services to be contacted during such an exposure, and additional personal protective equipment.

#### **4.2.5. Disposal operations**

The proponent shall ensure that the following precautions are observed when disposing asbestos wastes:

- ❖ The proponent shall notify the Authority on commencement of disposal activities.
- ❖ Asbestos materials must not be reused or offered for sale.
- ❖ All asbestos sheets and the debris should be wrapped in 1000mm gauge sheets before it is hauled to the disposal site or transfer station in a covered vehicle.
- ❖ Asbestos waste must be disposed of only at approved disposal site for which this report is prepared.
- ❖ The depth of the disposal pit shall be as deep as practically possible to accommodate more asbestos waste but at least one (1) metre above water table.
- ❖ The asbestos should be lowered gently into the disposal site and should not be dropped from any height to avoid breakage.

- ❖ When all available asbestos has been lowered into the pit, cover with polythene paper followed by 6-inch layer of soil. Continue doing this until the pit is full or the waste is finished.
- ❖ The pit shall be considered full when the asbestos waste is at least one meter below the ground level, or the asbestos waste is exhausted.
- ❖ After the pit is full, cover with 1000 gauges double wrapped polythene sheet and fill the pit with layer of soil up to the ground level.
- ❖ Disposal site should be completely fenced off with at least chain link and a lockable gate which shall be locked at all times. The fence should be at least one (1) metre from the edge of the pit.
- ❖ Warning notices stating “Asbestos hazard area, keep out” shall be placed at the disposal site. These signs, with lettering of minimum 150mm in height, are to be placed so that they are clearly visible.

#### **4.2.6. Post – Disposal**

Upon completion of the disposal operations, the proponent is expected to observe the following post-disposal guidelines:

- ❖ All transportation vessels, re-useable containers or any other similar article which have been in contact with asbestos waste shall be cleaned at the disposal site.
- ❖ The disposal site should be maintained including the warning signs, the fence, the gate among others to prevent vandalism and interference.
- ❖ Human activities which might interfere with the buried asbestos waste such as construction and pitting should not be allowed at the disposal site.
- ❖ The proponent shall notify the Authority in writing on completion of disposal of asbestos waste.

## CHAPTER FIVE

### **5.0. COMMUNITY AND STAKEHOLDERS PARTICIPATION**

#### **5.1. Introduction**

Public participation is a very important Part of an EIA process. This was done through administration of structured questionnaires to the immediate neighbours of the project and various stakeholders and interested parties, focus group discussion with key informants, to establish positive and negative impacts likely to arise from the proposed project and establish mitigation measures for the same.

The study provides for meaningful consultation with affected communities, with engagement based on the timely and effective dissemination of relevant project information and considering the range of stakeholders that may be interested in the project activities. The study somewhat documents the stakeholder engagement and consultation processes undertaken from scoping up to EIA disclosure, supplemented by interviews.

During the EIA process, members of the affected community were approached for their views on the proposed project. To achieve this, meetings were held on 27<sup>th</sup> August and 27<sup>th</sup> October, 2020 so as to inform the surrounding community of the proposed project. The meetings were also meant to enlighten them on asbestos roofing sheets and its dangers and measures the government through has put in place to ensure safe handling and disposal of the hazardous material.

Those in attendance welcomed the project but requested that extra caution be taken during its implementation.

#### **5.2. CPP Methodology**

Public participation was mainly achieved through direct interviews, observations and questionnaire administration. The following is a detailed discussion of public consultation methodology used by the EIA team.

#### **5.3. Direct Interviews**

Direct interviews were used to get responses from the project proponent and neighbouring Proponents and residential areas. Their comments were sought through engaging them in discussions about the proposed project, positive and potential negative impacts of the project and other related issues. Comments from these interviews were recorded.

