ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED ASBESTOS DISPOSAL (LANDFILL) SITE ON PLOT L.R. No. 2059 CHANJALO AREA, KAMALE SUB-LOCATION, ADU LOCATION, MAGARINI IN KILIFI COUNTY.

PROPONENT

LEGACY LA RELANCE (EA) LIMITED
P.O. BOX 42550 – 80100
MOMBASA, KENYA

GPS CO-ORDINATES:

2°48'28.3"S 40°01'08.3"E (-2.807850, 40.018964)

EIA TEAM LEADER:
EZEKIEL OLUKOHE
LEAD EIA/AUDIT EXPERT REG. No. 8379
P.O Box 42588-80100
MOMBASA

December@2022

CERTIFICATION

Certification by EIA Expert

I certify that this Environmental Impact Assessment study report has been done under our supervision and that all due diligence has been taken in assessment criteria, methodology and report writing and that it conforms to the requirements of the Environmental Management and Coordination Act, 1999 and Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations).

EIA Expert;

Edgar Ambaza Malenge (1916) **Ezekiel Olukohe (8379)**

Signature: _____ Signature: _____

Date: 2/2/2023

Certification by Proponent

LEGACY LA RELANCE (EA) LIMITED

I, DENIS K. LANGAT confirm that the content of this EIA study report is true to the best of my knowledge and it has been submitted to NEMA with my approval as the proponent.

Designation: DIRECTOR **Signature:** .....

Date: 2/2/2023

PROPONENT ADDRESS:

Legacy La Relance (EA) Limited

P.O. BOX 42550 – 80100

MOMBASA, KENYA

ii

EXECUTIVE SUMMARY

Environmental Impact Assessment study report 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. Early identification and characterization of critical environmental impacts allows the public and the government to form a view about the environmental acceptability of a proposed developmental project and what conditions should apply to mitigate or reduce those risks and impacts. Following concern arising from the presence of asbestos wastes generated in various asbestos containing materials, building and construction sectors, the company commissioned a study to assess and identify the appropriate site where these materials can be disposed-off safely. The study was to identify the impacts of such disposal within the premises and to make recommendations thereon. The study has made a series of recommendations regarding handling and disposal among others. As legislative requirements provide for the preparation of an Environmental Impact Assessment for projects that might have adverse effects upon the environment, the proposed project is being subjected to the statutory EIA process.

Legacy La Relance (EA) Limited, a Kenyan registered company with Memorandum of Association incorporated in Kenya to operate various business entities has a vested interest in operation of Asbestos Management, Handling and Disposal project the land is registered in the name of the proponent, Legacy La Relance (EA) Limited management have purchased the parcel of land which is estimated to be 20 acres and from the 20 acres piece of land, the proponent intends to utilize 5 acres for asbestos disposal site. Legacy La Relance (EA) Limited proposes to provide a facility that will offer solutions to asbestos disposal from various building that intend to dispose off the asbestos roofing's and any other asbestos containing material's within republic of Kenya.

Asbestos is a Group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment. All forms of asbestos are hazardous, and all can cause cancer.

Asbestos years back was lauded for its versatility, recognized for its heat resistance, tensile strength and insulating properties, and used for everything from fire-proof vests to home and commercial construction. It was woven into fabric, and mixed with cement.

Its properties were so desired that the United States military mandated its use in every branch of service. Asbestos was a perfect blend to make things better – except it was highly toxic, too. Today asbestos is a known cause of mesothelioma cancer, thus is banned in more than 50 countries and its use has been dramatically restricted in others.

The major components of this project will be erecting of a temporary site office; sanitary block with toilets, shower room and changing room; truck washing bay; chain link fence/perimeter wall to cover the selected area for disposal of asbestos; temporary storage areas; excavations and construction of pits/cells. Pits will be dug to a depth of approximately 10 metres then lined with concrete. During operation phase, there will be provision of safety gears that are appropriate for asbestos disposal and provision of security services at the site to prevent trespassing to site. The project cost is estimated to be Ksh.15 million and this is for fencing of site, construction cells and support facilities within the site. The proposed disposal site is in a bare field covered with shrubs. The area is sparsely populated

In view of its anticipated environmental impacts, an environmental Impact assessment was carried out to enhance project acceptability and identify measures aimed at mitigating the negative impacts. The full EIA followed an earlier scoping exercise that identified the significant impacts. The assessment used site surveys and a checklist among other tools. This report highlights the main features of the project and the procedural context, within which the EIA was prepared, and discusses some of the main issues that need to be addressed to improve the project's area and the surrounding.

The terms of reference for the preparation of the EIA Report are:

- A critical look into project objectives
- The proposed location of the project site
- Description of project objectives.
- A concise description the national environmental legislative and regulatory framework, and any other relevant information related to the project

- Evaluation of the technology, procedures and processes to be used in the implementation of the project
- Description, evaluation and analysis of the foreseeable potential environmental effects of the project broadly classified into physical, ecological/biological and socio-economic aspects which can be classified as direct, indirect, cumulative, irreversible, short-term and long-term effects.
- Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technologies
- An Environmental Management Plan (EMP), proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment,
- Propose measures to prevent health and safety hazards and to ensure security in the working environment for the employees, and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during operational phase.

SUMMARY EMP FOR CONSTRUCTION AND OPERATION

IMPACTS	**Mitigation measures**
Excavations and protection of flora and fauna	• Protect as possible indigenous trees and other surrounding vegetation that need not be removed. Minimize site clearance to only areas needed for excavations • Undertake continuous excavation of asbestos pits/cells. That is excavation of any subsequent pit shall base on expected asbestos materials • Plant trees around the perimeter fence and within some section of the site • Cover any asbestos pit that is not full with polythene sheet and soil 1m above the buried asbestos and seal the cell with concrete material as it awaits more asbestos materials to be concluded as full.
Safety & health	• Occupational Safety and Health Act, 2007 • Training the workers on the potential health risk caused by exposure to asbestos and how to reduce these risks • The asbestos removal and disposal workers shall be trained on safe asbestos handling techniques. • Notify workers about the upcoming disposal activity and the Safety requirements • Prepare appropriate PPE • PPEs shall be of single use and shall be used once and disposed with asbestos materials • Post appropriate signpost of the site that will inform the workers of

	key rules to follow • Put in place an appropriate emergency and incident response plan
Waste Generation	• Train cleaning and maintenance workers on the need for proper waste management • Minimize waste generation, segregate general and hazardous waste in color coded refuse bins. • Any waste/material contaminated with asbestos shall out rightly be disposed of in asbestos pit
Asbestos management	• The onsite and offsite Asbestos disposal site shall be marked clearly as asbestos hazard area in accordance with the National Guidelines on Safe Management and Disposal of Asbestos • The asbestos will be appropriately contained and sealed to minimize exposure • The asbestos prior to removal shall be treated with a wetting agent to minimize asbestos dust • Asbestos shall be handled and disposed by skilled & experienced professionals • If asbestos material is being stored temporarily, the wastes shall be securely enclosed inside closed containments, marked appropriately and secured. • The removed asbestos will not be reused or recycled in anyway • The asbestos materials removed shall be buried onsite/offsite based on the client's preference • Removal including Onsite/offsite disposal of asbestos shall be subjected to environmental impact assessment in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003.
Management of temporary waste storage sites	• Ensure management of temporary waste storage sites is in line with the National Guidelines on Safe Management and Disposal of Asbestos. • Register and monitor waste volumes at the temporary waste storage site • Oversee the physical removal of the waste from the temporary waste storage sites
Traffic and Pedestrian Safety	• Signposting, warning signs, barriers and traffic diversions: site should be clearly visible and the workers warned of all potential hazards • Provision of safe passages and crossings for pedestrians be made • Train staff at the site on safe and convenient passage at the work place. • Ensuring safe and continuous access to office facilities, shops and residences during disposal and cleaning activities, if the facility is in operation during this activity
Air Quality	• Establish simple air quality monitoring that ensures the outputs of the monitoring process are maintained and utilized in improving.

	• Appoint a dust monitoring agent/lab to monitor and analyze dust and air quality • Air monitoring should be done continuously in areas related to asbestos removal works.
Storm water Management	Ensure all storm water from the site is directed towards the established water drains
Hygiene and sanitary provision	Provide washrooms, bathrooms and changing rooms within the facility Provide truck was bay for cleaning asbestos transportation vehicles
Disposal Scheduling and Hours	The disposal and cleaning activities should be limited from 7 am or sunrise (whichever is later) to 5 pm or sunset
Clearance Inspections	Inspections should be done to ensure that temporary storage site and work environment is cleaned to a satisfaction standard.

There is increased awareness on health impacts of deteriorating asbestos roofing sheets and this has led to increased projects for removal of the asbestos roofing sheets for disposal and replacing them with galvanized roofing sheets. Research shows that undisturbed asbestos roofs in good condition typically do not pose a health risk if the asbestos fibres remain bound in solid cement. Asbestos roof sheets become more of a hazard over time, becoming brittle and deteriorating with exposure to the sun and rain. The asbestos fibres may become airborne and dangerous. The more weathered the roof becomes, the more significant the health risk.

This surge of projects of removal of asbestos roofing sheets have led to demand for proper disposal of the asbestos roofing sheets. It is for this reason that Legacy La Relance (EA) Limited is in the process of setting up a facility that will ensure safe disposal of asbestos containing materials mostly asbestos roofing sheets thus solving issue of poor disposal of the asbestos where some reuse or dispose haphazardly.

In view of its anticipated environmental impacts, an environmental Impact assessment study report was prepared to enhance project acceptability and identify measures aimed at mitigating the negative impacts. The EIA study followed an earlier scoping exercise that identified the significant impacts. The assessment used site surveys, a checklist interview of locals among other tools. In addition, public consultation was done through a public forum (*baraza*) chaired by the area Chief. This report highlights the main features of the project and the procedural context, within which the EIA was prepared, and discusses anticipated impacts and proposes mitigation measures to the anticipated impacts.

ABBREVIATIONS

NEAP	National Environment Action Plan
EIA	Environmental Impact Assessment
LTD	Limited
NEMA	National Environment Management Authority
EMCA	Environmental Management and Co-Ordination Act
OEL	Operational Exposure Limit
EMP	Environmental Management Plan

Table of Contents

1.0. INTRODUCTION

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. Early identification and characterization of critical environmental impacts allows the public and the government to form a view about the environmental acceptability of a proposed developmental project and what conditions should apply to mitigate or reduce those risks and impacts.

This Environmental Impact Assessment (EIA) is to provide information on the potential negative and positive environmental and social impacts of the proposed asbestos disposal site on Plot L.R. No. 2059 Chanjalo Area, Kamalo Sub-Location, Adu Location, Magarini in Kilifi County. It also aims to make recommendations for the mitigation of the potential negative impacts and enhancement of the positive ones. A field survey of the project site was conducted and potential environmental impacts of project activities were identified, assessed, and documented. The EIA Team carried out consultations with various stakeholders, particularly lead agencies, local authorities and the affected people.

Following concern arising from the presence of roofing asbestos within the county and republic of Kenya. Legacy La Relance (EA) Limited commissioned a study to assess and identify the appropriate site where these materials can be disposed off safely. The study was to identify the impacts of such disposal and to make recommendations thereon. The study has made a series of recommendations regarding handling and disposal among others.

As legislative requirements provide for the preparation of an Environmental Impact Assessment for projects that might have adverse effects upon the environment, the proposed project is being subjected to the statutory EIA process. Pursuant to section 58 of the Environmental Management and Coordination Act, (EMCA) 1999, the National Environment Management Authority (NEMA) requires project proponents to carry out Environmental Impact Assessments (EIA) and prepare related reports for developments that have the potential of resulting to negative social and environmental impacts. The proposed project falls under category 2-High Risk Projects (12) Waste Disposal (k) Commercial asbestos disposal sites. It is for this reason as

required by The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 that an EIA study done for submission to NEMA for consideration of approval.

