`

TECHNICAL UNIVERSITY OF MOMBASA

A Centre of Excellence

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

For

Proposed Center of Excellence for Research & Training in Blue Economy & Civil Engineering at Technical University of Mombasa

Coordinate: 4.0375°S, 39.6684°E

TUM is ISO 9001:2015 Certified

CERTIFICATION

A. EIA EXPERTS

This Environmental and Social Impact Assessment (ESIA) was prepared by **EHS SOLUTION LTD**. A firm of experts who participated in the actual ESIA include:

i. **Justus Oyola**- Lead Expert NEMA Reg no.
ii. **Paul Ochieng Omolo**- Associate Expert NEMA Reg no.
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Signature: Date;

For EIA experts

B. PROJECT PROPONENT

Proponent: Technical University of Mombasa

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Project: Center of Excellence for Research & Training in Blue Economy & Civil Engineering

Contact Person:

Telephone:

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Signature: **Date:**

For proponent

LIST OF ABBREVIATIONS AND ACRONYMS

AfDB – African Development Bank

C-BECE - Center of Excellence for Research & Training in Blue Economy & Civil Engineering

C-ESMP - Contractor's Environmental and Social Management Plan

E.A-Environment Audit

E.I.A-Environmental Impact Assessment

E.M.C.A-Environmental Management and Co-ordination Act

E.M.P-Environmental Management Audit

EHS - Environment, Health, and Safety

ESIA - Environmental and Social Impact Assessment

ESMF-Environment and Social Management Framework

ESMP - Environmental Social Management Plans

ESS - Environmental and Social Standards

GBV – Gender Based Violence

GRC - Governance Risk and Compliance

GRM - Grievance Redress Mechanism

HIV/AIDS - Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

ILO – International Labour Organisation

NCA-National Construction Authority

NEMA-National Environmental Management Authority

OHS-Occupational Health and Safety

P.P – Paper Page

PMT – Project Management Team

SEA - Sexual Exploitation and Abuse

WRMA - Water Resources Management Authority

DEFINITION OF TECHNICAL TERMS

1. **Environmental Impact Assessment**: This is a systematic examination conducted to determine whether or not a programme, activity or project will have any adverse impacts on the environment (E.M.C.A pp54)
2. **Environment**: This includes the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the built environment (EMCA pp 53)
3. **Environmental management**: This includes the protection, conservation and sustainable use of the various elements or components (EMCA pp54)
4. **Proponent**: Means a person proposing or executing a project, program, or an undertaking specified in the second schedule (EMCA pp 60&172)
5. **Project**: Includes any project, programme on the policy that leads to projects that may have an impact on the environment (EMCA pp60)
6. **Waste**: Includes any matter prescribed to be waste and any matter whether lipids, solid, gaseous or radioactive, which is discharged, emitted in the environment and likely to cause alteration of the environment (EMCA pp62)
7. **Project report**: Means of summary statement of the likely environmental effects of a proposed development
8. **Good environmental practice**: Means practice that is in accordance with the provisions of this Act or any other relevant law EMCA).
9. **Positive Impact:** A change that improves the quality of the environment (for example by increasing species diversity; improving the reproductive capacity of an ecosystem; removing nuisances; or improving amenities).
10. **Negative Impact:** A change that reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or property or by causing nuisance.

EXECUTIVE SUMMARY OF AN ESIA

Kenya's expanding marine sector and infrastructural requirements underscore the need for a *Center of Excellence for Research & Training in Blue Economy & Civil Engineering*. With almost 1,400 kilometers of coastline, the blue economy has enormous potential for economic growth in fisheries, tourism, marine transportation, and renewable energy. The project activities include; the construction of a Modern Building: offices, lecture rooms and equipped laboratories/ workshops, at Technical University of Mombasa. This project will help to promote sustainable growth, job creation, and increased competitiveness in Kenya's maritime and construction industries. The initiative is anticipated to build a skilled labour force required in value chain development and contribute to socio-economic development. The project will complement the African Development Bank's initiatives in value chain development in Blue Economy and other sectors such as energy and Civil Engineering.

To achieve this, The Government of Kenya has approached the African Development Bank (AfDB) to secure funding for the establishment of the Center of Excellence for Research & Training in Blue Economy & Civil Engineering at the Technical University of Mombasa. This initiative aligns with Kenya's Vision 2030 goals to enhance technical education and sustainable development, particularly in sectors like marine resources and infrastructure.

The Technical University of Mombasa intends to construct a multi-story building. The building, referred to as the Center of Excellence for Research & Training in Blue Economy & Civil Engineering (C-BECE), is a key flagship project in the Kenya Vision 2030 Medium Term Plans. The C-BECE is aimed at value addition by addressing the limited technological capabilities and the need to enhance advanced research facilities and access to Kenyan science and technology institutions.

Objectives for the assignment: is that before the commencement of activity implementation at the proposed project site, there is a need to conduct an environmental and social impact assessments (ESIA) study to identify any adverse environmental and social impacts associated with the project construction and propose mitigation measures to address those challenges. To achieve this, Technical University of Mombasa, through Ministry of Education in collaboration with AfDB engaged a consultant to conduct an environmental and social impact assessment priorto the approvals of the Project Execution.

Based on the outcomes of the environmental and social impact assessment, the assignment will

develop an environmental and social management plan in compliance with Kenyan regulations (NEMA) that will meet the African Development Bank's Environmental and Social Safeguards Policy requirements. The aim is to develop mitigation measures that will address any adverse environmental and social impacts the project activities may bring about, including the cost implications of implementing those mitigation measures, develop a monitoring timeframe, and assign responsibilities to implement the measures.

These Construction works have triggered the need for an ESIA on the site. In line with the Bank´s Environmental and Social Safeguards requirements, an Environmental and Social Impact Assessment (ESIA) must be conducted, and therelated reports approved and disclosed both by the Bank and the Government of Kenya. It is based on this, as well as the client's commitment to environmental conservation that the proponent has undertaken an ESIA for the proposed works.

Purpose/Rationale for The Environmental and Social Impact Assessment: Although the project implementation sites have been chosen and the project designs are being developed, full details on the nature design and scope of interventions are still being worked out. The ESIA is prepared for AfDB operations that fund multiple subprojects with potentially similar environmental and social impacts, but with different locations, scopes, and designs.

This ESIA has been developed to ensure that these investments are carried out in an environmentally and socially sustainable manner. The rationale for preparing the ESIA for the C-BECE is essentially to evaluate the project's potential environmental and social risks and the impacts of its implementation. The process of the ESIA will examine ways of improving project site selection, planning, design, and implementation; it's also to prevent, minimize, mitigate, or compensate for adverse environmental impacts, and to enhance positive impacts throughout project implementation. The ESIA document will serve the following purposes:

i) guide implementers to ensure the environment assessment process is carried out in compliance with national legislation (Republic of Kenya) and AfDB safeguards policies.
ii) Provide an environmental and social screening process to allow for identification, assessment and mitigation of potential impacts by proposed works at the time the detailed aspects are known.
iii) Used as a reference document for assessing the potential environmental and social impacts of investment alternatives.
iv) Serve as guidelines for the development of sub-project/site-specific Environmental Social Management Plans (ESMPs), due diligence reports, environmental audits, among

others.

Specific Objective of ESIA.

i) Establishing clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of subprojects to be financed under this project,
ii) Identification of specific roles and responsibilities, and outlining the necessary reporting procedures for managing and monitoring environmental and social risks related to subprojects,
iii) Establishing project funding required to implement the ESMP requirements and
iv) Providing lessons learned for application to future project.

Scope and Criteria of the ESIA

The assessment covers all phases of the project lifecycle, including pre-construction, construction, operation, and decommissioning. Utilizing a combination of conventional and participatory approaches, the consultants aim to identify potential environmental impacts and propose mitigating measures.

Methodology Outline

ESIA has been prepared by the requirements stipulated by the Government of the Republic of Kenya. An interactive approach was undertaken between the project management team and the environmental and social assessment consultant. The methodology used is commensurate with the Environment Regulations, in Kenya. The following methodological approaches were used to prepare the ESIA.

1. ***Scoping***. Specifically, the scoping enabled the ESIA team to:
    a. identify the study scope;
    b. identify data/information requirements
    c. develop effective methods of approaching the ESIA study, and
    d. define terms of reference for the ESIA study.

    The process identified relevant key environmental and socioeconomic issues for detailed assessment as well as identified key stakeholders in the process
2. ***Desk review***: done on relevant national and international policies, laws, proclamations, strategies, guidelines/manuals, related programs and Safeguard practice lesson learned from previous projects in similar contexts as well as AfDB safeguards standards and relevant international procedures to ascertain the optimal management of impacts.

3. ***Field Visits***: were made in the project implementing sites
4. ***Stakeholder consultative meetings***: were held with government officials in their respective offices and project sites as well as students within the project institutions and other stakeholders interested/affected by the implementation of the project were identified.
5. ***Impact Identification and Evaluation***: the ESIA identifies these impacts to mitigate the adverse ones or enhance the benefits. Impact identification is a process designed to ensure that all potentially significant impacts are identified and taken into account in the ESIA process.

Policy, Legislative, and Regulatory Framework

This report was prepared to ensure that the project in Technical University of Mombasa conforms to the national policy aspirations towards securing sustainable development. Specifically, this Report has been developed to ensure compliance with requirements of the Environmental Management and Coordination Act (EMCA) 1999 (amended 2015) -Kenya's supreme environmental law and the National Constitution. Section 58 of EMCA requires that all development proposed in Kenya to be subjected to environmental assessment to be conducted in line with the Second Schedule (of EMCA) and the Legal Notice 101 (Regulations for Environmental Assessment and Audit) of June 2003. The entire Study process has been designed to conform to the regulatory framework stipulated by the National Environmental Management Authority (NEMA)-the body that will review this report and make decisions on grant of an environmental license to the development.

Analysis of Relevant International Conventions:

Kenya is a signatory to and has ratified several international instruments on environmental conservation and management such as conventions and regulations. Among such conventions and regulations are (i) African Regional Policy Instruments (ii) The AfricanConvention on the Conservation of Nature (1968) (iii) The Ramsar Convention of 1971 on Wetlands of International Importance; especially as Waterfowl Habitats (RAMSAR) (iv) The Protection of World and Cultural Heritage Convention (1972); (iv) The United Nations Framework Convention on Climate Change (UNFCCC, 1992). (v) United Nations Convention on Biological Diversity (vi) Convention on the Rights of the Child**.**

The AfDB Safeguard Policies: The AfDB Safeguard Policies have been reviewed, as the

project intends to be funded by AfDB. The Bank's policies that led to this projection include:

i) Environmental Assessment (OS1);
ii) Involuntary Resettlement including Land Acquisition, Population Displacement and Compensation (OS2);
iii) Biodiversity and Ecosystem Services (OS3);
iv) Pollution Prevention and Control, Greenhouse Gases, HazardousMaterials and Resource efficiency (OS4); and,
v) Labour Conditions, Health and Safety (OS5).