#### **5.4. Questionnaire Administration**

Stakeholder comment sheets were prepared and administered to the neighbours of the proposed project. Comments were captured in specially designed forms for the purpose. See the completed CPP forms in Annex1

## 5.5. Stakeholder Comments

The stakeholders contacted do not anticipate any serious negative impacts from the project during ACMs removal and ultimate disposal. However, some of their concerns have been adequately covered in the preceding chapters. The good thing is that the stakeholders appreciate the fact that the proponent will put measures in place to ensure proper management of such potential negative impacts. Some of the concerns raised are noise pollution at the time of offloading ACMs at the disposal site. It's worth noting that the mitigation measures that have been recommended will help in eliminating and or minimizing the adverse impacts that consulted stakeholders raised. This includes ensuring that the removal and disposal is strictly guided by the provisions of NEMA guidelines on safe Management disposal of asbestos.

Some of the issues raised and comments made by those present include: -

- a) Noise pollution
- b) Soil pollution
- c) Clearing of vegetation



**Figure 4: Photos of stakeholders in a meeting on 27<sup>th</sup> August, 2020**



**Figure 5: Photos of stakeholders meeting held on 27<sup>th</sup> October, 2020**

The meeting was convened by the Senior assistant chief of Suna West-Wasimbete location.

Below is the list with names of those that were in attendance:

S/No.	Name	designation
1.	Mary Anyango	Resident/Farmer
2.	Alice Okello	Resident
3.	Margaret Marwa	Resident
4.	Benard Oloo	Resident/farmer
5.	Caxton Ochieng	Resident/farmer
6.	Felix Otieno	Resident/farmer
7.	Benard O.Odoyo	Farmer
8.	Bob Amwago	Resident
9.	Samuel Ochieng	Trader
10.	Wycliffe Ayonga	Mason
11.	David Amikhaye	Resident
12.	Jaoko Maurice	Resident/farmer
13.	Leonard Otieno	Resident
14.	Samson Omolo	Driver
15.	Kevin Genya	Teacher
16.	Austine Omondi Otieno	Businessman

17.	Collins Marlal	Resident
18.	Scovia Awuor	Hair dresser
19.	Gunca Carold	Resident/farmer
20.	Timothy Begi	Resident/farmer
21.	Steve Ologi	Business person
22.	Daniel Paul	Farmer
23.	Kennedy Ochieng	Resident/farmer
24.	Willington Masaga	Pastor/driver
25.	Rosana O. Achieng	Snr. Assistant Chief

The community members in attendance were not against the project but insisted on the following:

- i. Proponent to ensure measures in place to control noise pollution during construction and operational phases.
- ii. Proponent to ensure that there is no pollution of underground water.
- iii. Proponent to put in place measures to control soil pollution
- iv. Periodic medical examination to employees involved in handling of asbestos materials
- v. Provide effective PPE to employees handling asbestos waste material
- vi. Locals to benefit from the employment opportunities once the project is in operation.

## **CHAPTER SIX**

### **6.0 Project Alternatives**

Several alternatives to the project including different sites, and different technologies were considered during the EIA process. The alternatives are given below:

#### **6.1. Alternative Site**

This involves looking for a different site away from the proposed site. This is not an alternative option because this particular site is the only available and suitable land owned by the proponent. The current proposed site has been chosen through consultation with several stakeholders. Acquiring other sites would be costly to the proponent and will require consultation with the same stakeholders who approved the current site. It would cause unnecessary delays and also be a discouragement to other asbestos generators who are ready and willing to remove and replace asbestos materials aimed towards ensuring an asbestos free environment.

The proponent already has a valid NEMA license for the management of Hazardous and Industrial Waste at this particular site.

#### **3.2. 5.2. Alternative disposal method**

Land filling asbestos and asbestos containing waste is the recommended and acceptable mode of disposal of asbestos wastes because asbestos fibers are not able to move through soil. Other alternative methods like open dumping will pose a serious threat to human health. Exposure to asbestos dust from open dumping may lead to health consequences such as asbestosis, lung cancer and mesothelioma. These diseases cause long term serious social, economic and emotional problems.