1.1. DESCRIPTION OF THE PROJECT

Legacy La Relance (EA) Limited herein referred to as the proponent proposes to establish a commercial asbestos disposal site on Plot No. 2059 Chanjalo area, Kamale Sub-Location, Adu location, Magarini Sub-County in Kilifi County. The parcel of land is approximately 20 Acres size but the proponent intends to utilize five acres for the disposal activities. The proposed project involves construction of asbestos pits, temporary storage area, site office, sanitary block (toilets, shower room and changing room), truck washing bay, perimeter wall/fence and associate amenities. The proponent intends to venture into the business of asbestos removal & offsite disposal services. The site shall be fenced off to limit any access to unauthorized persons. The site is not for a one-off disposal but rather a site that will be used as a commercial disposal site for potential clients who wants to dispose-off their asbestos waste therefore the size/tons of asbestos to be disposed-off annually cannot be determined yet.

Proposed site having been identified ideal, shall only be commissioned once the license for operations has been issued. Once a potential client contracts the company (Legacy La Relance (EA) Ltd), the management will calculate the space that might be required for disposal of asbestos waste depending on the asbestos waste quantity available. Thereafter the proponent will excavate the space for that specific disposal up to a ***depth of 10 Metres*** below the ground but strictly guided by the hydrogeological survey report by a qualified and registered hydrologist to guide on depth. A concrete wall/lining will then be constructed on the excavated pit to ensure that the asbestos waste leachate does not go into the underground water sources or alternatively a polythene liner can be used if the wall characteristics permit. The asbestos waste shall be placed on the pit to up to 1m below ground level then covered appropriately. The proponent will then ensure that the pits are well marked indicating what has been disposed and the warning sign indicating ‘Danger’.

The proposed project will contribute towards sustainable waste management, employment creation and income generation both during construction and operation phases thereby improving the living standards, project consultants and the project proponent.

The proponent shall specialize in removal, transportation as well as **disposal** of asbestos materials. This will majorly involve

Item	Activity
1.	• The proponent shall advise all its **offsite and onsite clients** on environmental requirements such as the need for EIA, hydrogeological survey report and risk analysis where applicable. • Hydrogeological analysis (of the proposed on site/offsite landfill) to determine its suitability for asbestos disposal without contaminating the underground water to be included in the EIA report. Done by a qualified hydrologist • The proposed **OFFSITE DISPOSAL** has been subjected to hydrogeological survey analysis, report appended herein so the offsite disposal will only be subjected to EIA and Risk assessment and they shall have dully executed contract for disposal of asbestos materials with our company. • Risk assessment for removal and disposal of asbestos shall always be done by a DOSHS licensed Occupational Safety and Health (OSH) advisor and a NEMA registered environmental Expert.
2.	Removal and transportation to **the onsite pit** or **licensed offsite** landfill involves; a. Procurement of Personal Protective Equipment's (PPEs) and; b. Heavy gauge Asbestos plastic wrapping liners and pit plastic liners c. Notification of affected parties on the time and nature of work to be done d. Training of workforce on safe work procedure e. Fully trained technical and casual staff all equipped with recommended PPEs f. Removal tools g. Double wrapping of bundled asbestos roofing sheets with 500 gauged lined plastic sheet h. Securing the temporal holding area for asbestos before actual disposal which should not be more than 30 days if offsite. i. Transportation of asbestos to the on-site disposal pit/licensed offsite landfill using a NEMA licensed vehicle j. Excavation of the pit to a depth recommended in the hydrological report and shall follow NEMA guidelines on safe handling and disposal of Asbestos. k. Covering the pit with liner l. Gently lowering the stacked asbestos materials to the prepared pit m. Covering the pit with a plastic liner and soil 1m below the ground level n. Securing the pit with chain link and labeling as "asbestos hazard area keep out"

Note that the proponent shall undertake **onsite** and **offsite** asbestos disposal based on the **PREFERENCE OF THE CLIENT** and in accordance with the existing local bylaws and legal

requirements. **The main reference in this context is on the compliance to EMC (Waste Management) Regulations, 2006 and in line with the National Guidelines on Safe Management and Disposal of Asbestos, 2013**

1.2.1 Disposal procedures for asbestos

Asbestos waste must be disposed of at approved NEMA sites. It must not be sold or re-used. The proponent shall ensure a standard operating procedure for Asbestos handling and disposal and the same shall be oriented to all employees and clients.

Handling and disposing of asbestos include:

- ***Planning the project appropriately:*** assess the size and severity of the asbestos removal and disposal project. A licensed asbestos handler must prepare an asbestos removal control plan for any licensed asbestos removal work being undertaken.

  The removal control plan must include details of the means of transport and disposal of asbestos waste. The removal control plan must include details of the means of transport and disposal of asbestos waste.

  An asbestos removal control plan shall describe:

  - How the waste is contained (on and off site)
  - The quantity (amount and dimensions) of waste
  - Where the waste will be stored on site before disposal
  - How the waste will be transported (on and off site)
  - Approvals from the local authority
  - Local authority requirements such as quantity of asbestos and dimensions of containers
  - Where the waste will be transported to
  - Verification of correct disposal such as tip dockets.

The asbestos removal plan must be kept on site.

- **Preparing the work area:** The work area must be sealed off to prevent contamination outside the work area. Surfaces near the work area must be covered in plastic sheeting. Warning signs must be posted to alert others that the asbestos project is underway.
- **Wearing personal safety protection:** Workers must wear an N-100 or P-100 respirator and protective clothing to prevent asbestos exposure.
- **Safety protocols in the work area:** Heating, ventilation and air conditioning (HVAC) systems must be disabled to prevent circulation of asbestos fibers. A HEPA vacuum to be used to clean asbestos off immoveable objects to control dust and the clean-up should be after work is finished daily until the day of project completion. Decontamination units to be provided so as to allow workers remove contaminated clothing, shoes and tools. It should have showers.
- **How to handle and dispose-off asbestos waste:** Asbestos Containing Materials (ACM) should be wetted prior to any removal. Workers must wear appropriate personal safety protection (respirator and protective clothing) as they work with contaminated materials. All asbestos waste generated during the project should be wetted before being double-bagged in 6mm plastic bag. The wastes are temporarily stored at designated area within the project site awaiting disposal to an ACM waste licensed landfill.
- ***Transportation of asbestos waste to disposal site:*** A NEMA licensed vehicle shall be used to transport asbestos waste from project area to disposal site. The waste shall be carefully loaded and offloaded to prevent breakages and rapture of plastic bags.

The asbestos removal plan shall be kept on site.

Asbestos waste storage on site prior to removal

Before being removed from site, asbestos waste must be stored in closed containers that are impermeable to asbestos dust, such as 500 gauge thick plastic bags or double wrapped in 500 gauge thick polythene sheet

Asbestos waste shall:

- Be double-bagged in case of one bag rupturing
- Be in appropriate polythene bags or wraps
- Not be more than half-filled if in the bag

- Have excess air in the bag carefully removed before sealing so there is no release of asbestos dust

All stored asbestos waste shall be clearly marked to indicate the presence of asbestos.

1.1.1. Project Concept

Environmental Hygiene is the science of anticipation, recognition, evaluation and control of health hazards in the work environment with the objective of protecting the health of workers and citizens of the community. Its role is first, to ensure a healthy work environment through continuous surveillance; second, to protect workers from diseases that can be caused by unhealthy environments; third, to break the vicious cycle of 'unhealthy environment' – occupational disease.

The company however sought the assistance of an environmental consultant to carry out an environmental impact assessment of the asbestos disposal site.

The aim of the project is to provide a facility that will offer solutions on safe disposal of asbestos from various entities that intend to dispose-off the asbestos roofing sheets. The facility should be in line with NEMA set out guidelines for asbestos handling and disposal. The specific objectives of the proposed project are:

- To safely remove and dispose off asbestos materials,
- To ensure that the handling of asbestos containing products or material during the disposal and clean-up is in accordance with regulatory requirements
- To minimize occupational exposures to asbestos fibers and future liabilities
- To protect employees and the community from contact with asbestos fibers during the disposal and subsequent clean up exercise
- To disclose to employees, contractors and the public, asbestos contaminated sites within the premises and pronounce on management of these.
- To advise its potential clients on viable disposal options of asbestos either offsite or onsite and execute the preferred options with professionalism.

The objective is to carry out the Environmental Impact Assessment (EIA) study to identify, predict and evaluate potential environmental and socio-economic effects which may result from the proposed disposal facility for asbestos and to develop suitable Environmental Management

Plan (EMP) to mitigate the undesirable effects. The aim of Environmental Impact Assessment (EIA) is to enable NEMA (which is the approving authority) and the developer to properly consider the potential environmental consequences of the project and to make recommendations to reduce it.

The specific objectives of the EIA are:-

- Establish the existing environmental conditions.
- To consider all possible positive and adverse impacts to the project area and its environs.
- Design and prepare mitigation measures and plans to address all the possible environmental impacts.
- Develop a comprehensive Environmental Management and Monitoring Plan for the proposed Asbestos Disposal Site.
- Development of post project environmental monitoring programme.

The EIA shall include literature review; field studies; risk assessment; impact assessment and EMP.

1.2. Brief about Asbestos

Asbestos is a group of naturally-occurring silicate minerals, made of soft, flexible fibres that take on a fluffy consistency when pulled. Resistant to heat, electricity and corrosion, asbestos was traditionally used to reinforce and add strength to cement, plastic and roofing materials.

Corrugated asbestos roofs are a familiar sight in Kenya in various buildings built before the 90's. Due to its superior strength, thermal qualities and fire retardancy, asbestos was widely used in roofing and insulation.

Research shows that undisturbed asbestos roofs in good condition typically do not pose a health risk if the asbestos fibres remain bound in solid cement. Asbestos fibres are microscopic. They cannot be seen, smelled or tasted. If a person ingests asbestos dust, the fibres will become permanently trapped in the body, triggering inflammation, scarring and causing genetic damage to the body's cells.

Asbestos roof sheets become more of a hazard over time, becoming brittle and deteriorating with exposure to the sun and rain. Once asbestos roof is damaged, the asbestos fibres may become airborne and dangerous. The more weathered your roof becomes, the more significant the health risk.

Asbestos is known to cause fatal diseases such as asbestosis, lung cancer and mesothelioma. The symptoms of these diseases appear after about 20 to 30 years from first exposure.

No amount of asbestos can be considered safe, asbestos is most dangerous when a person is exposed to a strong concentration or exposed to moderate amounts on a regular basis for a long time.

To ensure elimination of risk of health complication that result from asbestos, use of asbestos material was banned in many countries amongst them Kenya. Currently, most property owners are replacing their asbestos roofing sheets with galvanized iron roofing sheets thus creating the need for a safe disposal site for the asbestos roofing sheets.

1.2.1. Asbestos as a contaminant

Most respirable asbestos fibers are invisible to the unaided human eye because their size is about 3–20 μm wide and can be as slim as 0.01 μm. Fibers ultimately form because when these minerals originally cooled and crystallized, they formed by the polymeric molecules lining up parallel with each other and forming oriented crystal lattices. These crystals thus have three cleavage planes, and in this case, there are two cleavage planes which are much weaker than the third. When sufficient force is applied, they tend to break along their weakest directions, resulting in a linear fragmentation pattern and hence a fibrous form. This fracture process can keep occurring and one larger asbestos fiber can ultimately become the source of hundreds of much thinner and smaller fibers.

As asbestos fibers get smaller and lighter, they more easily become airborne and human respiratory exposures can result. Fibers will eventually settle but may be re-suspended by air currents or other movement. When fibers or asbestos structures from asbestos containing materials (ACM) become airborne, the process is called primary release. Primary release mechanisms include abrasion, impaction, fallout, air erosion, vibration, and fire damage. Secondary release occurs when settled asbestos fibers and structures are re-suspended as a result

of human activities. In unoccupied buildings or during unoccupied periods, fiber release typically occurs by fallout or is induced by vibration or air erosion.