Enumeration of the major and moderate impacts

The construction of the proposed C-BECE is anticipated to have both negative and positive impacts. Measures have been put in place to mitigate the negative impacts at both the construction operation and decommissioning phases.

Positive Impacts of the Project

Some of the positive impacts anticipated from the proposed project include:

- Job Opportunities**:** Several workers including casual labourers, masons, carpenters, joiners, electricians, and plumbers are expected to work on the site for a period that the project will start to end.
- Provision of Market for Supply of Building Material**:** The project will require a supply of large quantities of building materials most of which will be sourced locally within Mombasa city and the surrounding areas.
- Livelihood improvement, the project will also be income-generating as the management will charge for use in order to ensure sustainability of the project. The profits can then form a source of income.
- Provision of the much-needed scientific research facilities

Negative Impacts of the Project

The study identifies the following negative impacts that are likely to occur because of the project:

- Occupational Health and Safety (*accidents and Injuries*)
- Public health and safety (*accidents and Injuries*)
- Visual/ aesthetic Impacts, Leakages and spills
- Noise, and vibrations, Air pollution
- Solid Waste generation,
- Waste water generation

- Fire Hazards, Increased Energy consumption
- Increased Waterconsumption
- Risk of Spread of HIV/AIDS
- Risk of Child Labour, Gender inequity
- Sexual Harassment and abuse amongst workers in the workplace
- GBV: Sexual exploitation and abuse (SEA)

The ESIA also presents mitigation measures to be employed to help prevent or minimize the environmental and social impacts of the project during the mobilization, construction and operation phases and decommissioning phase.

i. ***Measures recommended during the mobilization and construction phase include***: control of noise pollutions from heavy construction equipment, trucks and public transport through proper inspection and maintenance, limiting noisy activity on day time, use of noise suppressors and operation control of public transport; control of air pollution from construction works and movement of vehicles through proper inspection and maintenance to reduce exhaust emissions;

   Safety risks to pedestrians will be mitigated through providing designated walkway, use of appropriate signs to direct pedestrians and installation of physical barriers. Regarding spread of Sexual Transmitted Diseases and Gender Based Violence (GBV) will be mitigated by implementing HIV/AIDS awareness and prevention program and integrating measures for prevention and handling GBV and Sexual Harassment in the contractor's environmental and social management plan (C-ESMP)

ii. ***At operational phase measures recommended includes***: Regular monitoring air quality where noise will be measured periodically. In addition, pollution from generated wastewater and solid waste, will be mitigated by connecting to existing sewerage system and by disposal of solid waste in the landfill. Emphasis has also been on the control of emission levels (from exhaust), which will be mitigated by regular maintenance of transport vehicles. A major concern for the laboratory and equipment at operational stage will be the availability of water, chemicals management and disposal of wastewater from the laboratory. Reduction of parking space will be mitigated through the promotion of off-street parking facilities and ensure smooth transition towards new parking facilities.

In all phases, occupational health and safety will be carefully considered and controlled through continuous inspection to prevent disease and accidents, and workers will undergo an

environmental and safety briefing on safety, sanitation measures, and emergency rescue procedures before construction begins. Adequate sanitary facilities and garbage bins will be provided.

Public Consultation and Stakeholder Analysis

Various meetings were held with the project proponent during which, comments on the content, quality and focus of the environmental reports were made. The proceedings from those discussions are incorporated and form part of this report. Various consultative fora incorporating the proponent and senior staff of Mombasa County were held to agree on the modalities that would inform the project design process. Key Informant Interviews were also conducted with various key stakeholders. The stakeholders helped in the drafting of the checklists used to predict the impacts for this study. Questionnaires were also used to collect opinions from the residents of neighbouring the project site.

The key issues raised by the stakeholders during consultation were as follows:

1. The environmental concerns raised include: Noise and Vibration during construction, air pollution from dust to be generated during construction; and solid waste production and littering the environment.
2. The socio-economic concerns raised include: Increased pressure on utilities/services, community health and safety concerns, socio cultural disruptions, among others.
3. Student potential relocation to other buildings, avoiding disrupting normal businesses and learning activities.

The Consultant responded to the stakeholders' concerns by reassurance that all the issues raised will be addressed as part of the mitigation measures proposed in the ESIA report and to be implemented and monitored during the project period.

Environmental and social management plan (ESMP):

The study report incorporates an ESMP whose main aim is to improve the overall net effect of the project and avoid or minimize the potential negative impacts of the project activities. To avoid, reduce, and/or minimize for potential significant, negative environmental and social impacts, mitigation measures were proposed and environmental and social management plan (ESMP) formulated. Recommendations were proposed to carry out annual environmental audits and follow-ups once the project is in operation. However, a monitoring program was also developed to not only track down occurrence of impacts, but also to check on compliance

requirements. Environmental and Social safeguards specialists shall also conduct regular and impromptu monitoring to ensure that all the requirements of the Africa Development Bank (AfDB) and National laws are adhered to as captured in the ESMP.

Project Alternative: Many ESIA systems require the consideration of alternatives or options to a project proposal that will help the project achieve its objectives. It is at the core of the ESIA process and methodology. During the scoping process, alternatives to a proposal can be developed or refined, either directly or in relation to the key issues identified. A comparison of alternatives will help to determine the best method of achieving project goals while minimizing environmental impacts, or, more creatively, indicate the most environmentally friendly or best practicable environmental option.

a. ***The 'No Action Alternative'***: environmentally speaking, not carrying out the development (No Project Alternative) may be the best option, as the area would remain a relatively undisturbed area providing a habitat for the varied flora and fauna presently observed. Although this area will continue to be impacted, though minimally, by anthropogenic and natural factors but from a socio-economic perspective the "no action" alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realized and the resources in the area would continue to be underutilized.
b. ***Alternative Site:*** this option involves pursuing the proposal but on a different site meaning its impacts that are relevant to the proposed site or occur due it will be avoided. The avoidance of these in-situ and ex-situ regional impacts would be the main benefit of this option but there will also be other impacts specific to the alternative site and due to specifications of the proposed project, a different site away from the current sites, would also increase logistic costs. Alternative sites are also not readily available since availability of land is limited. Additionally, the selected sites are in government land and therefore no need to compensate the land owners as well as developing a relocation action plan. The site at Technical University of Mombasa is in line with the land uses within the institution.
c. ***Alternative Schedule:*** this option entails implementing the proposal at a later date, thereby offsetting its effects at that time. The only benefit is if the proposal involves improvements in baseline conditions and technologies. However, there are no guarantees in this case, and it may only result in development delays; thus, carrying out the proposed project with mitigation would be a preferable option due to the uncertainty. Furthermore,

carrying out the proposed project at a later time may result in more operational and logistic costs due to rising inflation and standards of living.

d. ***Alternative Design:*** this option foregoes the project in favour of different infrastructure designs that include buildings, roads, power, water, and sewerage, among others. The project will be designed taking into account the options available to ensure cost effectiveness while avoiding or reducing environmental and social impacts to the greatest extent possible. Furthermore, some of the other design options may result in higher building densities and less internal transport/path optimization. This means that the project will use more energy and resources than the preferred project option.

Recommended Alternative*:* Following an analysis of alternatives, taking into account environmental and social impacts, as well as stakeholder feedback, it was determined that the current site was the best option for minimizing the project's environmental and social impacts. Based on the needs assessment, the facility is well suited to be built at the Technical University of Mombasa's main campus. The C-BECE will contribute significantly to engineering and maritime research, as well as technical skill development. As a result, there were no better alternatives. Furthermore, the chosen site is on government/institutional land, so there will be no need to compensate the landowners or develop a relocation action plan.

The current identified site is recommended as an best suited site based on environmental and social impacts, as well as stakeholder feedback.

Environmental Monitoring Plan

Construction Phase							
Impact	Proposed mitigation measure	Implementation tool	Monitoring Indicators	Means of verification	Monitoring frequency	Responsibility	Estimated Cost USD
Air/noise pollution	• Use local routes away fromsensitive areas • Site construction facilities in sensitive areas • Use equipment fitted with abatement devices and a good maintenance regime • Prohibit working at night working if possible • Observe seasonal sensitivities • Give due notices for settlements/sensitive receptors	Part of the contract agreement with the contractor Contractor's maintenance program or plan for equipment/ machinery	Contractors plan andreport Grievances Recorded	Independent checks by project engineers and ESS Maintenance recordsverified by the project engineers and PMT Self-check by Contractor	Construction stage	Contractor (s) and PMT	3,000
Water Pollution	• Construction of a functional waste management infrastructure at each facility • Adoption of Best environmental practices in waste management • Good drainage system to reduce erosion • Proper siting of drainage outfalls • Water abstraction to	Industry-specific standards, for water quality monitoring Standards for drainage works construction AfDB's OS-4 Construction site management plans	Water quality analysis Visibility of oil andother pollution materials on water bodies	Incidences of pollutionreported Water quality results	• Regular Monthly report • Occasional checks and observations by project engineers and PMT • Periodic reports on performance by Contractor	Contractor (s) and PMT	4,000

	adhere to the local laws to avoid over-extraction of groundwater						
Solid waste generation and disposal	Develop a waste management plan including hazardous waste; construction waste, general waste,and kitchen waste	Part of contract agreement with Contractor Contractor's waste management plan; Industry-specific standards, particularly the EHS Guidelines	Number of waste management infrastructure provided Final waste disposal records	Periodic reports	Monthly	Contractor(s) and PMT	6,000
Impact on flora, fauna and ecologically sensitive areas	• Demarcate and avoid areas of unique flora and fauna • In case of any identified ecologically sensitive areas, conserve them • Rehabilitate cleared areas with native species, and ecosystem restoration in habitats of conservation value	AfDB's OS-3	Presence of sensitivehabitat	Activity reports Site remediation reports	Construction	Contractor/PMU	2,000
Marginalisation of women and other vulnerable groups	• Provide women and vulnerable groups specific interventions Target the women and other vulnerable groups in the allocation of Project resources and benefits	ESMF	Number of women benefiting from Project activities Number of women and other vulnerablegroups enrolled for training	baseline data and project implementation report	During Project implementation	PMT	2,000

Interaction between workforce and Student community communities	Carry out training and awareness training for the workforce and their dependents on HIV/AIDSand other sexually transmitted illnesses, and communicable diseases Carry out health awareness-raising campaigns for communities on similar topics	ESMF; Industry-specific standards, particularly the EHS Guidelines	Health and safety incident register Grievance records Number of training and awareness sessions held Number of women and other vulnerablegroups that Participated	Site visit and Observations by ESS/Contrac tor	Construction and operation	Contractor and PMT	1,000
Labour and working conditions	Employment practices and workingconditions should conform to ILO standards and national regulations Institute a clear and comprehensivehealth and safety reporting and grievance procedure system freely available to all of the workforce	Industry-specific standards	Comprehensive health and safety reporting and grievance procedure	Periodic reports byperformance ESS/Contractor	Construction and operation	Contractor and PMT	1,000
Economic Development and Employment	The contractor is to develop an Employment Plan, with clear employment requirements and procedures for the construction and operational/ maintenance workforce Institute fair and transparent hiring and staff management procedures	Industry-specific standards and Guidelines ESMP	Employment Plan	Periodic reports byperformance ESS/Contractor	Construction nand operation	Contractor and PMT	2,000
Total	**TOTAL**						**21,000**
Operations Phase							
Impact	Proposed mitigation measure	Implementation tool	Monitoring Indicators	Means of verification	Monitoring frequency	Responsibility	Estimated Cost