#### **3.3. 5.3. No Action Alternative**

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option cannot be adopted since **the Kenya is** committed to ensuring that the right to clean and health environment for all as enshrined in the constitution of Kenya that espouses the tenets, duties and responsibilities of the state and its institutions to eradicate all forms of environmental degradation to promote sustainable development. Asbestos is a serious hazardous substance that needs to be eliminated at all cost **and the proponent proposed project will complement and support the Government commitment for safe disposal of asbestos containing materials.** Therefore, the 'No action alternative' is not a viable option.

#### **3.4. 5.4. The proposed development alternative**

Under the proposed development alternative, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's Proposed **safe** Disposal of Asbestos Waste; provided all environmental measures and precautions are complied with during the site preparation, transportation, storage, disposal and post-operations as guided by the National guidelines on Management and safe disposal of asbestos This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the Environmental Impact Assessment report to the maximum extent practicable.

## **CHAPTER SEVEN**

### **7.0. POTENTIAL ENVIRONMENTAL IMPACTS**

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long-term or short-term in duration and widespread or local in the extent of their effect.

In the case of the proposed Disposal of Asbestos containing materials, potential environmental impacts would be realized during the site preparation, transportation and disposal of the wastes and at both stages, positive and negative impacts would occur. The need to maximize the positive and reduce/mitigate the negative is essential before a project can win community acceptability. This project will result to the following bio-physical-socio-economic impacts:

#### **Site preparation, Removal of asbestos, Transportation and disposal**

##### **7.1. Negative impacts**

###### **7.1.1. Loss of vegetation**

During excavation of the pit/land fill, there are temporal potential impacts. The cleared grass, shrubs and light trees as well as excavated soil will form unwanted heaps at the site. This activity will inevitably lead to loss of vegetation. However, it was noted that there are no rare plant species or mature trees in the location.

###### **7.1.2. Soil erosion and water logging**

Soil erosion is likely to occur at site once exposed by excavation works especially during rainy and windy seasons due to the slope gradient of a portion selected for the disposal. Considering the land clearing, excavation and other construction processes, soil will be exposed to erosion agents leading to soil/land degradation hence impacting negatively on the environment. Water logging of the exposed site may also occur in the event of heavy rainfall hence the need to provide cut off trenches/storm water drains channelling the water into nearby storm water drains.

#### **7.1.3. Dust emissions and exhaust emissions**

Particulate matter pollution is likely to occur during the site clearance, excavation of the top soil especially when done during dry season. Motor vehicles used to the waste would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions.

#### **7.1.4. Health and Safety**

There is the potential of increased chances of the public health and occupational health hazards and safety (OHS). Accidents may occur during removal, transportation and disposal of asbestos waste. Inhalation of dust, gaseous substance or aerosols from removal and transportation of asbestos material can cause serious health risks to workers and nearby residents. An effective use of protective gear and adherence to safety precautions and guidelines is recommended.

#### **7.1.5. Ground water pollution**

The risk for groundwater contamination is too great. If control measures fail (Lining with polythene) coupled with high water table, there is also the risk of contamination of ground water as a result of land filling.

Additional negative impacts are:

Labour intensive--requires strict removal, transportation procedure to safeguard human health

Expensive

#### **7.2. Positive impacts**

- Reduces human health risk by eliminating cancer causing agents
- No on-going maintenance after disposal
- Provides longer-term disposal solution
- Appropriate for hazardous waste disposal
- It creates employment- during removal, transportation and disposal.