1.2.2. The Need and Desirability of Asbestos Disposal Project

The presence of asbestos poses a long term environmental and human health risk to people, and therefore the need and urgency to dispose off and clean up the various premises and facilities in order to eliminate any further environmental and health risks. The asbestos materials and substances will be contained in one area which will be easily manageable rather than having different area or pieces of land with disposal points of asbestos. It will be much valuable for authority to consider issuing out the license for this facility since it will offer long term solutions for asbestos disposal menace within the republic.

1.2.3. The need for a License

The facility was subjected to full study after evaluating the impacts associated with this kind of project in length, it is important for the authority to issue this project with EIA license as a monitoring tool both during construction and operational phases.

1.2.4. Asbestos sheets removal

Waste containing asbestos in the form of dust or fibers is listed as hazardous according to the **fourth** and **fifth schedules** of regulations on waste management, **Legal Notice No. 121 of 2006.** As per the Environment Management and Coordination Act, 1999, the National Environment Management Authority (NEMA) has the responsibility of enforcing agency for all types of wastes, including hazardous wastes. According to the General provisions, section 23 of the Waste management Regulations, 'No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment licence issued by Authority under the provisions of the Act'

This EIA identifies, describes, and evaluates the potential environmental impacts that could result from the implementation of the proposed action. Resource areas most relevant to the proposed action are the focus of analysis. These include "Infrastructure and Utilities - Potential effects on sanitary sewer, potable water, solid waste management, drainage, transportation, and electricity. Potential effects on existing environmental and management practices for hazardous materials and wastes will also be assessed.

The proposed disposal site involved represents little ecological interest, being bare land. Air quality and health and safety issues are, however, considered more significant taking into account the national legislation on the issues. With adequate mitigation measures, environmental protection policies would be largely satisfied. The on-site and off-site impacts are also considered to be significant enough to warrant investigation.

Warning and safety signage will be placed at the areas within the temporary site and the disposal site. Skilled staff/workers as well as a site supervisor will be required, and all will use the required Personal Protection Equipment (PPE). Unauthorised personnel will not be allowed near the work areas. All personnel involved with the asbestos disposal and remediation process will be subjected to medical surveillance as per the Occupational Health and Safety Act, 2007.

The asbestos workers coming in direct contact with asbestos waste will need to shower (using clean water) to remove any asbestos fibers from their PPE – decontamination suits on a daily basis. A fully functional decontamination unit or trailer will be utilized at each site. The decontamination unit, placed about 30 metres of the sites will consist of three chambers and will have a fully operational hot and cold running water system, adjustable at the shower tap, and a functional water filtration unit that will filter the water waste down to 5 microns prior to being tapped for disposal. Workers should wear a clean outer protective suit as they exit from the work area to the decontamination area.

The site that had asbestos pile will then be cleaned up. Prior to commencement of the disposal and clean-up, the asbestos sheets and the contaminated site shall be sprayed with water to suppress the release of fibers. Stock pilled asbestos waste shall be continuously sprayed with a mist of water during the disposal and cleaning process so as to effectively reduce and control the release of the fibers. Damp asbestos will be manually lifted by the use of shovels, forks or by hand and placed into 500 micro-plastic bags (Double bagged and labelled). The cleaning process will involve removing the soil overlain by the asbestos roofing wastes. The areas where any soil has been removed during the cleaning process will be backfilled with clean soil and covered.

Bagging

All asbestos to be disposed of at the proposed disposal site will be contained by layers that separate it from the environment. The layers will include two impermeable, high density plastic

liners, alternating with thick layers of soil between and on top to cushion the material against puncture as well as geotextile sheets that further seal the disposal "cell."

These procedures to seal the waste from contact with the environment make it extremely unlikely that any water could come into contact with the material. Medical experts recommend that asbestos simply be buried in an ordinary landfill since asbestos is not soluble in water and one must guard only against inhalation. The asbestos disposal activity at the site thus exceeds the requirements of the Environmental legislation.

Handling and Transportation

The handling and transportation of asbestos material shall be in accordance to waste regulations. All machinery involved in an asbestos disposal and clean-up process shall be jet-washed for asbestos contamination before leaving the sites.

Disposal

The removal of asbestos material from the temporary site to the disposal site will involve the asbestos workers excavating the asbestos material to remove it and the contaminated soil, and then placing it into airtight containers. Or wrapping and gently lifting the temporary stored asbestos materials into a NEMA licensed truck and transport to the NEMA Licensed landfill or licensed onsite disposal.

There are two options for disposing of asbestos:

- Asbestos waste is double-wrapped in 500 gauge thick plastic bags or sheeting, sealed with tape and labelled double wrapped and transported to a licensed asbestos disposal site .
- Label all bags with an appropriate warning such as:

CAUTION

ASBESTOS DO NOT DAMAGE OR OPEN BAG

DO NOT INHALE DUST

The disposal site will **be dug to a depth recommended in the hydrogeological survey report and it will be considered full once it's one meter below** the ground level. The wrapped/contained asbestos will then be gently put in the dug site and buried with soil layers. The proponent intends to dig approximately 10 metres below ground.

Asbestos waste must be disposed of at a licensed asbestos landfill. The site is usually operated by a NEMA licensed asbestos handler in this case the proponent site should obtain a license to own/operate an asbestos disposal facility and a NEMA license to own an asbestos containing materials waste transportation vehicle; However potential proponents shall be given options to dispose onsite or offsite depending on their preference and cost implications. Our Company is ready to offer the services as preferred subject to compliance with NEMA requirements on offsite and onsite disposal.

- Asbestos waste is a regulated hazardous waste;
- Asbestos is a hazardous material that can have health effects to yourself and others if asbestos fibers become airborne;
- It is illegal to dispose of asbestos waste in domestic garbage bins;
- It is illegal to re-use, recycle or illegally dump asbestos products;
- It is illegal to store, sell or give away asbestos.

All employees will wear protective clothing. Each asbestos worker will be provided with

- An approved and unused disposable overall
- Clean boots
- Clean PVC gloves
- High filter Dust masks

Restrictions will be placed on the site where asbestos is buried. Land uses that involve digging of foundations that may expose asbestos to the surface will prohibited.

Before completion, certifications will be done on the sites surfaces to ensure that they are clear of asbestos.

1.2.5. The Project Cost

The project cost of KSh. Fifteen million is anticipated for, the main components of this programme is to provide for a temporary storage area (40ft container), asbestos pits, sanitary facility (washrooms, changing room, and birth room) entry gate, labor and provision of PPE's for the personnel and twenty-four hour security surveillance. However the cost of PPEs and other disposable equipment's will depend on disposals done.

2.0. SITE DESCRIPTION

2.1.1. Location and Land use

The proposed site is located L.R No. 2059 Chanjalo area, Kamale Sub-Location, Adu location, Magarini Sub-County in Kilifi County. The proposed site is geo-referenced as 2°48′28.3″S 40°01′08.3″E (-2.807850, 40.018964). The parcel of land is approximately 20 Acres size and there is no any development on the said parcel of land and the proponent intends to utilize approximately five acres for the disposal activities.

The site is located about 17 kilometres off Malindi –Lamu road from from Marereni town and is accessible through the earthen (murram) feeder road passing by H. Young quarry site. The site is neighbored by land parcels that are not developed at all, human settlement in this area is scattered. The area is sparsely populated.

There is vast land in the area and is used for grazing of animals mostly goats. Some people in the neighbourhood do cultivation and plant crops during the rainy season. The land for the proposed project was bought from Daniel Karsani by Denis Langat who is one of the directors of Legacy La Relance (EA) Limited as per the attached sale agreement.

Adu location in which the proposed site falls administratively is sparsely populated with an estimated population of 11,566 and is approximately 5427Km2 in area. The proposed project site is not neighbored by Residential area, no farms nor any shopping center within. From observation, neighbouring parcels including site are virgin land as the area is occupied with natural vegetation forming bushes. The nearest homestead is about 1.5km away and shopping Centre is about 15km away from the proposed project site there are no rivers or water body within the proposed site therefore the proposed project site is suitable for commercial asbestos disposal.

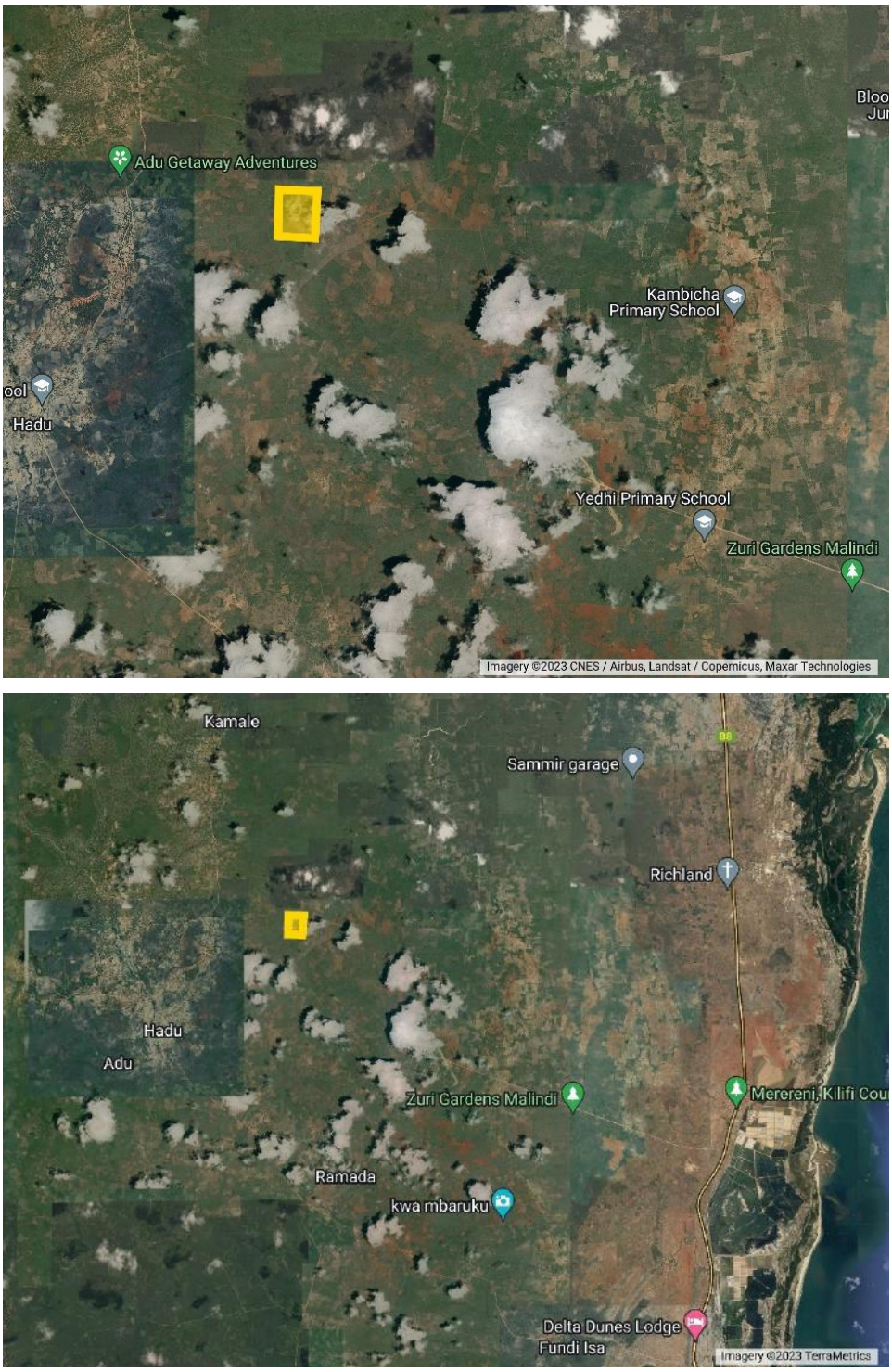

Figure 1: Google map extract showing proposed project site

Figure 2: Photos showing project site and its environs

There is no visible river or water body within the proposed site. The approximate depth of the water table from ground is approximately 20 metres. attached, is a hydrological report. 2.1.2 Site Construction

The proposed disposal site is currently a bare land that is an isolated area with no residential neighborhoods around it.