Air/noise pollution	Facility fitted with equipment withabatement devices and good maintenance regime Prohibit operations at night if possible	Part of the contract agreement with the contractor Contractor's maintenance program or plan for equipment/ machinery	Contractor's plan andreport Grievances recorded	Independent checks byproject engineers and ESS Maintenance recordsverified by project engineers and PMT Self-check by Contractor	Construction stage	Contractor (s) and PMT	1,000
Water Pollution	• Operation of functional waste management infrastructure at each facility • Adoption of Best environmental practices in waste management Good drainage system to reduce erosion • Water abstraction to adhere to the local laws to avoid over-extraction of groundwater	• Industry-specific standards, for water quality monitoring • Standards for drainage works construction • AFDB's OS-4 • Construction site management plans	Water quality analysis Visibility of oil and other pollution materials on water bodies	Incidences of pollutionreported Water quality results	• Regular Monthly report • Occasional checks and observations by project engineers andPMT • Periodic reports on performance contractor	Contractor (s) and PMT	1,000

Solid waste generation and disposal	• Solid Waste • Generation and Management • Regular inspection and maintenance of the waste disposal systems during operation phase • Establish a collective waste disposal and management system • Provide waste disposal bins to each house well protected from adverse weather and animals • Ensure waste materials are disposed of on Council and MINISTRY OF ENVIRONMENT AND FORESTRY approved sites • Use of the 3rs – Reduce, Re-use, Re-cycle	• Part of the contract agreement with the Contractor • Contractor's waste management plan; • Industry-specific standards, particularlythe EHS Guidelines	• Number of waste management infrastructure provided • Final waste disposal records	Periodic reports	Monthly	Contractor(s) and PMT	2,000
Impact on flora, fauna and ecologically sensitive areas	Rehabilitate cleared areas with native species, and ecosystem restoration in habitats of conservation value	AfDB's OS-3	Presence of sensitivehabitat	Activity reports Site remediation reports	Construction	Contractor/PMU	1,000
Marginalization of women and other vulnerable groups	Provide women and vulnerable groups specific interventions Target the women and other vulnerable groups in the allocation of Project resources and benefits	ESMP	Number of women benefiting from Project activities Number of women and other vulnerablegroups enrolled for training	baseline data and project implementation report	During Project implementation	PMT	1,000

Interaction between the workforce and local communities	Carry out training and awareness training for the workforce and their dependents on HIV/AIDS and other sexually transmitted illnesses, and communicable diseases Carry out health awareness-raising campaigns for communities on similar topics	ESMF; Industry-specific standards, particularly the EHS Guidelines	Health and safety incident register Grievance records Number of training and awareness sessions held Number of women and other vulnerablegroups that Participated	Site visit and Observations by ESS/Contractor	Construction and operation	Contractor and PMT	1,000
Economic Development and Employment	Innovators to develop products and services and investment opportunities maintenance workforce Institute fair and transparent hiring and staff management procedures Students to train and undertake swimming operations and utilizing the skills	Industry-specific standards, and Guidelines	Products and servicesdeveloped	Periodic reports byperformance ESS/Contractor	Institutions in operation	Contractor and PMT	2,000
Total	**TOTAL**						**9.000**
Decommission Phase							
Impact	Proposed mitigation measure	Implementation tool	Monitoring Indicators	Means of verification	Monitoring frequency	Responsibility	Estimated Cost
Air/noise pollution	Site demolition facilities Use equipment fitted with abatement devices and a good maintenance regime Prohibit working at night working if possible	Part of the contract agreement with contractor Contractor's maintenance program or plan for equipment/ machinery	Contractor's plan andreport Grievance srecorded	Independent checks byproject engineers and ESS Maintenance recordsverified by project engineers and PMT Self-check by Contractor	Construction stage	Contractor (s) and PMT	1,000

Water Pollution	Adoption of Best environmental practices in waste management Good drainage system to reduce erosion Proper siting of drainage outfalls Water abstraction to adhere to the local laws to avoid over-extraction of groundwater	Industry-specific standards, for water quality monitoring Standards for drainage works construction AFDB's OS-4 Construction site management plans	Water quality analysis Visibility of oil andother pollution materials on water bodies	Incidences of pollutionreported Water quality results	• Regular Monthly report • Occasional checks and observations by project engineers and PMT • Periodic reports on performance • by Contractor	Contractor (s) and PMT	1,000
Solid waste generation and disposal	Develop a waste management plan including for hazardous waste; construction waste, general waste and kitchen waste	Part of the contract agreement with Contractor Contractor's waste management plan; Industry-specific standards, particularly the EHS Guidelines	• Number of waste management infrastructure provided • Final waste disposal records	Periodic reports	Monthly	Contractor(s) and PMT	1,000
Interaction between workforce and local communities	Carry out training and awareness training for the workforce and their dependents on HIV/AIDS and other sexually transmitted illnesses, and communicable diseases Carry out health awareness-raising campaigns for communities on similar topics	ESMP; Industry-specific standards, particularly the EHS Guidelines	Health and safety incident register Grievance records Number of trainingand awareness sessions held Number of women and other vulnerable groups that participate	Site visit and Observations by ESS/Contrac tor	Construction and operation	Contractor and PMT	2,000

Labor and working conditions	Employment practices and working conditions should conform to ILO standards and national regulations Institute a clear and comprehensive health and safety reporting and grievance procedure system	Industry-specific standards	Comprehensive health and safety reporting and grievance procedure	Periodic reports by performance ESS/Contractor	Demolition and operation	Contractor and PMT	1,000
Accidents/ Injuries	Securing the Site by fencing off	ESMP	Comprehensive health and safety reporting and grievance procedure	Periodic reports by performance ESS/Contractor	Demolition and operation	Contractor/ Proponent	2,000
Subtotal							**8,000**
OverallTotal							**38,000**

Grievance Redress Mechanism: The AfDB defines project GRM as a systematic process for receiving, evaluating and facilitating resolution of affected people's project-related concerns, complaints and grievances about the borrower's/client's social and environmental performance on a project. AfDB requires its clients to be aware of and respond to stakeholders' concerns related to the project in a timely manner. In OS 1, the Bank requires the borrower/client to establish a "credible, independent and empowered local grievance and redress mechanism to receive, facilitate and follow up on the resolution of the affected people's grievances and concerns regarding the environmental and social performance of the project.

The process by which the GRM is designed should be integrated into the overall approach to project preparation as prescribed in the Bank's ISS. The Bank ISS through its Integrated Environmental and Social Impact Assessment (IESIA) Guidelines Notes provides guidance on development and Implementation of GRM. It should also be included on a case-by-case basis.

The GRM in the AfDB -**C-BECE**- project will be established under the guidance provided in the Bank ISS through its (IESIA) Guidelines Notes. The first step will be to determine the primary goal of the GRM which would generally be to resolve specific grievances in a manner that meets both project management and community needs, but with important local variations. The scope of the grievances that may legitimately be brought forward by the communities and/or individuals affected shall be defined in advance.

The project will require the development of governance risk and compliance GRCs at the project level. GRM staff, or GRM members, should be qualified, experienced, and competent individuals who can earn the respect and trust of the affected communities. It is also critical to maintain gender equality within the GRMs.

General Costs for ESMP Implementation and Monitoring: The ESMP implementation budget refers to all costs that will be incurred to implement the requirements or recommendations in this ESIA. In the ESMP the requirements are to ensure that implementation of the project integrates environmental and social issues for the sustainability of the project as well as its components and sub-components. ESMP recommends the following key issues; Preparation of site-specific ESIAs, training and capacity building, reviewing and monitoring mechanisms. The total cost for implementing Environmental Management Plan including the Monitoring Plan is tuned to USD 206,850

Conclusion and Recommendations

Conclusion:

The ESIA study results show that, despite, some limited negative environmental implications of the project, C-BECE Project will have high socio-economic benefits to the people of Coastal region in Kenya and adjoining regions. The associated negative impacts will be minimized through good engineering design and envisaged construction practices. Specific mitigation measures have been suggested in this report to offset the inherent adverse impacts. In implementing these mitigation measures there would be an improvement of environmental soundness of the project.

It is, therefore, concluded that, implementation C-BECE will entail no detrimental impacts on the environment, social and physical cultural resources if the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. Ministry of Education and the project proponent through PMT is committed in implementing all the recommendations given in the ESIA and further carrying out the environmental monitoring.

Recommendations:

i) Aspect of the project will require a multi-sectoral and a multi-disciplinary approach in the overall implementation. Therefore, it is important that during the implementation, relevant stakeholders are effectively engaged.

ii) The implementation of C-BECE-Addition works is likely to have multiplier effects and proliferation of other economic activities hence engaging other stakeholders, and especially the private sector may help in addressing some of the cross-cutting challenges.

iii) The contractors and the project proponent should take into consideration all the legislative measures put in place so as to ensure the due process is followed.

iv) The mitigationmeasures provided are based on the recommendations of this ESMP and they should be followed soas to address the environmental issues that may arise in the course of the implementation of this project. But contractors should enrich the ESMPs and develop their site specific ESMPs

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CHAPTER ONE: INTRODUCTION

1.1 Project Proponent

Technical University of Mombasa through the Ministry of Education

1.2 Project Financier AfDB

African Development Bank

1.3 Background and Rationale of ESIA Study

Technical University of Mombasa has the mandate of advancing knowledge and its practical application through teaching, research and innovation to serve both industry and the community. The Mission of the University emphasizes on the promotion of quality and relevant education and integration of science and technology into the production system of the economy. To successfully achieve this Mission, the institution needs to construct a Center of Excellence for Research & Training in Blue Economy & Civil Engineering. The Centre is a key flagship project in the Kenya Vision 2030 Medium Term Plans. The Centre is aimed at value addition by addressing the limited technological capabilities and the need to enhance advanced research facilities and access to Kenyan science and technology institutions. It will further contribute to the development of the country's economy, and generate knowledge, employment, and access to new markets so that the advantage arising from the high educational attainment can become an effective factor of competitiveness, developing initiatives that make possible business activities based on knowledge. It is also further projected to be a world class high technology research facility and a center of excellence to cater for research needs at the national, regional and international levels.

More recently developers, spurred on by regulators world over, have recognized the need for change in order to safeguard the environment as stipulated by Kenya Constitution 2010. The Environmental Management and co-ordination (Amendment) Act, 2015, section 58 (4) provides for the preparation and submission of Project Report before undertaking a proposed project.