- Source of government revenue- fees paid to government (NEMA) in the process of seeking approvals from part of government revenue

<b>Potential Impact 1</b>	<b>Loss of vegetation/habitat</b>
Project Activities	Site preparation
Environmental Receptor	Land
Duration	Project lifespan
Magnitude	Short term
Mitigation Measures	Rehabilitate the site through planting of grass and trees and general environment greening to restore flora and fauna habitat.
Significance	Direct/medium negative/seasonal/reversible impact
<b>Potential Impact 2</b>	<b>Dust /Air pollution</b>
Project Activities	Site excavation and construction of the land fill
Environmental Receptor	Livestock, wildlife, human beings and plants.
Duration	Short term
Magnitude	Medium
Mitigation Measures	Appropriate scheduling of activities. Dust suppression through sprinkling if any. Proper servicing of equipment to reduce exhaust fumes. Communication with residents. Provision of dust protective screens.
Significance	Minor negative/indirect/sporadic/avoidable impact
<b>Potential Impact 3</b>	<b>Soil erosion and water logging</b>

Project Activities	Site preparation.
Environmental Receptor	Livestock, human beings, wildlife, water and land tillage machinery
Duration	short term
Magnitude	Minor
Mitigation Measures	Provide cut off trenches/storm water drains channelling the water into nearby storm water drains. Implement soil erosion control measures around the site
Significance	Minor, direct, avoidable impact
<b>Potential Impact 4</b>	<b>Health and safety aspects</b>
Project Activities	Site preparation, removal, transportation and disposal
Environmental Receptor	Workers, neighbours
Duration	Short to long term
Magnitude	Minor
Mitigation Measures	Wear protective/safety gear and adhere to safety precautions. Medical Examinations of workers involved in asbestos handling and disposal and guidelines.
Significance	Minor, direct, occasional, avoidable impact.

## CHAPTER EIGHT

### 8.0. PROPOSED MITIGATION MEASURES

The proposed mitigation measures to the anticipated/identified potential negative impacts are highlighted below.

<b>Potential Impact 1</b>	<b>Loss of vegetation/habitat</b>
Project Activities	Site preparation
Environmental Receptor	Land
Duration	Project lifespan
Magnitude	Short term
Mitigation Measures	Rehabilitate the site through planting of grass and trees and general environment greening to restore flora and fauna habitat.
Significance	Direct/medium negative/seasonal/reversible impact
<b>Potential Impact 2</b>	<b>Dust/Air pollution</b>
Project Activities	Site excavation and construction of the land fill
Environmental Receptor	Livestock, wildlife, human beings and plants.
Duration	Short term
Magnitude	Medium
Mitigation Measures	Appropriate scheduling of activities. Dust suppression through sprinkling

	of water if any. Proper servicing of equipment to reduce exhaust fumes. Communication with residents. Provision of dust protective screens.
Significance	Minor negative/indirect/sporadic/avoidable impact
<b>Potential Impact 3</b>	<b>Soil erosion and water logging</b>
Project Activities	Site preparation.
Environmental Receptor	Livestock, human beings, wildlife, water and land tillage machinery
Duration	short term
Magnitude	Minor
Mitigation Measures	Provide cut off trenches/storm water drains channelling the water into nearby storm water drains. Implement soil erosion control measures around the site
Significance	Minor, direct, avoidable impact
<b>Potential Impact 4</b>	<b>Health and safety aspects</b>
Project Activities	Site preparation, removal, transportation and disposal
Environmental Receptor	Workers, neighbours
Duration	Short to long term
Magnitude	Minor
Mitigation Measures	Wear protective/safety gear and adhere to safety precautions and guidelines.
Significance	Minor, direct, occasional, avoidable impact.

## **CHAPTER NINE**

### **9.0. ENVIRONMENTAL MANAGEMENT PLAN**

#### **9.1. Significance of EMP**

Environmental Management Plan (EMP) for developing projects is usually to provide a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the EMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The EMP is a vital output of an Environmental Impact Assessment as it provides a checklist for project monitoring and evaluation. The EMP outlined below has addressed the identified potential negative impacts and mitigation measures of the proposed Asbestos Waste Disposal based on the section of Environmental Impacts and Mitigation Measures of the Negative Impacts.