2.1.2 Available utilities

Communication is achieved by land line, mobile telephones and radio which are available. The area is served by good road network, the proposed disposal site; paths for ease of movement and transportation are available.

3.0. PROJECT JUSTIFICATION AND ALTERNATIVES

Asbestos waste is defined as Hazardous Waste. It is an exposure to asbestos fibers that presents the health risk to people. Many studies have described a link between occupational exposure to various types of asbestos and lung cancer and associated diseases. Asbestos has therefore been designated as a known human carcinogen and hazardous substance. This carcinogenic activity is directly linked to the air pathway and ingestion of the fibers when swallowed.

The presence of asbestos within a premises poses a long term environmental and human health risk to people who operate on the/within that site. There are several persons, government departments, warehouses and factories within the Country who intend to remove the asbestos but does not have land for disposal of the same. This project therefore intends to provide solution of individual companies/organisations that intend to remove the asbestos and safely dispose them off in a licensed site. This will eliminate the asbestos in the human environment thus eliminating the risk associated with the asbestos.

The asbestos materials and substances will be contained in one area which will be easily manageable rather than having different area or pieces of land with disposal points of asbestos, it will be much valuable for authority to consider issuing out the license for this facility since it will offer long term solutions for asbestos disposal menace within the republic.

The proposed land use / development will outweigh the negative impacts of it. By removing the asbestos contaminated soil, further human health risk to the premises employees and nearby communities will be eliminated.

The assessment of technology alternatives is limited due to asbestos being a hazardous substance. The preferred option for handling asbestos is to remove and dispose the asbestos by burying in a special constructed pit.

4.0. PROCESS AND PROCEDURAL CONTEXT

After many years of economic growth, there has been concern for the state of environment in Kenya. This is due to degradation that has occurred in many areas which if not addressed now may jeopardize the future development. In 1994, the Government adopted an environmental action plan (NEAP) thereby committing itself to sustainable development. Such commitment has been expressed further by the government's active participation at international meetings and programmes.

The Government's aims are, specifically, to:

- Increase efforts to mitigate the adverse effects of environmental degradation;
- monitor environmental performance of industries, commercial concerns and the agricultural sector; take strong and pro-active action on emerging environmental issues facing the nation;
- build partnerships with community Groups, non-governmental organizations, business and industries; and
- Facilitate public awareness and provide educational opportunities for people to learn about conservation and sustainable human development.

The enactment of the Environment Management and Coordination Act (EMCA) in 1999 was another milestone in the country's effort towards sustainable development. In line with provisions contained in Section 58 of the Act, ElAs are therefore being increasingly introduced into the national decision-making process and are basically aimed at alerting the decision-makers on the consequences of the proposed development on the environment.

5.0. METHODOLOGY

The assessment was conducted by use of the following methods:-

- Literature review, public and government sources
- Site reconnaissance
- Interviews with site personnel
- Use of an observation schedule

- Use of a checklist

Some questions whose answers had to be sought included:

- Are there potential physical or health hazards associated with the proposed activities to the premises workers?
- Will there be significant disturbance of existing communities?
- Are there potential impacts on the socio-economic interests?
- Are there any employment opportunities to be created by the proposed activity?
- Will the proposed project require major development to existing physical infrastructure, including transport and power generation?
- What would be the increased demand upon the existing provision of social services?

The site was visited so as to collect ground information by both observation and interviews to ascertain the collected information and to fill gaps where omissions or assumptions had been made. Observation was guided by a prepared schedule and involved ‘walk - through’ checks of the site grounds and the surroundings.

The Impact Assessment followed a scoping stage that enabled the identification of certain issues. Interested parties were contacted for their views on the project. After ascertaining that all details were available, this report was prepared.

6.0. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

6.1. The Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. Any other law that is inconsistent with the constitution is null and void to the extent of its inconsistency. Further any action by an individual or a State organ that contravenes the Constitution is null and void.

It promulgated, the right to a clean and decent environment is enshrined in the bill of rights 67

Article 67 (1) Every person has the right to—

(a) A clean and safe environment;

(b) Have the environment protected, for the benefit of present and future generations, through legislative and other measures that—

(i) Prevent pollution and ecological degradation;

(ii) Promote conservation; and

(iii) Secure ecologically sustainable development and use of natural resources; and

(c) Access information about the environment

The proponent strives to ensure that its activities are geared towards safeguarding the environmental rights of locals. The project will contribute towards eliminating a health disaster related asbestos roofing sheets including handling and disposal. the proponent will provide a facility that ensures a safe disposal of the asbestos material thus contributing to the enjoyment of the right to a clean environment. The project is a measure to safeguard the health of a bigger population.

Relevance to the proposed project

- *The proponent has a right to carry out the project within legal limits*
- *The proponent must ensure that the development is carried out in an ecologically, economically and socially sustainable manner*
- *The proponent is entitled to a fair administrative decision making process from NEMA and other state organs.*
- *The proponent must ensure that all the applicable provisions of the Constitution are observed at all times.*

6.2. Policy framework

6.2.1. The National Environment Policy, 2013

The Policy provides a holistic framework to guide the management of the environment and natural resources in Kenya. It aspires to an integrated environmental management approach to issues in all government policies for sustainable development. It contains several guiding principles: ecosystem approach, precautionary, polluter-pays principle.

Kenya Vision 2030

It is the country's development blueprint, 2008 to 2030, which aims at making Kenya a newly leading industrializing "***middle income country providing high quality life for all its citizens by 2030***."

It is based on 3 pillars-**economic, social & political**. Environment sector falls under the social pillar. It also emphasizes the need to achieve economic growth in a sustainable manner.

The Kenya Vision 2030 has proposed specific strategies to protect the environment. These include:

- Promoting environmental conservation, reducing pollution and improving waste management through the design and application of economic incentives
- Commissioning of public-private partnerships
- Improving the capacity to adaptation of global climate change, etc.

The proposed project contributes towards reducing pollution and improving waste management in that the asbestos roofing sheets which are considered hazardous will have a safe disposal site unlike being disposed in open dumpsites or being reused.

6.3. Institutional Framework

6.3.1 NEMA

This is the government agency charged with the general supervision and coordination of all environmental matters in the Kenya. NEMA is the principal instrument of the government in the implementation of all policies relating to the environment. The facility should comply with NEMA's requirements/regulations on waste management, water quality, noise & vibrations, air quality, monitoring and other aspects.

6.3.2 Kilifi County Government

County Governments are empowered to make by-laws in respect of suppression of nuisances, imposing fees for any license or permit issued in respect of trade or charges for any services. County Governments also are given power to control or prohibit all developments which may be or become a source of danger, discomfort or annoyance to the neighborhood, and to prescribe the conditions subject to which such developments shall be carried on. The proponent should comply with all applicable in Kilifi county Government laws and by-laws.

6.3.3 Directorate of Occupational Safety and Health Services

The mandate of the DOSHS is to ensure compliance with the provisions of the Occupational Safety and Health Act 2007 and promote safety and health of workers.

Some of the core functions include:

- Inspecting workplaces to ensure compliance with safety and health laws
- Investigation of workplace accidents and diseases with a view to preventing recurrence
- Medical examination of workers
- Training on Occupational Health and Safety, Fire Safety and First Aid
- Disseminating information on occupational safety and health to customers

6.3.4 National Environmental Tribunal (NET)

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. If disputes to this project arise, they are supposed to be presented here for hearing and legal direction.

6.4. The Environmental Management and Co-Ordination Act of 1999.

Enacted in the year 1999, the Environmental Management & Coordination Act (EMCA) has put forth guidelines aimed at protecting Kenya's natural resources from pollution by industries and other anthropogenic activities.

The Act provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith. The Act is based on the recognition that improved legal and administrative co-ordination of the diverse sectoral initiatives is necessary in order to improve the national capacity for the management of the environment. It accepts the fundamental principle that the environment constitutes the foundation of our national economic, social, cultural and spiritual advancement. The Environmental

Management and Co-ordination Act, 1999 establishes the legal and institutional framework for the co-ordination of the diverse sectoral initiatives for environmental management. The Act itself is a framework statute whose provisions can only be implemented through the promulgation of enabling regulations.

6.4.1 Environmental Impact Assessment

The National Environment Management Authority (NEMA) is mandated by the Environmental Management and coordination Act (EMCA) no 8 of 1999 to administer the EIA.

Project which require EIA

a) The Revised second schedule of the Act (EMCA of 1999) specifies projects or activities, which must be subjected to environmental impact assessment (EIA). These too must be subject to environmental audit after one year of operation.
b) The proposed project falls under the Category of **High Risk Project** as listed in the amended second schedule of the EMCA, CAP 387 and in line Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. In this case the project is subject to Environmental Impact Assessment Sturdy.

The following is a summary of legislature relevant to this study extracted from the Act.

Section 58 (1)

Notwithstanding any approval, permit or licence granted 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, proceeded with, carried out, executed or conducted by another person 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 and which shall be accompanied by the prescribed fee.

Section 58 (2)

The proponent of a project shall undertake or cause to be undertaken at his own expense an environmental impact assessment study and prepare a report thereof where the Authority, being satisfied, after studying the project report submitted under subsection (1), that the intended project may or is likely to have or will have a significant impact on the environment, so directs.

Offences

Section 138

Any person who-

Fails to submit a project report contrary to the requirements of section 58 of this Act; Fails to prepare an environmental impact assessment report in accordance with the requirements of this Act or regulations made thereunder; Fraudulently makes false statements in an environmental impact assessment report submitted under this Act or regulations made thereunder; Commits an offence and is liable for conviction and imprisonment for a term not exceeding **twenty four months** or to a fine of not more than **two million shillings** or to both such imprisonment and fine.

Section 139

Any person who: -

Fails to keep records required to be kept under this Act; fraudulently alters any records required to be kept under this Act; fraudulently makes false statements in any records required to be kept under this Act; commits an offence and is liable upon conviction to a fine of not more than **five hundred thousand shillings** or to imprisonment for a term of not more than **eighteen months** or to both such fine and imprisonment.

Section 72 (1)

Any person, who upon the coming into force of this Act (14/1/2000), discharges or applies any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permits any person to dump or discharge such matter into the aquatic environment in contravention of water pollution control standards established under this Part shall be guilty of an offence and liable to imprisonment for a term not exceeding two years or to a fine not exceeding one million shillings or to both such imprisonment and fine.

Section 72 (2)

A person found guilty under subsection (1) shall, in addition to any sentence or fine imposed on him: pay the cost of the removal of any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants, including the cost of restoration of the damaged environment, which may be incurred by a Government agency or organ in that respect; pay third parties reparation, cost of restoration, restitution or compensation as may be determined by a court of law on application by such third parties.

Other relevant sections include:

Section 59, - Publication of Environmental Impact Assessment

Section 60, - Comments of EIA report by Lead Agencies

Section 61, - Technical Advisory Committee on EIA

Section 62, - Further EIA

Section 63, - Environmental Impact Licence

Section 64, - Submission of fresh EIA report after EIA Licence issued

Section 65, - Transfer of EIA Licence

Section 66, - Protection in respect of an EIA Licence

Section 67, - Revocation, suspension or cancellation of EIA Licence

Section 68, - Environmental Audit

Section 69, - Environmental Monitoring

Section 78-85, - Air quality standards and emission licensing

Section 86 - **Standards for waste**

Section 87 - **Prohibition against dangerous handling and Disposal of wastes**

Section 90 - Court order to cease operation

Section 91-93 - **hazardous wastes**

Other relevant pieces of legislation related to this report include:

- The Public Health Act Cap 242
- Land Control Act, 2002
- Occupational Health and Safety Act, 2007
- The Food, Drugs and Chemical Substances Act Cap 254
- The Physical Planning Act, Cap 286
- The Land Planning Act Cap 303
- The Water Act, 2002
- Environmental Management and Co-ordination (Waste Management) regulation, Legal Notice No.121 of 2006
- Legal Notice No. 61 of 2009 on Noise Pollution Control.