The major objective of an Environmental Social Impact Assessment (ESIA) study is to evaluate the effects/impacts of the proposed development on the entire environmental aspects aimed at influencing the protection and co-existence of the development with the surroundings as well as the compatibility of the proposed development to the area to ensure and enforce sustainable environmental management during construction, occupation and decommissioning phases. The

scope of the assessment study covers the physical extent of the project site and its immediate environs, construction works of the proposed development (ground preparation, foundations, walling, roofing among others), installation of basic utilities and services as required by the construction of various facilities.

The output of the report is the production of a comprehensive Environmental Social Impact Assessment (ESIA) report for submission to NEMA for approval.

1.2 Scope and Objective

1.2.1 Scope of ESIA Assignment

The study was conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the neighboring areas/environment as they may be affected by or may affect the proposed project. Any potential impacts (localized or delocalized), are also evaluated as guided by EMCA 1999 and the Environmental (*Impact Assessment and Audit*) Regulations 2003. This study report includes an assessment of the impacts of the proposed sites and their environs concerning the following:

i. A review of policy, legal and administrative framework.
ii. Description of the proposed sub-project design and proposed works including technology, materials, by-products, procedures and processes to be used during construction operation and decommissioning.
iii. Description of the project area's physical, biological, social, cultural, and economic environment.
iv. Conduct an assessment of environmental and social impacts due to the proposed construction.
v. Identify mitigation measures for negative impacts as well as enhancing measures for the positive impacts of the project.
vi. Develop an environmental and social monitoring plan (ESMP)
vii. Acquire NEMA EIA license

1.2.2 Objectives of the Project

The objective of the C-BECE is to provide business-oriented and self-sustaining research infrastructure and equipment in the delivery of innovative research solutions by establishing a modern Centre for establishing maritime education and training, a research hub and Civil Engineering training.

The ESIA aims to carry out an assessment to identify significant potential impacts of the proposed project to the environment and social aspects, and formulate recommendations to ensure appropriate measures to mitigate any adverse effects to the environment.

The key objectives of this study include the following:

i. To construct a physical building complex to house C-BECE to support Maritime education, Nautical and Seafaring Studies and Civil Engineering
ii. To fully furnish and equip C-BECE
iii. To ensure sustainability through incorporating the design principles and practices to minimize the environmental impact
iv. To enhance the visibility and brand image of TUM as a centre of excellence in Blue Economy studies and Civil Engineering

1.2.3 Objectives of the ESIA

i. To examine in detail likely positive and adverse environmental impacts associated with the proposed project
ii. To determine the compatibility of the proposed development with neighbouring land use
iii. To propose appropriate mitigation measures for the significant negative impacts.
iv. To assess and analyse the environmental costs and benefits associated with the proposed project.
v. To develop an environmental and social management plan

1.3 Output and Terms of Reference for the ESIA

Lead Expert in Environmental Impact Assessment and Auditing was appointed by the project proponent to conduct the ESIA study for the proposed C-BECE. The ESIA included the necessary specialist studies to determine the environmental impacts relating to the biophysical and socio-

economic aspects and to determine the issues or concerns from the relevant authorities and interested and/or affected parties. The appropriate measures to ensure the co-existence of the proposed development with other social and economic activities in the area are provided as part of ESMP.

The output of this work is an Environmental Impact Assessment study report to apply for an ESIA license and ensure sustainability development is attained. The terms of reference were:

- The objectives of the project,
- A description of the location of the proposed project,
- The technology, procedures and processes used, in the implementation of the project,
- The materials used in the construction and implementation of the project,
- The products, by-products and waste generated by the project,
- A concise description of the national and county environmental legislative and regulatory framework,
- Baseline information and any other relevant information related to the project,
- To recommend a specific environmentally sound and affordable waste management system,
- Hold public participation forums
- The environmental impacts analysis of the project including direct, indirect, cumulative, irreversible, short-term and long-term impacts anticipated, social analysis, economic analysis and cultural analysis;
- Integration of climate change vulnerability assessment, adaptation and mitigation actions;
- Analysis of alternatives including project site, design, technologies and processes and reasons for preferring the proposed site, design, technologies and processes;
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
- Provision of an action plan for the prevention of foreseeable accidents, occupational diseases and management of hazardous activities in the course of carrying out activities of the project;

1.3.1 Responsibility and Undertaking

The proponent had the responsibility to provide information required by the Consultant which included: site plan(s) showing roads, service lines, buildings layout and the actual sizes of the sites, details of raw materials, proposed process outline and anticipated by-products, future

development plans, operation permits and conditions, land-ownership documents and site history, and estimated investment costs. The output from the consultants includes the following:

- An Environmental and Social Impact Assessment report comprising of an executive summary, assessment approach, baseline conditions, anticipated impacts and proposed mitigation measures
- An Environmental and Social Management Plan outline, which also forms part of the report recommendations.

1.4 The ESIA Methodology Approach

The key activities undertaken during the assessment were:

(i) Review of project documents such as the Architectural drawings, site plan, land and structural documents

(ii) Screening of the project. This step was applied to determine whether an ESIA was required and what level of assessment was necessary. Issues considered included the physical location, sensitive receptors near the site and the nature of anticipated impacts. It was concluded that the proposed project falls within the category of projects under the second schedule of EMCA CAP 387 that requires an Environmental Impact Assessment to be carried out before implementation,

(iii) Physical evaluation of the activities around the site and the environmental setting of the wider area. This is achieved through existing information, literature and physical observations.

(iv) Review of available documentation (desk review) on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information,

(v) Expert knowledge

(vi) Public participation and discussions with the local community, proponent and the project team regarding the proposed project. The Communities surrounding the project site were interviewed and they expressed their views towards the upcoming project. In addition to that, questionnaires were administered to solicit for more details and views from the surrounding facilities and businesses. Meetings were also held in adjacent estates to collect residents' views.

(vii) A scoping exercise that identified the key issues to be addressed in the assessment. The scoping process helped narrow down to the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social,

economic and cultural aspects. The site history and the facilities in close proximity to the site were considered during this stage.

(viii) A comprehensive report including issues as listed in the Environmental (Impact Assessment) Regulations 2003.

1.5 Constraints and Limitations

This report presents information that is generally consistent with the data and information gathered through various sources and approaches mentioned above. The findings and issues presented from the stakeholder and community engagement program are representative of the general views and perceptions of some selected people and stakeholders. As such, they may not cover the specific issues for some unique situations or some individuals affected by the project. The validity of the secondary data used in this report should be viewed concerning the data source publication dates. It is therefore necessary to view such information concerning the time reference and the limitations specific to the publication

CHAPTER TWO: PROJECT DESCRIPTION

2.1 Project Overview

The proposed development involves the construction of a multi-storey building comprising Blue Economy and Civil Engineering blocks within an already established university on approximately. It will serve as a hub for interdisciplinary collaboration, academic exchange, and technological advancement. The building space of the main building is proposed to be 6,600m^2.

The development shall comprise the construction of:

Laboratory and workshop descriptions for Blue Economy Civil Engineering

1. **Public Health Laboratory**

A public health laboratory for engineers is a specialized facility that applies engineering ideas to public health procedures. It develops and tests technology and methods to improve environmental health, sanitation, water quality, and disease prevention. The laboratory, which is outfitted with cutting-edge instruments and testing equipment, facilitates research into air and water pollution control, waste management, and sustainable infrastructure design. It is a collaborative area where engineers may work on new solutions to public health concerns, assuring safe and healthy surroundings using evidence-based techniques and cutting-edge technology.

2. **Structures Laboratory**

A civil engineering structures laboratory is a facility dedicated to investigating and testing the behavior and strength of various construction materials and structural components. The lab is equipped with advanced testing machines, load frames, and simulation software, allowing for experimentation on beams, columns, slabs, and other structural elements under various stress circumstances. It funds research in fields such as material characteristics, structural analysis, and seismic engineering. The laboratory gives students and researchers hands-on experience, improving their grasp of structural behavior, design principles, and safety regulations, resulting in safer and more efficient infrastructure.

3. **Materials Laboratory**

A civil engineering materials laboratory is a specialist facility that tests and analyzes construction materials like concrete, steel, asphalt, and composites. The lab is equipped with advanced instruments such as universal testing machines, mixers, and microscopes, allowing for studies on material qualities, durability, and performance under a variety of settings. It promotes material science research, quality control, and creative construction processes. The laboratory gives students and researchers hands-on

experience with material testing, which improves their understanding of material behavior, composition, and applications in civil engineering projects. This promotes the development of high-quality, sustainable, and safe construction techniques.

4. **Surveys Laboratory**

A Surveys Laboratory for Civil Engineering is a dedicated area for teaching and research in land surveying and geospatial analysis. The lab is equipped with advanced technologies such as total stations, GPS units, and laser scanners, allowing for precise measuring and mapping of land characteristics. It enables training in topographic surveying, geodetic computations, and construction layout. The laboratory gives students and researchers practical experience with modern surveying techniques, which are required for proper site assessment, planning, and infrastructure development.

5. **Highway Engineering Laboratory**

A Highway Engineering Laboratory is a specialized institution that studies and tests materials and designs used in road construction and maintenance. The lab is equipped with advanced tools for assessing asphalt, concrete, and soil qualities, allowing for tests on pavement performance, durability, and safety. It promotes study into traffic flow, road design, and sustainable construction methods. The laboratory provides students and researchers with hands-on experience in highway material testing and analysis, ensuring the creation of efficient, long-lasting, and safe road infrastructure.

6. **Soils and Geotechnical Laboratory**

A Soils and Geotechnical Laboratory for Civil Engineering is designed to investigate soil qualities and behaviors that are important for foundation design and earthworks. It includes advanced testing equipment for determining soil strength, permeability, and compaction. The lab facilitates geotechnical engineering research, such as slope stability and soil-structure interaction. Students and researchers acquire practical expertise in soil analysis, which is critical for safe and effective civil engineering projects.

7. **Carpentry and Joinery Workshop**

A Carpentry and Joinery Workshop for Civil Engineering offers hands-on training in woodworking skills required for construction. The workshop is outfitted with equipment and machinery for cutting, shaping, and assembling wood, allowing the fabrication of formwork, frames, and unique structures. It

teaches students practical carpentry and joinery skills, which ensure precision and quality in building projects while also improving their construction craftsmanship.

8. **Plumbing workshop**

Plumbing Workshop for Civil Engineering provides hands-on instruction in the installation and maintenance of plumbing systems. The workshop is outfitted with tools and fixtures for pipe fitting, welding, and system testing, giving students hands-on experience with water supply, drainage, and sanitation systems. Students learn the fundamentals of designing and implementing efficient plumbing systems, as well as guaranteeing reliability and safety compliance in residential, commercial, and industrial building projects.

9. **Hydraulics Laboratory**

A Hydraulics Laboratory for Civil Engineering is a specialized facility for studying fluid mechanics and hydraulic systems. The lab is equipped with flumes, pumps, and flow monitoring systems, allowing for studies on water flow, pressure, and behavior under varied conditions. It promotes study in fields such as river hydraulics, pipe flow, and hydraulic construction. The laboratory gives students and researchers hands-on experience analyzing and designing efficient water distribution and management systems, flood control measures, and sustainable hydraulic infrastructures, resulting in practical understanding and innovation in civil engineering water resources projects.