### 9.1.1. Environmental Management Plan

Expected Negative Impacts	Recommended Mitigation Measure(s)	Person Responsible	Time Frame	Estimated Cost (KES)
<b>CONSTRUCTION PHASE</b>				
Loss of vegetation cover during excavation	Rehabilitate the site through planting of grass and trees and general environment greening to restore flora and fauna habitat	ECCL	Throughout the operation phase	50,000
Dust emission	Appropriate scheduling of activities. Dust suppression through sprinkling of water if any. Proper servicing of equipment to reduce exhaust fumes. Communication with residents. Provision of dust protective screens	ECCL	Throughout project phase	20,000
Soil erosion and water logging	Provide cut off trenches/storm water drains channelling the water into nearby storm water drains.	ECCL	Throughout project life	100,000
Health and safety aspects	<ul style="list-style-type: none"> <li>- Notify workers about the upcoming activity</li> <li>- Train staff of safe working procedures</li> <li>- Provide appropriate PPE complying with international good practise</li> <li>- Post appropriate signages onsite to inform/warn employees and the public</li> </ul>	ECCL	Throughout project life	50,000
Traffic and Pedestrian Safety	<p>(a) Signposting, warning signs, barriers and traffic diversions: site should be clearly visible, and the workers warned of all potential hazards</p> <p>(b) Provision of safe passages and crossings for pedestrians be made</p> <p>(c) Active management by trained and visible staff at the site, if required for safe and convenient passage for the workers.</p> <p>(d) Ensuring safe and continuous access to office facilities, shops and residences during disposal and</p>	ECCL	At preparation and operation phase	50,000

**PROJECT OPERATION PHASE**

<p>Air pollution from dust and/or Asbestos dust, Exhaust fumes etc</p>	<ul style="list-style-type: none"> <li>- Adhere to the Asbestos disposal guidelines listed above</li> <li>- Strict enforcement of on-site speed limit to reduce</li> <li>- Provide Adequate PPE to staff</li> <li>- Air monitoring should be done continuously in areas related to asbestos removal works.</li> <li>- Management of asbestos-contaminated soil/dust by sweeping around the area where asbestos removal work is undertaken and packaging the asbestos contaminated soil in asbestos waste bags, labelled as asbestos waste and disposed of together with the asbestos waste in the licensed disposal pit.</li> </ul>	<p>ECCL</p>	<p>Project site Preparation and operation phase</p>	<p>500,000</p>
<p>Oil Spillages</p>	<ul style="list-style-type: none"> <li>- Proper maintenance of vehicles and machinery involved to avoid oil leaks during equipment and machinery use.</li> <li>- Maintenance activities to be conducted in areas designated for the purpose i.e. maintenance workshop.</li> </ul>	<p>ECCL</p>	<p>Project site Preparation and operation phase</p>	<p>5,000</p>
<p>Increased Water Demand</p>	<p>Taps that turn-off automatically when water is not being used be considered on the deliver hoses being used to control dust/wet asbestos sheets. Regular monitoring, reporting, and repairing of water leakages shall be implemented during the work. Staff to be sensitized to conserve water by avoiding unnecessary water use.</p>	<p>ECCL</p>	<p>Project site Preparation and operation phase</p>	<p>5,000</p>
<p>Health and Safety risks</p>	<ul style="list-style-type: none"> <li>- Develop an asbestos removal management plan that shall identify specific control measures that will be put in place to ensure workers and other persons not involved in the removal work are not at risk when asbestos removal work is being undertaken.</li> </ul>	<p>ECCL</p>	<p>Project Operation phase</p>	<p>Nil</p>