Kenya is also a signatory to a number of different international conventions on the environment some of which include the above mentioned.

The proponent will be strictly guided by the **National Guidelines for safe Management and disposal of Asbestos, 2013.**

6.4.1 The Water Act, 2016

The Water Bill was gazetted in 2016 as the Water Act, and went into effect in 2017 when effective implementation of its provisions commenced. In furtherance to the Water Act 2016, the Ministry of Water and Irrigation and Water Resources Authority (WRA) in collaboration with other stakeholders has prepared a set of Regulations which have now been gazetted to give guidelines on water permit acquisition and adherence to conditions attached and also enforcement of the user fee charges.

Relevance to the proposed project

- *The proponent will ensure that water usage in all phases of the project cycle is in line with the provisions of this Act and obtain a permit from WRA if a borehole will be considered as a source of water to supply the facility. The proponent will also ensure that the activities of the site does not cause any leachate that may cause water pollution.*

6.4.2 The Public Health Act- Laws of Kenya, Chapter 242

The Act prohibits activities that may be injurious to health. It then becomes the responsibility of the county government to maintain clean and sanitary conditions.

Relevance to the proposed project

- *Applicable during the entire project cycle in ensuring proper and hygienic methods are used within the facility.*
- *Maintain the completed building according to standards*
- *Ensure access to safe drinking water for the workers during the project life cycle*
- *The proponent will put measures to prevent activities that would be a nuisance to the public*

6.4.3 Occupiers Liability Act Cap 34

This is an Act of parliament to amend the law as to liability of occupiers and others for injury or damage resulting to persons or goods lawfully on land or property from dangers due to the state of the property or to things done or omitted to be done there.

Relevance to the proposed project

- *The proponent will ensure safety of workers during construction and possible decommissioning phases and residents upon operation phase of the development.*

6.5. 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 and *the proponent will ensure to fully adhere to this Act once the project commences.*

6.5.1 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.

Principal Act	Responsible Institution	How it applies to the facility	Remarks
The constitution of Kenya (2010)	**GoK**	Article 67 (1) Every person has the right to— (a) A clean and safe environment; (b) Have the environment protected, for the benefit of present and future generations, through legislative and other measures that— (i) Prevent pollution and ecological degradation; (ii) Promote conservation; and (iii) Secure ecologically sustainable development and use of natural resources; and (c) Access information about the environment	The proponent shall strive to ensure their activities don't interfere with the right to clean environment by the public or neighbours.

Environment management and Co-ordination Act Cap. 387	**NEMA**	Section 58 makes it a requirement that no project listed in schedule 2 of this Act to undergo EIA licensing by NEMA before its commencement. Part VII Section 68 of the Act requires The owner of the premises or the operator of a project to keep accurate records and make environmental audit reports for submission to the Authority describing how far the project conforms in operation with the legal requirements. It requires the owner of premises or the operator of a project to take all reasonable measures to mitigate any undesirable effects and shall prepare and submit an environmental audit report on those measures to the Authority annually or as the Authority may, in writing, require. Section 74 of this Act requires that all industrial undertakings not connected to sewerage system managed by local authority to install an appropriate plant for the treatment of such effluents before they are discharged into the environment and to apply for Effluent Discharge License. Section 80 requires that an owner or operator of a trade, industrial undertaking or an establishment that emits a substance or energy which is causes or is likely to cause	The proponent shall be carrying out annual environmental audit reports to check on efficacy of EMP Proponent shall apply for all requisite licenses for operation of a waste disposal site

Environmental Impact Assessment and Audit) Regulations, 2003	**NEMA**	Regulation 31 makes it a requirement to carry out environmental audits. Regulation 32-36 give the standards the Audit should meet and gives the procedure.	The proponent shall cause to be carried out annual environmental audits once project is operational
Environmental Management and Coordination (Waste Management) Regulations, 2006	**NEMA**	Requires the Facility to: – Segregates waste (hazardous and non-hazardous) by type and then disposes the wastes in an environmentally acceptable manner – Contract a NEMA licensed Waste handler – Label hazardous waste containers in accordance with section 24 of the Regulations – Any business/industrial operator who generates waste to minimize the waste generated by adopting cleaner production principles that include improvement of production process through eliminating use of toxic raw material; improvement of production process through conservation of energy and raw materials; enabling the recovery and re-use of the product where possible; reclamation	The proponent shall apply for license to operate disposal site. Proponent shall ensure all vehicles transporting asbestos to this site are NEMA licensed

Environmental Management and Coordination (Water Quality) Regulations,2006	NEMA	The Regulation requires the Facility to: – Refrain from any activity which might cause water pollution. – Not to discharge any liquid, gaseous or solid into water resource as to cause pollution. – Acquire EIA license prior to abstracting ground water or any activity that is likely to have any adverse impact on the quantity and quality of the water – Follow the monitoring guide set out in the Third Schedule to the regulation when discharging effluent into the environment – Carry out effluent discharge quality and quantity monitoring in accordance with methods and procedures of sampling and analysis prescribed by the Authority, and shall submit quarterly records of such monitoring to the Authority (NEMA). – Regulation 6 makes it a requirement for any entity discharging effluent into environment to apply for Effluent Discharge license from NEMA	– Waste water from washrooms is managed by use of septic tank and soak pit – The proponent shall put in place measures to prevent underground water pollution

Environmental Management and Coordination (Air quality) regulations, 2014	**NEMA CGM**	Formulated to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. These Regulations prohibit any operator of a trade or industry from: - Causing emission of any air pollutant from controlled facility listed in fourteenth schedule without a valid emission license. - Causing emission of any air pollutant from any point sources in levels exceeding set standards. - 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 schedule of the Regulations - Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed the set standards. - All persons whose operations cause or are likely to cause the emission of pollutants in excess of the limits set out these regulations shall install air	The proponent shall always ensure asbestos roofing sheets are wetted before their removal from the house

Occupational Health and Safety Act, 2007	**DOSHS NEMA**	Requires the facility to: • Comply with general duties 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. • Register the workplace with the DOSHS • Maintain cleanliness in the workplace, avoid overcrowding and provide ventilation • Maintain general welfare conditions such as First Aid facilities, supply of drinking water. • Manage health, safety and welfare by establishing work permit systems, providing PPE requirements and undertaking medical surveillance. • Ensure that there are an appropriate number of certified first aiders trained by an approved institutions and that the certification of these first aiders is current; • Provide a General Register for recording amongst other things all incidents, accidents and occupational injuries	The proponent shall ensure he has; • Provided a First Aid box for handling first aid cases at the site; • Provided PPEs for use by all the employees; • Provided firefighting equipment; • Provided sanitary conveniences (toilets) to the employees; • provided general register and record all incidents • ensured employee training on first aid, occupational health, safety and environment issues - Register the premises with DOSHS as a workplace

7.0. DESCRIPTION OF ENVIRONMENT

7.1. Introduction

This section discusses baseline information of the study area in covering, climate, hydrology, geology, soils, land use, water supply and population.

7.2. Project Location

The proposed asbestos disposal site is located north of Malindi town on Plot No. 2059 Chanjalo area, Kamale Sub-Location, Adu location, Magarini Sub-County in Kilifi County. The proposed site is geo-referenced as 2°48′28.3″S 40°01′08.3″E (-2.807850, 40.018964).

Adu location in which the proposed site falls administratively is sparsely populated with an estimated population of 11,566 and is approximately 5427Km^2 in area. The site is located about 17 kilometres off Malindi –Lamu road from Marereni town and is accessible through the earthen (murram) feeder road passing by H. Young quarry site.

From the initial analysis, the site was found to be suitable for the proposed development. No activities were ongoing on site.

7.3. Physical Environment

7.1.1. Climate (hydrology and meteorology)

The proposed project site located in Magarini Sub-County north of Malindi lies in the Monsoon belt, with prevailing winds predominantly from the north east during the months of November-March and mainly from the South East during the month of April to September. The climate of Malindi – Magarini is usually hot and humid all year round.

Mean daily temperatures range from 22ºC - 30ºC. The calculated average annual temperature for the area is 27ºC while the mean maximum and minimum temperatures are 30ºC and 23ºC respectively.

The area experiences bimodal rainfall pattern with short rains occurring between October to December and the long rains occurring between April to June. There are two dry periods; January-March and July – September. In most coastal regions of East Africa, rainfall decreases from the coast towards the hinterland. The average rainfall ranges from 400mm in the hinterland to over 1200mm along the coastal belt. The coastal belt receives more rainfall compared to the hinterland ranging between 900mm to 1100mm due to the effect of monsoon winds.

7.1.2 Geology

The geology of Kenya's coastal strip was determined by the rifting and break-up of the palaeozoic Gondwana continent. Jurassic rifting of a Permo-Triassic basin filled with terrestrial clastic material into a pre-marine basin on the eastern edge of the African plate. These characteristics are generically the same as Southern Africa's Karoo sediments. Reworking and uplift led to the deposition of marine and peri-marine sediments, culmination in an erosive hiatus from Cretaceous to mid-Neogene times (the Pliocene). Fresh uplift led to the deposition of fluviatile pebble beds, gravels and sands of the Magarini/ Kilindini formation on older competent sediments. At Pleistocene times, sea level changes led to transgressions and regressions, leaving behind raised sands and fossil coral limestones (Horkel et al., 1984). Consequently, the hydrogeology of corals is characterised by good interconnectivity of pores which subsequently result into good permeability hence poor fair discharge & recharge of the aquifers in this region.

The subject area is Magarini sub-county i.e. from Gongoni, Marereni, Adu, Ramada, Fundi Isa and Marafa. The area is composed of unconsolidated to slightly consolidated rocks of tertiary and Quarternary origin. The oldest formation in the area is the Fundi Isa limestone which are the Miocene age (L.A.J. Williams, 1962). They consist of yellow limestone, fine grained calcareous sandstone, marls and sands.

Exposure of Fundi Isa limestone are restricted to small water courses near the Hadu-Marafa and Hadu-Fundi Isa roads. The Marafa beds now referred to as the Marafa formations are well exposed on an erosional scarp (Hell's Kitchen) north of Marafa village after which they are named.

Around Magarini village there are exposures of red sands which have been named after village as 'Magarini sands'. The sands are even grained and well sorted. The quartz grains are coated with very thin film of ferric oxide (Fe_2O_3).

7.1.3. Physiography

The area can be divided into three physiographic units, namely coastal uplands, coastal plains and minor valleys and valley bottoms.

The coastal plains cover the bulk of the area. They are mainly gently undulating with slopes varying from 0% to 8%. However, the eroded parts in Marafa (Hell's Kitchen) has slopes up to

16%. The altitude ranges from about 40m to slightly over 150m above mean sea level around Magarini.

The coastal plains occupy only a very small portion of the eastern part of the area. The land generally nearly level to gently undulating with slopes mainly varying from 0 to 2%. The altitude is under 40m above the mean sea level.

Minor valleys and valley bottoms are encountered along the stream and drainage ways distributed all over the area. The slopes vary from 0-5%.

7.1. Biological Environment.

7.1.1. Flora and Fauna

Magarini area is sparsely populated and people have large tracks of land most covered with bush woodland. The area under cultivation is very small. Grazing/browsing is the main land use and accounts for over 70% of the settled plots. The main animal types found within the area are mostly domestic animals. The dominant animals breeds are the gala goats, the small east African goats and the Zebu cattle.

The proposed project site is currently undeveloped with few shrubs and few trees. The shrubs will be cleared during the site preparation but the trees will remain intact. The neighboring property is undeveloped parcel of land.

7.2. Population dynamics

The population of the County 30 years ago was approximately 45,000 persons. According to the 1999 census, the County had a population of 244,945 persons. However, this has shot up to well over 284,657persons (2009 census) with population densities ranging from 3 persons per km^2 to more than 800 persons per km^2. The population distribution is varied with most people living in the high potential areas of the foot slopes of the hills and in urban centers.