10. **Laboratory associated Blue Economy and Marine include:**

- Chartwork and Navigation laboratory
- Electronic Navigation laboratory
- Marine hydrodynamics laboratory
- Simulators
    - Nautical simulator
    - Marine Engineering simulator

2.2 Scope of Project

The government policy on all new development projects requires that an environmental impact assessment be carried out at the design stage of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the construction, operation and decommissioning of the facility. The scope of this ESIA, therefore, covered:

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

The scope of the assessment covered the project site, area near the proposed site, construction & operation works and the utilities under the project. The output of this work was a comprehensive ESIA report to apply for an ESIA license.

2.3 Project site

The proponents propose to develop on land in sub-division in Tudor, Mombasa County. The land is in Tudor off the Tom Mboya Road at Technical University of Mombasa main campus. It is neighbored by residential houses from high raised buildings, bungalows to those of two floors (marionettes'). The proposed site is within urban developed area and some services (electricity, water and road networks).

The site has the following attributes

i. The site is accessible by road.
ii. The site can access services such as electricity, internet connections and security.
iii. The site is not any of those areas which are subject to repossession by any authority in the Republic of Kenya.

2.4 Project Cost

The project will cost approximately Ksh. **808,700,000.00**

The below indicates the building space for each floor:

Table 2.1 Proposed C-BECE Complex Building

FLOOR	SPACES		AREAS
Ground floor	BLUE ECONOMY	CIVIL ENGINEERING	
1st floor	• Auditorium • Electronic Navigation laboratory • Marine hydrodynamic laboratory	• Two workshops • Plant (transformer generator)	1526m^2
2nd floor	• Marine Engineering • GMDSS class& navigation laboratory	• Workshops	1545m^2
3rd floor	• Simulator rooms and labs	• Laboratories • Cafeteria	1710m^2
4th floor	• Chartwork and Navigation laboratory • Staff offices • Classes	• Classrooms/Laboratory	1543m^2
5th floor	• Library • Classes • Staff offices • Store	• Drawing room • Library • Staff offices	1692m^2
6th floor	• Classrooms	• Library • Drawing room	1321m^2
7th floor	• Classrooms	• Auditorium	1101m^2
	• Restaurant	• Auditorium	662m^A

2.5 Design Criteria, Standards and Neighbourhood Development

A preliminary investigation was undertaken to determine the topography, ground water table level, nature and characteristics of the soil and bearing capacities. The results determined the nature of the structural forms that were adopted about foundations. The structural design criteria depended on the structure. The type of sewerage disposal system and storm water drainage system adopted were influenced by the results of the preliminary investigation. All the designs complied with the applicable codes of practice. The foundations were also governed by the results from the geotechnical investigation. The sewerage disposal system proposed will be that of a mechanical

sewerage treatment system to enable recycling of the waste water in the estate which can be used for irrigating the gardens and cleaning purposes

The design criteria, standards and characteristics of the proposed building include the following among others:

- All works to be carried out in accordance with the local government authority's regulations
- All drainage passing under building and drive areas to be of PVC pipes.
- All sanitary work to be by MOH rules and regulations and Mombasa County area standards and requirements.
- All reinforced concrete (RC) works to be to structural engineer's details

  The neighborhood, where the proposed development is located is characterized by residential dwelling units and estates. These include individual residential and household homes.

2.6 EDGE

A green architectural approach has been incorporated in our designs

2.6.1 Water and Energy Usage

The main source of energy will be from the national grid and solar will be installed to supplement KPLC. Energy efficiency, a key focus of the design, is demonstrated by the use of energy-efficient light fittings such as LED lights and the installation of solar panels for lighting and water heating. The installation of solar panels on the roof will provide renewable energy.

Rain water harvesting is a major component of the design as rainwater shall be the key source of water for the building. This shall be complemented by the recycling of treated wastewater to be used in the toilets and watering the flower gardens.

2.6.2 Indoor Environmental Quality

The design has been planned with a focus on creating a healthy and conducive environment for its occupants. This includes considerations for indoor air quality, access to natural daylight and views. Ensuring better indoor environmental quality not only benefits the health and wellbeing of the occupants but also adds value to the building and reduces liability for the owners. To achieve these the following measures have been proposed:

i. Indoor air quality plan

ii. Thermal comfort
iii. Building finishes (interior materials)
iv. Adequate ventilation and exhaust
v. Daylighting

2.6.3 Passive Cooling Technique

This technique plays a significant role in the building sustainability strategy. An internal landscaped courtyard or atrium has been incorporated to facilitate passive cooling through the stack effect especially benefitting the main circulation areas. Additionally, a solar shading system has been implemented to minimize solar heat gain on the building facades, control glare and evenly distributed daylight within interior spaces. These passive cooling measures not only contribute to energy efficiency but also create a comfortable and living environment for occupants while reducing the building's environmental footprint.

2.6.4 Energy Footprint of Construction Materials

All materials will be sourced locally to reduce energy footprint hence ensuring environmental sustainability. Examples of materials include building stones, sand, concrete, timber, steel reinforcement bars, cement, roofing materials, electrical wires, conduits, and water.

2.7 Construction Activities and Inputs

All the construction inputs shall be obtained from licensed dealers. The following will be required for the successful implementation of construction activities:

- Construction tools and equipment including machinery mainly vehicles will be used for the transportation of materials and in the execution of the proposed works
- A construction labor force of both skilled and unskilled worker.
- Water for construction purposes.

2.7.1 Inputs during Construction

Typical inputs which will be used in the construction phase are land and water which will be readily available. The materials that shall be used include building sand, aggregates, natural stones, either hand or machine-cut construction stones, steel and timber for making structural formwork and interior design, tiles for roofing and floor tiles. Others include concrete blocks for constructing

selected internal and external pavements, precast units for drains, PVC pipes for sewer and water reticulation, paints, electrical wiring and fitting, barbed wires, wire mesh, water tanks and gutters. Window casement and glasses, spades, pick axes, and other hand-held tools will also be needed.

2.7.2 Construction Activities and Timetable.

The construction activities shall begin from the time NEMA gives approval of the Environmental Impact Assessment Study. Materials from the excavations of the ground and foundation work will be reused for earthworks and landscaping. The site will then be filled with hardcore and murram then be compacted as other civil and engineering works shall follow.

2.8 Project implementation Sequencing/Phasing

i. Pre-construction stage

a. Plan preparation and seeking of the appropriate approvals from the relevant authorities.
b. Appraisal of baseline conditions to determine supply and demand for required infrastructure utility services.
c. EIA Project Report and Study Report preparation including the necessary approvals.

ii. Construction stage

a. Establishment of related works and all support infrastructure that are significant for the construction work: This would involve the transportation of machinery and deployment of the workers to the construction site. The machinery would be used for ground breaking and transportation of materials from the sources to the site. The major machineries that will be used include mixers, welding machines and transmission machines.
b. Acquisition and transportation of building materials: The contractor shall source for materials for construction from the various available suppliers. Supply of materials will be a continuous activity throughout the project life since different materials will be needed at different phases of the construction. The materials that shall be used in the construction include among others building stones, sand, ballast, cement, timber, reinforced concrete frame, steel, bars, G.I pipes, PVC pipes, pavement blocks, concrete slabs, murram, hardcore, insulated electrical cables and timber among others.
c. Excavation and landfilling work: Excavation will be carried out to prepare the site for the construction of foundations to lay the buildings and all other proposed facilities and utilities.

This will involve the use of heavy earthmoving machinery such as tractors, tippers and bulldozers.

d. Masonry, Concrete Work and Related Activities: The construction of the foundations, floors, pavements, and drainage systems among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labor intensive and will be supplemented by machinery such as concrete mixers.

e. Transportation of the construction wastes from the site: Construction waste that cannot be used for either backfilling or landscaping work at the site will be deposited in approved dump sites by a contracted licensed waste handler.

2.9 Solid Waste Management

The technologies for the management of solid wastes will incorporate the collection of the waste from the source, transportation of the waste to the place of storage and final disposal through a contracted waste handler. The following waste management techniques shall be used in the different stages of the project.

a. **During construction**: The main wastes from the construction site will consist of material residues of the construction materials. These include pieces of concrete, heaps of sand and aggregate, bits and pieces of various pipe types, cans of paint, polythene sheets, paper packaging materials, pieces of timber, and offcuts of metals among others. They shall be managed as follows:
   - Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable by the supervising architect and environmental consultant.
   - Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping.

b. **During operation**: During the operation phase, the Institution will contract a licensed waste handler who will collect their waste at agreed intervals and dump it at licensed waste dumping sites.

2.10 Proposed Finishes

The finishes are proposed to entail paving slabs for paving finishes while the external wall to have rendered finish, natural stone cladding, marine grade bituminous and first quality exterior silicone paints to rendered surfaces. The internal wall finishes will also be plastered and painted with emulsion paint and with glazed ceramic wall tiles. The floor will have ceramic floor tiles. The timber doors will be painted with clear varnish, window grilles are proposed to have corrosion-resistant marine metal paint and the ceiling will also be plastered and painted with emulsion paint. The roof terrace floor will be finished with concrete interlocking tiles, a bituminous membrane on waterproofing floor screed, and a precast concrete coping on the parapet wall.

2.10.1 Electrical Design for the Proposed Buildings

Electrical Supply and Distribution System is essential as a vital means for the operation of the Technical University of Mombasa during normal utility power, utility power failure, and emergency operation periods. System Supply will be a 3-phase power supply of 11kV step down to 415/240 Volts. The proposed electrical works that shall be provided to the proposed building will include:

- Main Power Distribution.
- Standby Power Generating System.
- Solar supply system.
- General Lighting will be provided for all buildings.
- Interior and external, Landscape Façade and Street Lighting by Specialist Lighting Consultant
- General Emergency Lighting and Exit Signs will be provided.
- Lightning Protection System.
- Earthing and Equip-potential Bonding System.
- Telecommunication and Data System.
- Fire Detection and Alarm System
- Security and surveillance system

Electricity will be provided by Kenya Power & Lighting Company Ltd at 11KV and will be distributed at 415/240V. A dedicated intake space at the office building will be provided for Kenya Power & Lighting Company MV equipment and will serve as Utility Company point of isolation at MV side. The Power intake point will connect the Kenya Power & Lighting Company supply and

the whole Development electrical system. The power intake space will be turned over to Kenya Power & Lighting Company (KPLC) and the facility's maintenance staff for their exclusive access and maintenance. To ensure power supply reliability, 100% 50 KVA 3 phase generator backup with 9 hrs fuel supply capacity has been provided for.