	<ul style="list-style-type: none"> <li>- Provide appropriate and adequate PPE</li> <li>- Setting up an area for personal decontamination, and</li> <li>- Ensuring that decontamination of the work area, workers, PPE and tools used in asbestos removal work to eliminate and or minimize exposure to airborne asbestos fibers.</li> <li>- Undertake medical examinations before and after an employee commences asbestos removal work. The examination should include a discussion about whether the employee has had a history of exposure to ACMs and spirometry test.</li> </ul>		Project Operation phase	100,000
			Before then annual	5,000
				30,000
	Clearance Inspections should be done to ensure that temporary storage site is cleaned to a satisfaction standard. After the cleaning work Manager should inspect to eliminate risk of future contamination and exposure to asbestos	ECCL	Throughout project operation phase	Nil
Underground water contamination	Construct a concrete lining in the asbestos disposal site Before disposing the asbestos. This will reduce possibility of underground water contamination.	ECCL	Project site preparation	500,000
Emissions	ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Proper maintenance of vehicles and machinery involved to increase combustion efficiency.	ECCL	Project site preparation and operation phase	Nil
Solid Waste Generation	Accurate estimation of sizes and quantities of materials required rather than cutting them to size or having large quantities of residual materials. Excavated materials from the disposal pit to be used in backfilling.	ECCL	Operation phase	Nil
Energy Consumption	Ensure that electrical equipment and other appliances are switched off when not being used. Transportation of materials	ECCL	Operation phase	Nil

	to be planned to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts.			
Noise Pollution	Sensitization to ensure that vehicle drivers and machinery operators switch off engines of vehicles or machinery when not in use and also to avoid gunning of vehicle engines or hooting especially when passing.	ECCL	Project site preparation and operation phase	100,000

<b>Expected Negative Impacts</b>	<b>Recommended Mitigation Measure(s)</b>	<b>Person Responsible</b>	<b>Time Frame</b>	<b>Estimated Cost (KES)</b>
	<p>Provision of PPE suitable (as guided by the risk assessment) for asbestos removal work to all workers involved in the asbestos removal work.</p> <p>Training of all workers in the use of PPE provided to ensure appropriate use.</p>	ECCL	Before Removal Phase	50,000
	Undertake a clearance inspection by a competent and experienced person after completion of asbestos removal and before re-occupation of the asbestos removal work area.	ECCL	After Removal Phase	10,000
	Undertake medical examinations before and after an employee commences asbestos removal work. The examination should include a discussion about whether the employee has had a history of exposure to ACMs and spirometry test.	ECCL	Before and After Removal Phases	20,000
Dust Emissions	Strict enforcement of on-site speed limit to reduce	ECCL	During	5,000

<b>Expected Impacts</b>	<b>Negative</b>	<b>Recommended Mitigation Measure(s)</b>	<b>Person Responsible</b>	<b>Time Frame</b>	<b>Estimated Cost (KES)</b>
		dust during the work. Water to be sprinkled on graded access routes where necessary to reduce dust generation by vehicles and other machinery movement. Appropriate PPE to be provided to all workers likely to be affected by the dust.	ECCL	Removal Phase	
Oil Spillages		Proper maintenance of vehicles and machinery involved to avoid oil leaks during equipment and machinery use. Maintenance activities to be conducted in areas designated for the purpose i.e. maintenance workshop.	ECCL	Before and During Removal Phases	5,000
Increased Demand	Water	Taps that turn-off automatically when water is not being used be considered on the deliver hoses being used to wet the ACMs. Regular monitoring, reporting and repairing of water leakages shall be implemented during the work. Staff working on ACMs removal shall also be sensitized to conserve water by avoiding unnecessary water use.	ECCL	Before and During Removal Phases	5,000
Generation of Exhaust Emissions		Transportation of materials shall also be planned to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Proper maintenance of vehicles and machinery involved to increase combustion efficiency.	ECCL	During and After Removal Phases	5,000