The population of Kilifi County in 2019 stood 1,453,787 individuals spread over an area of 12,245.90 square kilometres. The population of males was 101 852 and that of females 104897. Magarini Sub-County as per 2019 census has a population of 191,610 over an area of 5,229$Km.^{2.}$ The project site area is sparsely populated with Adu location in which the proposed site falls having a population estimate of 13,367 people. Kamale Sub-location has a population of 3,185 over an area of 1,456.1$Km.^{2.}$

7.2.1 Demographic Characteristics

Kilifi is a cosmopolitan area with mixed ethnic groups. Kilifi County has its Capital in Kilifi town. The county has a population of 1,453,787 and covers an area of 12,245.90Km^2. Magarini Sub-County is located north of Malindi town which as per 2019 census has a population of 191,610. The project site area is sparsely populated with Adu location in which the proposed site falls having a population estimate of 13,367 people. Kamale Sub-location has a population of 3,185 over an area of 1,456.1$Km.^{2.}$

The area is composed majorly made up of the local community is the giriama tribe which is among the Mijikenda community. Other tribes from Kenya have also started buying land in the area for agricultural purposes

The areas major religion is Christianity.

7.2.2 Socio-economic

Major economic activities in Magarini Sub-County are salt harvesting and tourism. Charcoal burning is also rampant in the area

Road access in the rea has improved as the main access roads to Adu, Ramada and Kamale have undergone levelling and spot murraming.

8.0. ANALYSIS OF ALTERNATIVES

8.1 Project Alternatives

Two project alternatives are available namely the 'no project' alternative and 'yes project' alternative. Analysis of each alternative is as follows.

8.2 The "no project" alternative

This option will mean that the project will not be undertaken. This implies that the proposed bakery will not be established. This implies that the proponent of this facility will have to look for alternative land elsewhere.

In analyzing this option, the following was considered: -:

- Employment creation, the current government policy on employment and wealth creation aims at creating as many jobs as possible annually this can be realized by encouraging and supporting projects such as the proposed one. If the 'no option project' was to be considered, then this government target may not be realized.
- Financial investment: The 'no' option will mean that the proponent would have incurred financial implications in purchase of land and cost of documentation;
- The overall goal of safe disposal of asbestos material will not be achieved as existing facilities may not be enough for the quantity of asbestos in Kenya
- Income to government Income in form of taxes to the central government from the facility will not be realized.

8.3 The 'yes project alternative'

This was considered to be a viable option. This option was considered viable as opposed to the 'no option' because:

- Jobs will be created in the area;
- It will contribute to ensuring safe disposal of asbestos thus reducing risk of health hazards associated with asbestos;
- There will be increased revenue inform of taxes to the government.

8.4 Alternative Site

This will involve looking for another project site. The disposal site is always required to be away from human settlement. This proposed project site is far from human settlement. The nearest

homestead is approximately 2.5km. Furthermore, the proponent does not have a suitable location other than this land and the land under question is about 20 acres undeveloped.

8.5 Alternative Technology

The assessment of technology alternatives is limited due to asbestos being a hazardous substance. The preferred option for handling asbestos is to remove and dispose the asbestos through burial in constructed pits. The asbestos materials will be disposed off in underground concrete confinement (asbestos pit). The confinement will have a depth of approximately 10 metres below the ground level.

Conclusion

In light of the above analysis, yes project alternative will be preferred to no alternative because: -

- The area is sparsely populated – Project site has no human settlement in it.
- Land is unutilized and is covered with bushes
- Proponent has already incurred costs
- There will be more taxes due to government if facility is constructed as more work will attract more taxes.

9.0. CONSULTATION WITH NEIGHBOURS

9.1 Introduction

Public consultation with regard to proposed facility was conducted as required in the Environmental Impact Assessment and Audit Regulations of June 2003. The consultation was vital and served to: -

- Inform all neighbours of the proposed facility within their locality;
- Explain to the neighbours the nature of the proposed project, its objectives and scope;
- Give neighbours an opportunity to present their views, concerns and issues regarding the proposed facility; and
- Obtain suggestion from neighbours on possible ways that they fill potential negative impacts can be effectively mitigated.

9.2 Comments from neighbours

A 'baraza' was held on 10th November, 2022 at the proposed site. The 'baraza' was chaired by the area assistant Chief, Mr. Justin Karisa and was representing the area chief Mr. Patrick Charo who was the organiser of the meeting. Present were community members, village elders, 'Nyumba Kumi' and community policing team of the area. Various neighbours were also in attendance. (*See attached minutes for the baraza*).

The list of members of the public interviewed is attached on the annex.

Issues Raised

- The lifespan of the constructed pit or will it come a time it will deteriorate and collapse thus affect futue generation
- Elaboration on negative impacts of the project
- Assurance that locals will be involved in the project – they be prioritized in employment
- How the community will be protected against inhaling the fibre
- The proposed project has helped raise awareness on risks of asbestos in the surrounding community

Figure 3: First photo showing address by area assistant Chief, attendees and last photo is address from EIA team member

10.0. IDENTIFICATION AND PREDICTION OF IMPACTS

In line with the EIA Regulations, the following methodology was used in assessing impacts related to the proposed asbestos disposal and subsequent clean-up of the temporary storage site. All impacts are assessed according to the following criteria:

» The **nature**, a description of what causes the effect, what will be affected and how it will be affected.

» The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of activity), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).

» The **duration**, wherein it is indicated whether:

- The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
- The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
- Medium-term (5–15 years) – assigned a score of 3;
- Long term (> 15 years) - assigned a score of 4; or;
- Permanent - assigned a score of 5.

» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:

- 0 is small and will have no effect on the environment;
- is minor and will not result in an impact on processes;
- is low and will cause a slight impact on processes;
- 6 is moderate and will result in processes continuing but in a modified way;
- 8 is high (processes are altered to the extent that they temporarily cease); and
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:

- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely); and

- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.

» The **status**, which is described as either positive, negative or neutral.

» The degree to which the impact can be reversed.

» The degree to which the impact may cause irreplaceable loss of resources.

» The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

S= (E+D+M) P; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to carry out the project in the area),

» 30-60 points: Medium (i.e. where the impact could influence the decision to carry out the project in the area unless it is effectively mitigated),

» > 60 points: High (i.e. where the impact must have an influence on the decision process to carry out the project in the area).

(A) Impacts that may result from the planning, design, construction, operational, decommissioning, and closure phases as well as proposed management of identified impacts and proposed mitigation measures

This environmental assessment has considered the impact of the asbestos disposal and cleanup on the receiving environment. It is not a retrospective impact assessment of what asbestos contamination has occurred on the site. The disposal and clean up of asbestos contaminated land will be a once-off activity and therefore planning, design, construction and operational phases are not applicable to the asbestos disposal and site clean-up at the premises. The potential

impacts from the asbestos disposal and cleanup (direct, indirect and / cumulative) are detailed below.

An assessment of the "no-go alternative" (i.e. the option for not undertaking the asbestos disposal and clean-up) is included in this assessment; however, the no-go option is not preferred.

- **The No-Go Option**

Asbestos is heat resistant and mostly impervious to chemical treatment. It has no odor and is not soluble in water. When asbestos fibers are airborne then it poses the main health risk to people operating at the premises or in the surrounding areas (either by inhalation or ingestion of the fibers).

It is possible for Clumps of asbestos to be mixed within soil within the premises (soil that has been handled many times) to a point where the asbestos has separated literally into millions of small fibers that are invisible to the naked eye. The assessment process has identified the potential for asbestos to be present in the soil which may be released into the atmosphere from materials that may be present on the site, including material buried at insufficient depths, as well as wind erosion, weathering and/or disturbance, for example by heavy vehicle movement or construction work. There is therefore the need to obtain a waste license which would be applicable in the event that remediation of this site is required in the future.

Asbestos concentrations as low as 0.001% (weight basis) in loose, coarse textured soil may give rise to measurable levels of airborne asbestos, if disturbed. In an attempt to provide some sense of risk, the following must be borne in mind: A single asbestos bundle the size of a human hair through a microscope has the appearance of a large untwisted, steel cable i.e. made up of hundreds of smaller strands (fibers, in the case of asbestos). Asbestos fibers tend to fracture longitudinally (along their length) and if airborne, could release thousands of fibers into the air. These small diameter fibers (not visible to the human eye) and fiber-containing particles may remain suspended in the air for a long time and can be carried long distances by wind or water before settling.

Should Asbestos remain on the temporary site, and that soil containing asbestos fibers be disturbed and asbestos fibers released into the atmosphere, the main health risks that the asbestos potentially pose to Legacy La Relance (EA) Limited Ltd employees and people located directly next to the sites include:

- Asbestosis: Exposure to airborne asbestos fibers can cause pulmonary fibrosis. The lungs build up fibrotic scar tissue around asbestos fibers which causes difficulty in breathing, decrease blood flow to lungs which results in poor oxygen exchange, enlarged heart, a persistent dry cough and ultimately death.
- Lung Cancer: A disease characterized by uncontrolled cell growth in tissues of the lung. If left untreated, this growth can spread beyond the lung in a process called metastasis into nearby tissue and, eventually, into other parts of the body.
- Mesothelioma: This is a rare form of cancer that affects thin membranes which surround the lungs and other internal organs.
- Cancer of pleura and peritoneum.
- Cancer of bronchus.
- Cancer of intestines.
- Warts or corns: Dermal contact with asbestos can result in the formation of warts or corns.

Asbestos fibers are chemically inert. They do not evaporate, dissolve, burn or biodegrade in the environment. However, single fibers and clumps of fibers may be released in the air as dust as a result of wind erosion and other types of activities that generate dust. Once inhaled, fibers may be deposited and retained in the airways and lung tissue. Because asbestos fibers remain in the body, each exposure to asbestos increases the likelihood of developing an asbestos related disease. Many of these diseases caused by asbestos (asbestosis, mesothelioma, lung cancer) take between 15 and 40 years to be diagnosed.

The human respiratory system is therefore assumed to accumulate fibers linearly with concentration. For this reason alone, the cumulative nature of asbestos in the lungs, be it in small doses over long periods of time or a single large dose over a few hours or days, the health risks posed to potentially exposed premises employees and contractors, should not be underestimated. The illnesses listed above are dependent on the degree and frequency of exposure by an individual. In addition, there is a long time period between initial exposure and the development of asbestos-related disease.

The option for not implementing the asbestos clean-up is not preferred from a legal and human-health perceptive. A summary table of the impact (baseline conditions) that may continue to

occur at the premises and its environs should the asbestos disposal and clean-up not take place is provided below.

Nature: Negative effects of airborne asbestos fibers on human health (Legacy La Relance (EA) Limited Ltd employees who access the areas containing asbestos fibers) prior implementation of mitigation measures.	
Extent	Local (1)
Duration	Permanent (5)
Magnitude	High (8)
Probability	Improbable (2)
Significance	**Low (28**)
Status (positive or negative)	Negative
Reversibility	Not reversible
Irreplaceable loss of resources?	Yes (may result is illness and mortality of people)
Can impacts be mitigated?	Yes
Mitigation: (1) Undertake the asbestos disposal and clean-up to remove visible asbestos waste and contaminated soil as soon as any asbestos is removed to the burial site	
Cumulative impacts: Cumulative health impacts may result on the premises employees and people who operate at the premises if asbestos is not removed	

- **Potential Impact on health of asbestos workers and Premises employees during the disposal and Clean-Up**

Asbestos containing dust is a complex mixture of fibrous structures. Not only do single fibers vary in dimensions but also such fibers may be found combined with other fibers in the form of bundles, clusters, or matrices. These are known as asbestos structures that can be inhaled. The relationship between soil and air levels of asbestos fibers is therefore considered complex. The potential for asbestos fibers to become airborne depends on the type of work activities as well as natural activities such as wind, i.e. the potential for mechanical disruption of the soil by human and/or natural activities. The removal/disposal of asbestos and asbestos containing materials, including soil, is anticipated to be **high risk** work. Suitable precautionary measures must be

implemented during asbestos sheet removal or even the disturbance of asbestos contaminated soil in order to minimize the potential for the release of the fibers into the air.