2.10.2 Fire Detection and voice evacuation System

The buildings will be provided with a complete fire alarm system designed and installed in accordance with the NFPA-72 and local Authority Having Jurisdiction (Mombasa County Government). The whole building will have Fire alarm and detection system points, including the smoke detectors, the break glasses, the washers, and the sounders. These devices will be placed at strategic locations such as corridors, entrances, and exit areas where they can be easily accessed in the event of a fire. Each alternate floor of every building in the landing sites will have a Fire Alarm Repeater Panel (FARP).

Fire Fighting System; The following firefighting equipment will be provided; -

Hose reels

-4 No. Non-recessed swinging type hose reel complete with 30 meters of 20mm internal diameter rubber fire hose with nylon spray/jet shut off nozzle, conforming to BS 5274; all wire brushed, cleaned, and painted complete with installation with one coat of red oxide primer, undercoat, and gloss coat to Architects color including banding and color coding to British Standard.

External Fire Hydrant

-2 No. 2 way pillar type fire hydrant with dia 63 outlet to LCPB/EN 12845 standard each with 100mm UL Listed/ FM Approved hydrant isolation valve, Connection: Flanged as BS EN 1092-2/ Flanged as ASME B16.1, PN 16.

Portable Fire Extinguishers

Portable fire extinguishers will be provided by NFPA 10; Standards for Portable Fire Extinguishers. Extinguishers will be provided at all hazard areas such as kitchens, electrical rooms, garbage rooms, and generators. The Extinguisher types to be provided are:

- Carbon Dioxide gas
- Water Carbon dioxide
- Dry Chemical

Signages and Fire exits

There will be signages of fire hose Reel, fire exits and fire instructions all as described in the particular specifications and to the Project Engineers' Approval. The building has a fire escape ladder on the top floors of the building, and 3 No fire escape points at the ground floor of the building which will be at the entry lobby and at the two exits of the building where people can safely evacuate in the event of a fire.

Fire assembly points

There will be 1 No. Fire assembly points outside the fisheries office building to provide a safe and organized location for people to evacuate to, and to ensure that everyone is accounted for in the event of fire. All this is shown in the site plans.

2.10.3 Plumbing and drainage fittings

i. **PP-R Pipes**: Due to the light-weight nature, chemical inert, corrosion, scaling and erosion-resistant nature of PP-R pipe, they are easy to install, durable and will not react with water or dissolved chemicals in the water. Therefore, these pipes will be used instead of copper and many plastic pipes which will not leach harmful chemicals to the water supply in buildings for human consumption.

ii. **Pipes (uPVC Pipes):** Due to the resistance of uPVC pipes to acids and sulphates, this material will be used instead of concrete pipes for ND not exceeding 250 mm in the sewer network. uPVC pipes will also be used for diameters exceeding 200 mm for locations where jointed concrete pipes are unsuitable, such as embankments that are likely to settle, or where very steep gradients result in high velocity and possible pipe erosion, or where water-logged areas have to be traversed and concrete pipes become unsuitable because of their porosity.

iii. **Manholes:** There shall be 17 No Manholes size 600 x 450mm and averaging 750mm deep constructed in 100mm thick concrete base (1:3:6), approved 150mm block sides rendered all

around in cement and sand (1:4). They shall have an approved heavy-duty Fiber Reinforced Plastic cover and frame, Including all necessary excavations, disposal and form work

iv. **Gulley traps**: There shall be 200 x 200 x 300mm deep gulley traps complete with 400 x 400 x 10mm thick mild steel grating welded to 10mm thick mild steel frame at 30mm centers, hot galvanized and Sandblasting, with 2 pack epoxy zinc phosphate primer and painted with three coats of marine grade gloss oil paint to approval, 150mm thick plastered masonry walls, class 25/20 concrete base, concrete cover to receive grating and all surface finishes.

v. **Landscaping and tree planting**: To improve the environmental and aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping and tree planting. This will include establishment of flower gardens and lush grass lawns and will involve replenishment of the top soil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping. The proponent has already established a tree nursery in preparation of the trees to be used for landscaping and tree planting.

2.11 Project Decommissioning

The project can only be decommissioned in the event that the intended plan has served its purpose and is no longer required or the structured stability of the buildings is at stake or a new owner with a different plan has come up and wishes to engage in something else but not apartments. In that case, the decommissioning will entail demolishing of the buildings to pave way for the new set up. If decommissioning has to entail demolishing, the plan below can be adopted.

i. The building shall be assessed to determine the presence of hazardous conditions, materials, or waste and a report prepared for the management teams.

ii. The building components shall be surveyed to determine if they have potential reuse or recycling. The local community shall be given preference for re-use of the building materials that ca not be sold.

iii. Quantities of all structures to be removed, relocated, sold, recycled or donated shall be estimated by site assessment.

iv. All hazardous materials are to be removed by specialist sub-contractors and disposed of by good environmental practice. Hazardous materials may include, but not be limited to, lead-painted surfaces, asbestos, PCB transformers, light ballasts and coolants, petroleum products and liquids, solvents, hazardous cleaning products, potential ignition sources, potential shock

hazardous, potential drowning hazards, potential fall hazards, etc. Shall be removed prior to the prior to initiation of general decommissioning

v. All utility connections, power, water, sanitary connections etc., shall be identified, disconnected, capped and properly closed prior to or at the time of decommissioning.

vi. Dust controls shall be used during general demolition to minimize airborne dust levels both during demolition, loading and transport activities. Dust emissions shall be kept below industry standards in accordance with guidelines contained in NEMA emissions standards;

vii. All loads for transport shall be covered and secured

viii. All building materials to be disposed of shall be taken to a licensed disposal facility, scrap yard or recycling Centre. Manfest of all loads, including detailed material descriptions shall be maintained

ix. For all buildings, including the latrines, to be dismantled and removed from the premises. The concrete foundations should be broken up either buried on the site or taken to a recognized dumping site by the authorities.

x. The site can thereafter be planted with trees as it awaits any other conducive development or fenced off at the initial stages to allow a responsible party to consider various options

A final Decommissioning Report shall be completed upon completion of decommissioning activities.

On site security shall be maintained throughout the decommissioning phase of the project.

Project Implementation activities are as described in the table below.

Table 2.1: Proposed project activities during construction

S/N	Activity	Description
1	**Site Preparation**	● Clearing and leveling of the construction site. ● Excavation of trenches for utilities and foundations ● Installation of temporary fencing and access roads
2	**Foundation Construction**:	● Pouring of concrete foundations for the laboratory building and associated structures. ● Installation of underground utilities, including water, sewer, and electrical systems.

		● Placement of steel reinforcement bars (rebar) and formwork for foundation structures.
3	**Structural Erection:**	● Erection of steel framework for the laboratory building and support structures. ● Installation of precast concrete panels for exterior walls ● Assembly of roof trusses and installation of roofing materials. ● Construction of interior structural elements, such as columns, beams, and floor slabs
4	**Interior Fit-Out:**	● Installation of interior partitions, doors, and windows ● Electrical wiring and installation of lighting fixtures. ● Plumbing installation, including fixtures and fittings. ● HVAC (heating, ventilation, and air conditioning) system installation. ● Finishing work, such as painting, flooring, and ceiling installation. ● Installation of laboratory equipment, benches, and furniture.
5	**Materials, Equipment, and Machinery:**	● Materials: Concrete, steel, glass, wood, insulation materials, plumbing fixtures, electrical components, HVAC systems, laboratory equipment, etc. ● Equipment and Machinery: Excavators, bulldozers, cranes, concrete mixers, scaffolding, welding equipment, drilling machines, HVAC systems, laboratory instruments, etc.
6	**Additional Considerations:**	● Environmental and social impact mitigation measures, such as dust control, noise management, and waste management, should be implemented throughout the construction process. ● Health and safety protocols should be strictly followed to ensure the well-being of workers and surrounding communities. ● Regular monitoring and reporting of construction progress, compliance with regulations, and environmental and social performance should be conducted.

Description of Project's operational activities

Table 2.2: Project's Operational Activities

Operational Activity	Description
Research Conduct	● Scientists, researchers, and technicians utilize the laboratory's specialized equipment and facilities to conduct experiments and studies in various fields of particle physics, material science, chemistry, biology, and engineering. ● Experimental setups are designed and executed to investigate the properties, behavior, and interactions of particles, atoms, molecules, and materials at the atomic and subatomic levels. ● The laboratory serves as a hub for interdisciplinary research, fostering collaborations among scientists from different disciplines to address complex scientific questions and challenges.
Data Collection and Analysis	● Advanced instrumentation, such as particle accelerators, synchrotron radiation sources, spectroscopy devices, and imaging systems, are used to collect data from experiments. ● Data analysis techniques, including statistical analysis, computational modeling, and simulation, are employed to interpret experimental results, extract meaningful insights, and validate theoretical models.
Instrumentation and Facility Maintenance	● Ongoing maintenance and calibration of laboratory equipment and instruments are essential to ensure accurate and reliable experimental outcomes. ● Skilled technicians and engineers are responsible for the upkeep, repair, and upgrade of scientific instruments, as well as the overall maintenance of the laboratory facility.
Collaborative Research Projects	● The laboratory collaborates with academic institutions, research organizations, industry partners, and government agencies on collaborative research projects. ● Joint research initiatives may involve sharing resources, expertise, and data to address scientific and technological challenges and achieve common research goals
Training and Education	● The laboratory provides training programs, workshops, and seminars to educate scientists, students, and professionals on advanced research techniques, experimental methodologies, and scientific discoveries. Educational outreach activities, including tours, lectures, and public

	engagement events, are organized to promote scientific literacy and awareness of particle physics and related fields.
Regulatory Compliance and Safety	● The laboratory adheres to regulatory requirements and safety protocols to ensure the well-being of personnel, protect the environment, and prevent accidents or incidents. ● Compliance with local, national, and international regulations governing the operation of scientific research facilities is essential to maintain operational integrity and public trust.
Landscaping	● The site will be landscaped after construction, using existing and locally -available plant species where applicable in order to improve the aesthetic value of the proposed project location.
General Cleaning	● This will involve regular washing and cleaning of the Facility spaces, common areas, pavements and other public areas.
General Repairs and Maintenance	● The facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of ● leaking water pipes, painting and replacement of worn-out materials among others.