<b>Expected Negative Impacts</b>	<b>Recommended Mitigation Measure(s)</b>	<b>Person Responsible</b>	<b>Time Frame</b>	<b>Estimated Cost (KES)</b>
	Proper maintenance of vehicles and machinery involved to reduce noise generation. Activities likely to generate noise to be planned, whenever practical, to be done during daytime when most of the neighbours are at work. Strict adherence to the provisions of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations.			
Heat Stress	Control measures such as selection of appropriate PPE fitted to reduce the build-up of heat, cool cotton underclothing, scheduling appropriate work breaks, job rotation, educating workers about heat stress risks to be considered.	ECCL	Before and During Removal Phases	5,000
Risk of Electrocutation	Undertake removal of asbestos cemented roofing sheets at the building in compliance with Electric Rules to ensure safe working conditions under high voltage lines.	ECCL	During Removal Phase	5,000
Other Occupational Accidents	Develop and implement safe systems of work for inclusion in the asbestos removal control plan to ensure safety of the persons doing the ACMs removal work.	ECCL	Before and During Removal Phases	Nil

## **9.2. Project Decommissioning stage**

In the event that the proposed disposal site lifetime is limited as a result of any unforeseen factors, then at some point, the asbestos containing site must be decommissioned or redeveloped to keep up with changes in land use and legislation on environmental impact. An initial site assessment will have to be undertaken before an acquisition is made and a change of site usage is proposed.

Environmental assessment is a key part of the due diligence process and ensuring that all surveys and assessments identify potential decommissioning hazards and risks and how to conserve resources and reduce the instances of environmental liability. In extreme situations, the decommissioning process may involve the safe handling and disposal of hazardous asbestos, material and waste and the clean-up of a site that has been contaminated by previous disposal operations. Exposure to asbestos may be fatal: the fibres can lodge in the lungs, thus causing the onset of a number of types of lung cancer. This may be prevented if suitable protective clothing is worn. The site may carry more risks through the decommissioning process.

The cost of the decommissioning process may be high, but the safety implications of contamination are so severe that each step of the process needs to be planned and executed to perfection. Ultimately, the purpose of decommissioning of the site will be to reclaim the land, making it safe for people and vegetation. The introduction of vegetation to the site is less likely to have any severe impact. Environmental impact assessment will ensure that environmentally responsible decommissioning and redevelopment is a priority and that introduction of right vegetative species offsets any damage that may have been previously caused. The regeneration of this site will aim at protecting the health of the people that work on or are near the site and provide protection for the land for any other future developments with minimal negative impact.

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## **CHAPTER TEN**

### **10.0. CONCLUSION AND RECOMMENDATION**

#### **10.1 Conclusion**

The result of this Environmental Impact Assessment (EIA) Project Report has indicated that there are no significant negative impacts likely to be generated provided safety precautions and mitigation measures as stipulated in the EMP are adhered to by the proponent.

#### **4. 11.2 Recommendations**

It is therefore recommended that the proposed project be approved for implemented by NEMA subject the adherence of the following recommendations: -

- ❖ Ensure implementation of the proposed mitigation measures and compliance with Environmental Management Plan.
- ❖ Workers are to be provided with personal protective gear during the removal, transportation and disposal of the wastes.
- ❖ Ensure that the temporarily stored asbestos wastes are properly sealed and warning notices indicated.
- ❖ Warning and informative signs to be erected at appropriate areas to ensure employee health and safety.

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## **REFERENCES**

National Guidelines on Safe Management And Disposal Of Asbestos

Government of Kenya (GOK), 1999. The Environmental Management and Coordination Act, 1999, Government Printer, Nairobi, Kenya.

Government of Kenya (GOK), 2003. The Environmental (Impact Assessment and Audit) Regulations, 2003, Government Printer, Nairobi, Kenya.

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Government of Kenya (GOK), National Guidelines on safe management and disposal of Asbestos, Government Printer, Nairobi, Kenya

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## **APPENDICES**

Certificate of incorporation

PIN certificate

Land ownership document

Workplace registration certificate.

Public Participation Questionnaires

Experts' NEMA Licenses