Mitigation measures are essential to avoid exposure of the asbestos workers, employees who operate at the temporary site and the final disposal site and members of the public who may use the sites or reside in close proximity of the sites, when the asbestos is being lifted by an excavator or manually using shovels and forks. In the absence of mitigation measures, and if people (mainly employees conducting the disposal and clean-up) inhale or ingest asbestos fibers while the asbestos clean-up is underway, the following negative human health effects may occur in the long term (note that it takes years before these effects could materialize and would be related to the level of exposure):

» Asbestosis (note that asbestosis is incurable).

» Lung Cancer (can be treated but however can also result in death).

» Mesothelioma (can be treated but however can also result in death)

» Cancer of bronchus, Cancer of intestines (can be treated but however can also result in death)

» Warts or corns (Dermal) (can be treated)

A potential public health risk exists within 100 metres of the areas of the asbestos disposal and clean-up, unless the recommended mitigation measures are implemented. The impact table below summarizes the potential impact on human health during the disposal and clean-up with and with-out mitigation / precautionary measures.

Nature: Direct impact on human health during the disposal and clean-up due to the release of airborne asbestos fibers		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	permanent (5)	Short – duration (2)
Magnitude	moderate (8)	Moderate (6)
Probability	definite (5)	Improbable (2)
Significance	**high(70)**	**low (18)**
Status (positive or negative)	Negative	negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes (may result is illness	No

	and/ mortality of people)	
Can impacts be mitigated?	Yes	

Mitigation:

- All employees will wear protective clothing during the exercise. Each asbestos worker will be provided and equipped with:
    - o An approved unused disposable overall
    - o Clean gum boots
    - o Clean PVC gloves
- Demarcate the areas of removal of contaminated soil. A respirator zone is an area where the concentration of regulated asbestos fibers in the air is, or is likely to be greater than the OEL for asbestos. No persons should be allowed to enter the area without wearing respiratory protective equipment and protective clothing. Respirator zones must be clearly demarcated and identified to prevent accidental and chance, albeit brief, entry. Even if a person passes through the area or there is little work being conducted in that area, a respirator must be worn.
- Ground markings are examples of demarcation where the area is not defined by walls. In addition, all access routes should be demarcated and identified by symbolic warning signs that are clearly visible.
- Wire fencing will be used for high risk areas.
- Warning & Safety signage will be placed at the areas within the premises for clean-up on the site.
- No member of the public to be allowed near of the works area.
- All personnel involved with the asbestos disposal process will be subjected to medical surveillance.
- Asbestos contaminated areas shall be sprayed with water prior to commencement of cleaning activities in order to suppress the release of fibers.
- Clearing of asbestos at any site shall be completed entirely before moving onto a new working site.
- Temporary storage of waste: the area currently used for stockpiling of excavated material shall be lined with impermeable material.

- All machinery involved in an asbestos disposal process will be jet-washed prior to leaving site.
- Asbestos air sampling will be conducted on the sites for clean-up
- The employer must not allow anybody to work in or to enter an environment in which they may be exposed to asbestos that will exceed the exposure limit for asbestos.
- When there is a visible dust or winds in excess of 20 knots, any asbestos disposal and cleaning process will be stopped.
- Thorough, complete and up to date records should be kept of:
    - o Medical surveillance of asbestos workers for a minimum period of 40 years;
    - o Maintenance of control measures for a period of 3 years;
    - o Asbestos inventory for minimum period of 40 years;
    - o Training given to employee in terms of Asbestos Regulations for as long as the employee remains employed at the workplace in which he or she is being exposed to asbestos dust; and
    - o Assessments and air monitoring at the sites that were cleaned

16. Transportation

- Ensure all asbestos is collected and loaded into a transportation vehicle licensed by NEMA
- The transporting vessel (truck will be lined with polythene).
- The transporting vessel shall be labelled <HAZARDOUS WASTE<
- The waste shall be transported to the disposal site in an enclosed vehicle.
- The tenderer shall have a documented HSE policy and ensure that all persons involved in asbestos handling are appropriately inducted/trained in emergency procedures e.g. how to handle asbestos waste, services to be contacted during such spillages.

Cumulative impacts:

Cumulative health impacts may result on the premises employees and people who operate at the premises if the asbestos is not removed, or if spillage/breakage occurs while removing the asbestos.

- **Safety risk to asbestos workers while working at the Sites**

While working at the temporary and disposal sites, the asbestos workers will face daily safety risks. These include:

» Uneven walkways

» Dust

» The handling and transportation of dangerous substances

These hazards have the potential to cause injury or death to the workers/contractors who will be undertaking the asbestos-clean-up and disposal. In this regard, Legacy La Relance (EA) Limited Limited. has a Safety, Health and Environmental policy that will apply to the asbestos disposal and clean-up workers to avoid and minimize injuries or fatalities on their premises (see attached Health Safety and Environment policy).

Nature: Safety risks to asbestos workers while working at the concerned sites		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	Short (5)	Short – duration (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**medium (33)**	**low (18)**
Status	negative	negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes (may result is illness and/ mortality of workers)	No
Can impacts be mitigated?	Yes	
Mitigation: » Legacy La Relance (EA) Limited Ltd Safety, Health and Environmental (SHE) policy will apply to the asbestos workers. » All employees will wear protective clothing during the disposal and clean-up of the		

area. Each asbestos worker will be provided and equipped with:

- o An approved unused disposable overall
- o gum boots
- o PVC gloves
- o dust mask

» In addition, high visibility vests must be worn at all times.

» The asbestos project team who will access the area must be in possession of a valid premises access card.

» If more than 20 employees are involved, the employer must have a Health and Safety representative (1 per 50 employees).

» The asbestos site manager shall establish a health and safety committee. The committee shall comprise of the following personnel:

- o Site manager
- o SHE representative
- o Premises representative

» There must be a health and safety plan that is kept onsite which must contain appropriate safety measures.

» Employees must be trained on the contents of the health and safety plan

» The premises first aiders must be available to the asbestos workers

» A first aid kit must be kept onsite.

Cumulative impacts:

The safety risk will be faced whenever the asbestos workers are at the site - an occupational hazard.

- **Impact on soil during asbestos clean-up**

During the clean-up activities, the contaminated soil will be removed and disposed of at the disposal site– this will result in a loss of soil, which will be replaced with either clean soil or stone at relevant areas where asbestos remediation is required. The loss of soil can be completely reversed by the addition of clean soil. However, remediation of the contaminated soils may lead to open excavated areas. The extent of soil removal coupled with the already impacted nature of

the area does not warrant the implementation of mitigation measures. To cover these areas with soil would entail removal of soil from some other (probably not impacted) area and may therefore constitute loss of valuable soil resources. Soil erosion is a minimum in the area owing to the nature of the soils and the extent of the area development. Areas that require a substantial amount of excavation, and pose a safety hazard as a result, can be backfilled with stones or soil.

Nature: Loss of soil due to removal during remediation of asbestos contaminated soil		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Small (0)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**low (12)**
Status	positive	positive
Reversibility	Yes	Not applicable
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » If necessary, backfill areas which have undergone a substantial amount of excavation with stones or soil.		
Cumulative impacts: None		
Residual Impacts: None		

- **Generation of waste (general and hazardous waste) during the clean-up**

Apart from the asbestos waste and asbestos contaminated soil, other waste may be generated by the asbestos clean-up activities, including the following:

» Hazardous waste:

- Asbestos contaminated PPE that will be discarded will become hazardous waste, and if disposed incorrectly on the site or surrounding areas may pose health risk to people who come into contact with the waste.
- Wastewater will be generated from the decontamination facility where asbestos workers will shower (on a daily basis, until the clean-up is complete). This water will not go into the municipal system and will be collected in receptacles - drums) and will be treated as hazardous waste, and disposed to a hazardous landfill.

» General waste:

- food wrappers
- eating utensils
- paper
- plastic
- used equipment

General waste can be disposed to a general landfill by the asbestos workers to avoid cross contamination with general waste from the daily operations at the active landfills. If general waste is dumped in the surrounding area, it may impact the environment and people around there, by creating a breeding ground for pests and disease. If hazardous waste is incorrectly disposed of into the surrounding environment (onto uncontaminated soil, which then can result in the release of asbestos fibers into the air), this will create an exposure route for asbestos related disease and could pose health risks to people in the vicinity of the waste. With proper general and hazardous waste disposal, the impacts of the general and hazardous waste that is generated by the disposal and clean-up can be avoided.

Nature: Generation of waste (general and hazardous waste) during the clean-up		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (36)**	**low (14)**
Status	negative	negative
Reversibility	Yes	Yes

Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » The asbestos contaminated soil, materials and other hazardous waste (such as used PPE and wastewater) from the asbestos clean-up will be disposed to a hazardous landfill by the asbestos workers or contractor-if need arises. » General waste will be handled by a NEMA licensed waste handler. » Littering on the site (general waste) is prohibited. » Waste receptacles for general waste should occur in designated areas. » General waste should be collected on a daily basis. » Ablution facilities must be provided for the asbestos disposal and clean-up workers. These should be located in a designated area. » Should any spillage of the asbestos waste occur, it must be cleaned-up immediately and the affected areas appropriately remediated.		
Cumulative impacts: None		

- **Creation of job opportunities during the disposal and clean-up process**

The exercise will result in a number of short-term employment opportunities. The number of staff required will be informed by the scope of work. Therefore, short term job creation will be a minor positive socio-economic impact.

Nature: Creation of job opportunities during the asbestos clean-up		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (36)**	**Low (28)**
Status	positive	positive
Reversibility	Not Applicable	Not Applicable

Irreplaceable loss of resources?	Not Applicable	Not Applicable
Can impacts be mitigated?	Yes	
Mitigation: » If semi-skilled and specialist asbestos workers are available in the nearest communities, they should be utilized for the asbestos disposal and clean-up		
Cumulative impacts: None		

- **Long –term positive impact on environment due to the Disposal and clean up**

The removal of asbestos waste visible on the surface of the premises will reduce the future health risk for any of premises employees or people who operate or reside near the premises. The completion of the disposal process will be seen as having a positive impact on the environment (air and soil) and social (premises employees and nearby residents) elements. This is mainly due to the risk of asbestos occurring in the air being reduced to low risk or eliminated altogether and as a result a low risk or elimination of risk of asbestos-related diseases. Therefore, the long-term impact of removal of asbestos from the premises premise is viewed in a positive light (or as a positive action / impact) in terms of the site's duty of care towards the environment and their social responsibility to remedy contamination due to the presence of asbestos and to prevent any further negative environmental (soil and air) or social impacts.

Nature: The main potential environmental impacts of asbestos disposal and clean up		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (36)**	**Low (28)**
Status	positive	positive
Reversibility	Not Applicable	Not Applicable

Irreplaceable loss of resources?	Not Applicable	Not Applicable
Can impacts be mitigated?	Yes	
Enhancement Measures: »After the disposal and clean-up the premises management should continue with the declaration of the remedied sites as "convenant sites" and limit future use of these areas. » These sites should have clear signage that is maintained on an annual basis. » If there is a re-surface of asbestos on the premises area, it should be reported to premises management, to initiate remedial activities » After the remedial activities, it is recommended that test soil samples and air quality samples of the cleaned areas should be taken at least one year after completion of remedial activities, and the results compiled into a report for submission to NEMA such that they can confirm the success of the remedial activities.		
Cumulative impacts: The potential asbestos clean-up at the premises is seen as a cumulative positive impact on the soil, air and reduction in the health risk to the employees.		

- **Impact on water during asbestos disposal and clean up**

There is no water resource in the immediate vicinity of the proposed disposal site.