Description of the Project's Decommissioning Activities

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. The following should be undertaken to restore the environment:

Table 2.3: Project Decommissioning Activities

Decommissioning Activity	**Description**
Facility Shutdown	● The decommissioning process begins with the orderly shutdown of the C-BECE building, including the cessation of research activities, equipment deactivation, and the removal of hazardous materials. ● Shutdown procedures are conducted in accordance with established protocols and safety guidelines to minimize risks to personnel and the environment

Equipment Removal and Disposal	● Specialized equipment, machinery, and scientific instruments within the facility are systematically dismantled, disconnected, and removed from the premises. Equipment removal is carried out by qualified personnel using appropriate tools and techniques. ● Disposal of equipment may involve recycling, repurposing, or environmentally responsible disposal methods to minimize waste generation and environmental impact.
Decontamination	● Decontamination procedures are implemented to mitigate potential hazards associated with chemical, biological, radiological, and other contaminants present within the facility. ● Surfaces, equipment, and infrastructure are cleaned, treated, or removed as necessary to reduce contamination levels to acceptable standards and ensure safe handling during decommissioning activities.
Structural Demolition	● Structural demolition involves the dismantling and demolition of buildings, laboratories, and other facilities within the NPSRL site. ● Demolition activities are carried out using heavy machinery, such as excavators, bulldozers, and cranes, under the supervision of qualified personnel to ensure safety and compliance with regulatory requirements. ● Debris and waste materials generated during demolition are segregated, removed, and disposed of responsibly.
Environmental Remediation	● Environmental remediation measures are implemented to address any contamination or environmental impacts resulting from the operation of the C-BECE building. ● Soil and groundwater remediation, air quality monitoring, and ecological restoration efforts may be undertaken to restore the site to its original or an acceptable condition in compliance with regulatory standards.
Waste Management	● Waste management practices are employed to handle, transport, and dispose of hazardous and non-hazardous waste materials generated during decommissioning activities. ● Waste streams are characterized, segregated, and treated accordingly to minimize environmental risks and ensure compliance with waste disposal regulations.

Site Restoration	● Site restoration involves the rehabilitation and reclamation of the decommissioned C-BECE site to its pre-existing or an alternative land use condition. ● Restoration efforts may include landscaping, soil stabilization, infrastructure removal, and site grading to prepare the site for future development, conservation, or reuse in alignment with regulatory requirements and stakeholder preferences

CHAPTER THREE: ENVIRONMENTAL AND SOCIAL BASELINE CONDITION

3.1 Site location

Technical University of Mombasa is located in the coastal city of Mombasa, lying between latitudes 1^0 05·43"S and 37^0 00·53" east and longitudes 1.0951^0S " and 37.01463^0E.

Mombasa County lies on the shores of the Indian Ocean along Kenya's coastline. It is located on the southeastern part of the Kenya Coast. It borders the Indian Ocean to the East and South East, Kilifi County to the North and Kwale County to the West and South West. It is connected to the mainland in the South by Likoni ferry, to the North by Nyali Bridge and to the west by Makupa bridge.

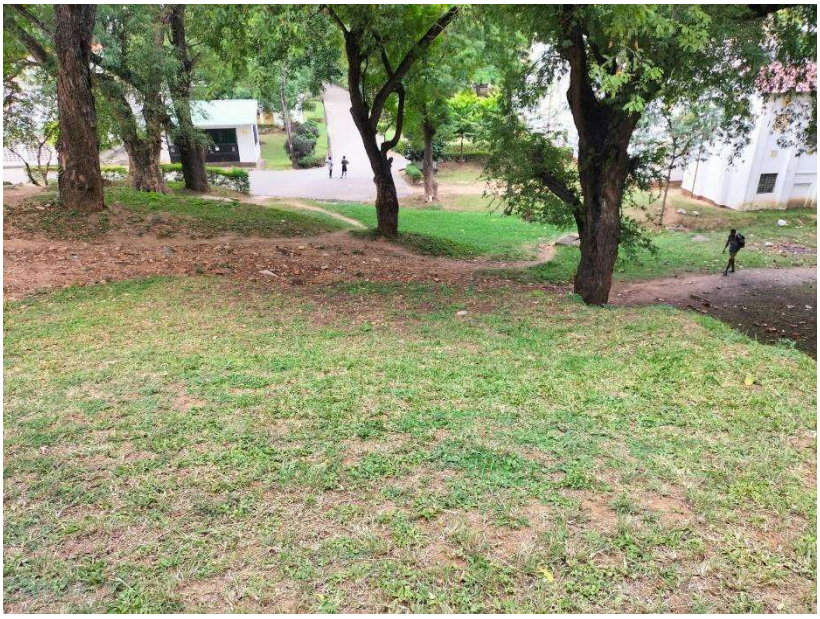

Photo 1: Proposed project site

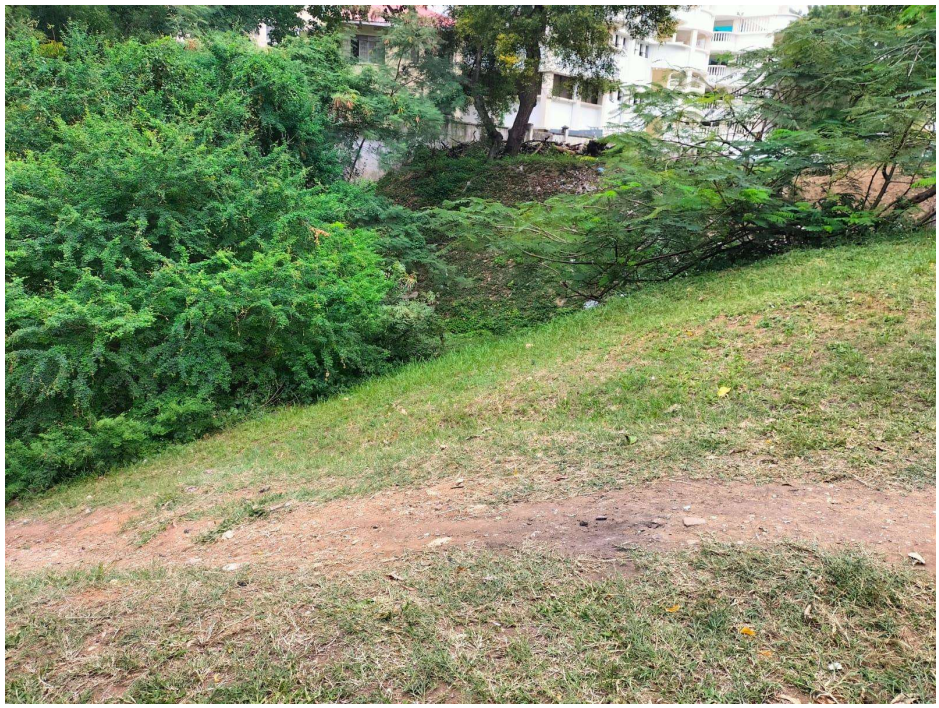

Photo 2: Proposed project site

3.2. Climate

The climate of Mombasa is tropical and has a monsoon type which is hot and dry from January to April/May. The rainfall is bimodal with the long rains usually starting around March/April and continuing until July. The short rains come in October and December. The amount of rainfall varies between 900-1,500 mm per annum along the coastline to with 60% reliability. However, the rainfall shows large yearly fluctuations with substantial monthly variations. It is unpredictable when the rains start and how much rain is distributed between the two seasons.

3.3 Topography and Geology

The topography of the project area, characterised by an average elevation of 75 feet reveals a diverse landscape conducive to development and environmental management. Situated along the Tudor creek, the area encompasses a mix of flat and elevated terrain of coastal plains. Additionally, the processes of coastal formations such as cliffs contribute to the aesthetic appeal of the area.

3.4 Population Distribution

According to the last census, the population of the county of Mombasa is 1,341,000 and covers an area of 218.9km^2. The total student population of the Technical University of Mombasa is 19,600, of which 60% of the students are pursuing Engineering and Applied Science courses. the university on 27 acres of land.

3.5 Housing

Most of the housing structures are permanently constructed using coral blocks or concrete blocks, with a larger part of the population living in privately owned houses. Rental residential units are also on the increase especially along Tudor area where Technical University of Mombasa is located. Tudor has revived different styles of architecture designs making it look unique.

3.6 Soils

The soils here range from very deep well-drained to very shallow, extremely sandy, strong brown, friable, sandy, clay, with topsoil of loamy sand to sand-loam. The project site is dominated by top sandy soil with the underlain layer being sand-loam mainly formed as a result of decomposition of dead plant matter. However, the underlying topsoil is exclusively beach sand and coral.

Permeability to be expected of the soils in the project site is in the range of low to moderate. This factor is important for any possibilities of seepage of the various surface-generated waters through soil and its interactions with groundwater. The expected permeability rates show that chances of serious surface/groundwater interactions in the project area are low.

3.7 Hydrology and Drainage

The nearest permanent surface water (the Indian Ocean) which is 100m from the site. There is hardly any potential adverse impact to surface water due to the distance. However, the hydrology and drainage of the project area is negligibly influenced by the ocean. The underground water table of which the entire county depends on is very high. It is estimated to be about 80 feet beneath the surface.

There are no permanent rivers in Mombasa. However, due to favorable geology, groundwater sourced from shallow wells and boreholes is available to supplement the needs of the residents. Otherwise, water to serve the needs of the area is sourced from Kwale through Marere Springs and

the Tiwi Boreholes; Malindi through the River Baricho; and from the Mzima springs in Taita Taveta County.

Technical University Mombasa has some potential in terms of groundwater resources. This is because of its geological structure that promotes rapid infiltration and percolation of surface run-off to recharge groundwater aquifers. Areas covered with the Kilindini sands have a high groundwater potential so are the areas with Triassic sandstone geology, which have shown high groundwater yields.

3.8. Flora and Fauna

The flora consists of several mature trees mainly neem trees (*Azadirachta indica*), coconut trees (*Cocos nucifera*), mkungu tree (*Terminalia catappa*), shrubs and grass cover. In the Tudor Creek, there is a stand of mangrove trees comprising *Sonneratia alba*, *Bruguiera gymnorrhiza*, *Rhizophora mucronata,* and Avicennia sp. The mangrove trees on the site will not be interfered with and in addition the proponent will plant more new trees as part of the landscaping. The sykes monkey (*Cercopithecus albogularis*) and the Indian black crows (*Corvus splendens*) are common fauna found in the project sites. Rodents and reptiles like the blue-headed coastal lizards (*Agama agama*) are occasionally found in the site.

3.9. Infrastructure

3.9.1 Roads

The site can be easily accessed through Tom Mboya Avenue in Tudor

3.9.2 Energy

Energy is essential for socio-economic development to meet basic sustenance needs. The TUM area is generally supplied by electricity from the national grid. The proposed development will be connected to the Kenya Power and Lighting Company power supply line. The KPLC electricity supply lines are already available within of the proposed project site

3.9.3. Health

The university has a clinic which serves staff and students and is supplemented by the Mombasa County Referral Hospital and Tudor Health Centre.

3.9.4 Education

The project site is located in an urban setting with several secondary, primary schools, one national polytechnic and several Technical and Vocational Centres. TUM is the only university in the locality and very strategic in the development of the area.

3.9.5 Livelihoods

The university is served by a number of shops, eateries, entertainment facilities, churches, mosques, temples and several small and medium businesses.

3.9.6 Waste disposal

There will be liquid, solid and gaseous wastes from the project site. These will be from project activities during construction, operation and decommissioning phases. There shall be wastewater from civil works, workers and the storm water. It is envisaged that at the construction stage, wastewater that shall be discharged will also be sprinkled on work areas to reduce dust generation by construction machinery. Other wastes from the construction site will be mainly material residues of the construction material. These include pieces of concrete, heaps of sand and aggregates, bits and pieces of various pipe types, cans of paint, polythene sheets, paper packing materials, pieces of timber, pieces of iron (metals) among others scattered within the project site. All debris and garbage generated during all stages of the development will be placed in a central place on the project site and collected by a licensed garbage disposal company who will deposit an approved disposal site.