10.1 ENVIRONMENTAL MANAGEMENT PLAN

Management Aspect	Mitigation measures	Time frame	Responsibility	Cost (Kshs)	Remarks
General Conditions	• Notify workers about the upcoming activity • Prepare appropriate PPE complying with international good practise • Post appropriate signpost of the site that will inform the workers of key rules and regulations to follow	During preparation for the proposed activity	Manager	60,000	This will help prepare the workers for the asbestos disposal and cleaning process
Waste Management	• Inform cleaning and disposal workers of their responsibilities in terms of the EMP. • Ensure that all waste removal workers comply with the Waste Mgt Regulations of 2006 and National Guidelines for Safe management, and disposal of Asbestos.	During the cleaning and disposal process	Manager	70,000	To ensure a clean and healthy environment

	• Collect waste paper generated at the work site in scrap paper bins. Notify the waste paper removal worker /contractor when the temporary scrap paper storage area reaches capacity, for removal of the scrap paper to a recycling facility. • Place all general / domestic waste in refuse bins.				
Asbestos management	• Asbestos disposal site shall be marked clearly as hazardous material in accordance with the Asbestos National Guidelines • The asbestos will be appropriately contained and sealed to minimize exposure • The asbestos prior to removal should be treated with a wetting agent to minimize asbestos dust • Asbestos shall be handled and disposed by skilled & experienced	Preparation and disposal of the asbestos	Manager	250,000	To prevent asbestos dust from becoming airborne; To minimize personal exposure to asbestos fibers To ensure good environmental and

	professionals • If asbestos material is being stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately. Security measures will be taken against unauthorized removal from the site. • The removed asbestos will not be reused				health status of the facility
Traffic and Pedestrian Safety	• Signposting, warning signs, barriers and traffic diversions: site should be clearly visible and the workers warned of all potential hazards • Provision of safe passages and crossings for pedestrians be made • Active management by trained and visible staff at the site, if required for safe and convenient passage for the workers. • Ensuring safe and continuous	At preparation stages	Manager	80,000	To avoid the spread of asbestos dust To reduce the potential to contaminate, as asbestos fibers can be spread through various mediums including living persons To eliminate risks of exposure to asbestos

	access to office facilities, shops and residences during disposal and cleaning activities, if the facility is in operation during this activity				fibers
Air Quality	• Establish air quality monitoring systems and implement operational management plans to ensure that the system is being maintained properly and that the outputs of the monitoring system are providing suitable data on air quality. • Appoint a dust monitoring system to monitor and analyse dust and air quality • Air monitoring should be done continuously in areas related to asbestos removal works.	At preparation and disposal stages of the disposal	Manager	200,000	To minimize air pollution To prevent asbestos fibers from being airborne
Storm water Management	Ensure all storm water from the site is directed towards the established water	During disposal process	Manager	20,000	To ensure that there is no ponding on the

	drains				disposal site or flowing water
Management of temporary waste storage sites	• Ensure management of temporary waste storage sites is in line set procedures and legal requirements. • Register and monitor waste volumes at the temporary waste storage site • Oversee the physical removal of the waste from the temporary waste storage sites	During preparation and disposal stages	Manager	80,000	To ensure that the wastes are removed effectively and in time
Affected flora and fauna	Preserve as possible indigenous trees and other surrounding vegetation that need not be removed Plant additional trees at site boundary	During preparation and disposal stages	Manager	20,000	To ensure environmental management and proper ecological balance
Information and training	Training on the potential health risk caused by exposure to asbestos and how to reduce these risks	Before the disposal process commences	Manager	40,000	To provide awareness on the risks of asbestos

Asbestos exposure	The company shall not permit any person to work in an environment in which he or she would be exposed to asbestos in excess of the prescribed occupational exposure limit.	At, during and after the disposal and cleaning process	Manager	80,000 (Air quality monitoring)	To minimise risks of contracting diseases associated with exposure to asbestos fibers, e.g. cancer
Medical surveillance	Ensure medical surveillance of an occupational medical practitioner after the disposal exercise	After the disposal exercise	Manager	100,0000	To minimize incidents of occurrence of occupational diseases, notably those caused by exposure to asbestos fibers
Cleanliness of premises and plant	workplaces are maintained in a clean state and are free of asbestos waste	After the disposal process	Manager	40,000	To eliminate workplace contamination
Disposal Scheduling and Hours	The disposal and cleaning activities should be limited from 7 am or sunrise (whichever is later) to 5 pm or sunset	During the disposal and cleaning exercise	Manager		To prevent risk of inhaling asbestos fibers, which is possible if one does not clearly see the area of work due to darkness

Clearance Inspections	Inspections should be done to ensure that temporary storage site is cleaned to a satisfaction standard.	After the cleaning work	Manager	50,000	To eliminate risk of future contamination and exposure to asbestos

11.0 Summary of Impacts and their mitigation measures

Possible Impact	Mitigation Measures
Destruction to Flora and Fauna	➢ In an effort to preserve the existing biodiversity, naturally occurring plants should be harvested during the site clearing phase and relocated to a nursery, to serve as a source of plants for replanting at a later date. ➢ Demarcate and delineate areas to be affected by the construction work. ➢ Conduct site clearing activities in stages to minimize the area of exposed soil. ➢ Control earthworks ➢ Install drainage structures properly ➢ It is important to note that there is no threated species of flora and fauna
Water quality degradation	➢ The asbestos shall be disposed in underground concrete confinement of 130mm thick. ➢ The maximum depth of the pit will be 9.5m. this will be more than 10m above water table, compared to 1m allowance recommended in the asbestos management guideline. ➢ Surface water from road, wash down and operational areas shall be directed to sediment traps then sock drains, the filter membrane, to the flash tank and finally to the settling ponds. ➢ The proponent shall install water quality monitoring device. ➢ Asbestos is insoluble in water and alkali and as such cannot leach.
Airborne and water contamination due to Seismic events	➢ The concrete underground wall shall be constructed to withstand the seismic events. ➢ The area has not experienced seismic events in the recent past.
Fire Safety	➢ The proponent shall install firefighting devices at strategic areas. ➢ There proponent shall have fire management plan for the area. ➢ The staff shall be trained on firefighting skill.
Health and Safety Risk	➢ Inform all the relevant stakeholder and government officials prior to commencement of any work.

	➢ All employees will wear protective clothing during the exercise. ➢ Provision of respirators to all persons entering the asbestos sites. ➢ Fence off the site to avoid unauthorized access. ➢ Warning & Safety signage will be placed at the strategic areas within the disposal site. ➢ All personnel involved with the asbestos disposal process will be subjected to medical surveillance. ➢ The area currently used for stockpiling of excavated material shall be lined with impermeable material. ➢ All machinery involved in an asbestos disposal process will be jet-washed prior to leaving site. ➢ Asbestos air sampling will be conducted on the sites for clean-up ➢ When there is a visible dust or winds in excess of 20 knots, any asbestos disposal and cleaning process will be stopped. ➢ Thorough, complete and up to date records should be kept of at the site. ➢ Ensure all asbestos is collected and loaded into a transportation vehicle licensed by NEMA ➢ The transporting vessel shall be labelled *'HAZARDOUS WASTE'* ➢ The proponent will follow laid down procedure for handling hazardous substances as per the waste management regulation of 2006 ➢ A first Aid kit must be provided onsite ➢ Employees must be trained on first aid issuance ➢ There must be a health and safety plan that is kept onsite which must contain appropriate safety measures.
Loss of heritage site	➢ There is no cultural site in this site.
Soil Erosion	➢ Ensure progressive rehabilitation of the site by planting local native trees. ➢ Upon permanent closure of the site, the will be initially covered to a depth of one meter beneath the final land surface. ➢ The proponent should consider backfilling areas which have undergone a substantial amount of excavation with stones/murram or soil.

Dust Pollution	➢ First 25m of access to the entrance to be sealed. ➢ Vehicle speeds on the access road will be limited to 10km/h to minimize the possibility of wheel generated dust. ➢ A wash down area will be provided for all trucks and vehicles leaving the site. The Unloading area with drainage and treatment of water. ➢ Site jet system to be established to allow adequate wetting of operation surfaces.
Unregulated access to the site	➢ The site will be secured by a 2m high fence and entrance to be locked when not in operation. ➢ Signage will be place at the entrance and along the access road to indicate speed limits and risk, OH&S entry obligations and emergency contact details. ➢ Full time surveillance to be installed.
Deposition of unauthorized waste (asbestos)	➢ All Asbestos Containing Materials (ACM) will be recoded on the plan with GPS coordinates indicating their origin for future tracking. ➢ All operation personnel will be trained in proper management of ACM and emergency response procedure. ➢ All deliveries to the site to be registered in NEMA tracking document system. ➢ Confirmation of material properties prior to disposal. ➢ Rejection of materials that are not classified for disposal in the site.
Waste generation	➢ Inform cleaning and disposal workers of their responsibilities in terms of the EMP. ➢ Ensure that all waste removal workers comply with the Waste Regulations of 2006. ➢ Collect waste paper generated at the work site in scrap paper bins. Notify the waste paper removal worker /contractor when the temporary scrap paper storage area reaches capacity, for removal of the scrap paper to a recycling facility. ➢ Place all general / domestic waste in refuse bins

12.0 PROJECT DECOMMISSIONING

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 cleanup of a site that has been contaminated by previous disposal operations.

Exposure to asbestos may be fatal: the fibers 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.

13.0 CONCLUSIONS

As a result of the current potential health risk posed by the presence of the asbestos waste at Legacy La Relance (EA) Limited premises and the long period of time that the asbestos has been present at the temporary site, it is recommended that the license and authorization for the potential asbestos disposal and clean-up at the proposed site within the premises be granted by NEMA, subject to the a specific mitigation measures contained in this report and the EMP, when handling and disposing of asbestos waste. The presence of asbestos at the current site within the premises grounds poses a long term environmental and human health risk to people who operate on the site, and therefore the need and urgency to undertake the disposal and clean-up in order to eliminate any further environmental risks at contaminated area within the premises is imperative. It is therefore recommended that the asbestos disposal and clean-up be undertaken by the premises management as a matter of urgency to avoid or reduce any future health risks to workers and people that operate at the premises.

14.0 NON-TECHNICAL SUMMARY

This Environmental Impact Assessment was conducted to determine the overall environmental impacts that the proposed asbestos roofing sheet disposal and subsequent clean up exercise is likely to have in the future. Legacy La Relance (EA) Limited. Believes that investing in environmental management is a worthwhile venture and has greater plans for land management for sustainable environmental undertakings during its activities at this site.

After consideration of all the environmental impacts that the proposed activity may cause, including public health risks; impact on soil, air and water; waste management issues; short and long term positive impacts, various mitigation measures are proposed. These measures are contained in the Environment Management Plan (EMP) and include the following: -

- Practising good waste management
- Control of asbestos fibre release and exposure effects
- Monitoring air and soil quality
- Medical surveillance
- Health and safety considerations

The proposed activity can be a sustainable development if all the mitigation measures advanced herein are adhered to.

15.0 REFERENCES

Administrative Staff College of India, Hyderabad, 2009, EIA Guidance Manual – Asbestos based industries, India.

ICF Incorporated 1989, Regulatory Impact Analysis of Controls on Asbestos and Asbestos Products, Fairfax Virginia, USA.

Kenya Gazette, No. 8 of 1999, The environmental Management and Co-ordination Act, 1999, Government Press, Nairobi, Kenya, 175pp

UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel. Fischer-Kowalski, M., Swilling, M., von Weizsäcker, E.U., Ren, Y.,Moriguchi, Y., Crane, W., Krausmann, F., Eisenmenger, N., Giljum, S., Hennicke, P., Romero Lankao, P., Siriban Manalang, A., Sewerin, S. UNEP (Industry and Environment), UNIDO, IFA: Environmental Management Systems, Technical Report No. 26 part 2, Paris France 1998

APPENDICES;

Appendix 1: Land Ownership Documents

Appendix 2: Certificate of registration copy

Appendix 3: PIN copy

Appendix 4: Public barasa minutes

Appendix 6: Hydrogeological Report