3.9.7 Water

The area is served by Mombasa Water and Sewerage Company (MOWASCO) but like most parts of the county, its water supply.is irregular and unreliable. The proposed development will be served by a water borehole which will be developed within the proposed project site. The hydrological survey for the borehole has been undertaken and water extraction point and borehole location determined within the project site. Therefore, to ensure constant and reliable water supply, more bore holes will be drilled. In general, the design of the project will tend to essentially optimize the use of best available technology to prevent or minimize potentially significant environmental impacts caused by water shortage.

3.9.8 Employment

Most of the employment in the area is sourced from tourism, fishing, businesses, entertainment and service provision- Earnings are generally low and affect the inhabitants' economic status.

Such a project will provide opportunities to a range of skilled and unskilled workers including Architectures, Engineers, Electricians, Plumbers, Carpenters, Masons etc.

CHAPTER FOUR: POLICY, LEGAL ADMINISTRATIVE FRAMEWORK

4.1 Introduction

This chapter outlines the policy, legal, regulatory and institutional framework in Kenya, particularly for protection and assessment applicable to the proposed project. The project will be subject to laws, regulations, guidelines and standards of the Government of Kenya, and the African Development Bank.

While incorporating the Integrated Safeguard Systems (ISS) of the AfDB, the project will among others:

i. Commit to have no adverse impact on the environment and the people around the project site,
ii. Inform the public that AfDB is funding the project and that an Independent Recourse Mechanism (IRM) will be available to hear complaints related to the project,
iii. The project budget will include funds to mitigate and compensate for any potential harm as a result of the project.

It is a legal obligation within the Laws of Kenya that a development of such magnitude adheres to certain legal parameters. This section therefore describes the Policy, Legal, and Institutional framework pertaining to the proposed commercial Centre. The policy, legal and institutional frameworks have been put in place to ensure that development projects adhere to environmental conservation at all times. As development activities have the potential to damage the environment, it is a challenge today to ensure that development efforts are sustainable. The National Environmental Management Authority (NEMA) is the national body charged with coordinating matters and implementing policies relating to the environment. This body was established under the Environment Management and Coordination Act (EMCA) in 1999.

The proposed development will change the landscape and among the environmental changes to be observed include exposure and compaction of the soils, loss of vegetation, waste generation etc. It is these issues amongst others that legislation sets to address. Through recognizing the importance of environmental conservation in all development endeavors, the Kenyan government put in place a wide range of policy, institutional and legislative frameworks to guide developments in Kenya in the process of minimizing environmental degradation

4.2 Legislative framework in Kenya related to this project.

4.2.1 Environmental Management and Co-ordination Act No. 8 of 1999

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

Section 58 of EMCA No.8 of 1999 states that every development shall undergo an Environmental Impact Assessment.

Compliance

- It is this law in consideration of this that the proponent has decided to undertake an EIA for his project in order to ensure sustainable development.

4.2.2 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. Under Chapter IV, article 42 provides for the right to a clean and healthy environment for all. Further, Chapter V of the Constitution deals with Land and Environment. Specifically, Part 2 elaborates on the following components regarding the protection of the environment.

- *Obligations in respect of the environment*
- *Enforcement of environmental rights*
- Agreements relating to natural resources

4.2.3. The Water Act, 2002

The Act makes it an offense to throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resource in such a manner as to cause, or be likely to cause, pollution of the water resource.

Compliance

- *Construction of a well-designed septic tank and contracting a registered solid waste collection firm to dispose of the garbage from the housing units shall be put in place.*

4.2.4. Public Health Act

This is the Act of Parliament that makes provisions for securing and maintaining health. Section 115 provides that no person shall cause a nuisance or shall suffer to exist on any land or premises

occupied by him or of which he is in charge of any nuisance or condition liable to be injurious or dangerous to health.

Compliance

- *All wastes (solid waste from building operations and sewage waste) shall be put in solid waste bins and sewage systems respectively for collection and disposal away from the building to ensure good sanitation.*

4.2.5 The Land Planning Act, CAP 303,

Subsidiary Legislation (The Development and Use of Land\Planning Regulations)

Part IV – Control of Development

(2) Any person who carries out development without consent shall be guilty of an offense and shall be liable to prosecution.

11. (1) every person requiring consent for development shall make application to the interim Planning authority for the area in which the land concerned is situated.

Compliance

- *The proponent should obtain all approvals of the project development and licenses from the relevant Local Authority Offices*.

4.2.6. The Occupational Safety and Health Act, 2007 CAP514

This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to:

- Secure the safety, health and welfare of persons at work; and
- Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions, factories and plantations. It establishes codes of practices to be approved and issued by the DOSHS for practical guidance of the various provisions of the Act:

Compliance

- *The proponent and contractor undertake to prevent pollution, minimize the emission of dust and production of noise during the process of site preparation and development.*

- *The proponent undertakes to provide all workers with Personal Protective Equipment for all works associated with this project as applicable so as to ensure health, safety and welfare for the workers that will be employed onsite.*

4.2.7 The Physical Planning Act, CAP 286

The Local Authorities are empowered under Section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same Section, therefore, allows for prohibition or controls the use and development of land and Buildings in the interest of proper and orderly development of an area.

Compliance

- *The project has been designed according to the prescribed land zoning requirements;*
- *The proponent should acquire the necessary permits from the council*

4.2.8 The Local Government Act, CAP 265

Compliance

- *The proponent has designated the proposed development in consideration of area zoning and the socio-economic trends of the area.*
- *The proponent has initiated an Environmental Impact Assessment for submission to NEMA for approval.*

4.2.9 Building code 2000 The Local Government (Adoptive By-law) (Building) Order 1968

Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and 311 the water must be discharged into sewers. The code also prohibits construction of structures of buildings on sewer lines.

4.3 The Penal Code Act, Cap.63

The Chapter on Nuisances and Offences against Health and Convenience contains sections related to the environment. Section 175 states that any person who does an act not authorized by law or omits to discharge a legal duty and thereby causes any common injury, or danger or annoyance, or obstructs or causes inconvenience to the public in the exercise of common rights, commits the misdemeanor termed a common nuisance and is liable to imprisonment for one year.

The Contractor and proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the Project cycle in order to mitigate any possible negative impact associated with dust, noise, and effluent discharge.

4.4 Environmental Regulations

4.4.1 Environmental Management and Coordination (Waste Management) Regulation of 2006

As per this project, the proponent should minimize the wastes he generates by adopting the following methods: conserving raw materials and energy, enabling the recovery and re-use of the products where possible, reclamation and recycling, and incorporating environmental concerns in the design and disposal of a product. The unusable waste will be disposed as appropriate at the municipal disposal site after proper segregation.

4.4.2 Environmental Management and Coordination Act (Environmental Impact Assessment and Environmental Audit) Regulation of 2003

- *The proponent has undertaken this EIA in compliance with this requirement.*

4.4.3 Environmental Management and Coordination (Water Quality) Regulation of 2006

It states "Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource is polluted before the enactment of the Act".

- *The proponent shall put in place solid and liquid waste management mechanisms to ensure they do not impact surface and groundwater.*

4.4.4 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009

These regulations prohibit emission of excessive noise and vibration. It states that "Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment".

The proponent shall ensure that all construction activities take place within the permitted periods.

4.5 Employment Act, 2007

This is an Act of parliament that applies to all employees employed by any employer under a contract of service. This Act repeals the Employment Act (Cap 226).

The Act highlights on the following:

- Employment relationship;
- Protection of wages;
- Rights and duties in employment such as:
    - Basic minimum conditions of employment in terms of contracts and agreements;
    - Hours of work
    - Entitlement to leave including sick leave
    - Provision of medical attention
    - Provision of clean drinking water

Employment of children in the following forms is prohibited in the following sections of the Act:

53. (1) notwithstanding any provision of any written law, no person shall employ a child in any activity which constitutes the worst form of child labor.

56. (1) No person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking. (2) A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is:

(a) Not likely to be harmful to the child's health or development; and

(b) Not such as to prejudice the child's attendance at school, his participation in vocational orientation or training programmes approved by Minister for labor or his capacity to benefit from the instructions received

The proponent and the contractor will need to adhere to all the requirements of this Act during the construction phase of the project.

4.5.1 Work Injury Benefits Act (WIBA)

It is an Act of Parliament to provide for compensation to workmen for injuries suffered in the course of their employment. It outlines the following:

- Employer's liability for compensation for death or incapacity resulting from accident;
- Compensation in fatal cases;

- Compensation in case of permanent partial incapacity;
- Compensation in case of temporary incapacity;
- Persons entitled to compensation and methods of calculating the earnings;
- No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury; and
- Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.

The contractor will need to abide by all the provisions of WIBA in managing hazardous environments and according to injured persons their dues in terms of shouldering the medical expenses or compensation of the families should there be loss of life.

4.5.2 HIV/AIDS Prevention and Control Act, 2006

This law requires HIVAIDs education in the workplace. Road construction works by their nature increase risks of HIV/AIDS spread between workers, especially those in camps, and host communities.

The proponent is expected to explicitly incorporate as part of Contractor's requirements, provision of HIV/AIDs education and awareness during the construction phase of this Project

4.5.3 Energy Act, 2006

Energy Act makes provisions that shall apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying, using electrical energy, importing, exporting, transporting refining, storing and selling petroleum or petroleum products, producing, transporting, distributing and supplying of other forms of energy, and to all works or apparatus for any or all of these purposes".

This Act also creates the Energy Regulatory Commission whose functions and powers include issuance of licenses, permits and exemptions for electric power and petroleum undertakings, review and approval of the electric power tariffs, imposition and collection of penalties and fines for non-compliance in the energy sector, investigation and resolution of conflicts, formulation of regulations and enforcement of standards in the Energy Sector, formulation and co- ordination of a disaster preparedness plan for the energy sector, ensuring fair play and competition within the Energy sector

4.6 Institutional Framework

4.6.1 National Environment Management Authority (NEMA)

NEMA is a semi-autonomous agency under the Ministry of Environment, established to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. The Director General appointed by the president heads NEMA. The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment.

The Authority shall:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programs and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.
- Take stock of the natural resources in Kenya and their utilization and conservation, with the relevant lead agencies.
- Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
- Carry out surveys, which will assist in the proper management and conservation of the environment.
- Advise the government on legislative and other measures for the management of the environment or the implementation of relevant international conservation treaties and agreements in the field of environment as the case may be.
- Advise the government on regional and international environmental convention treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements where Kenya is a party.
- Undertake and co-ordinate research, investigation and surveys in the field of environment and collect and disseminate information about the findings of such research, investigation or survey.

- Mobilize and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur.
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impeding environmental emergencies is give
- Undertake, in cooperation with relevant lead agencies programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard.
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.
- Render advice and technical support, where possible to entities engaged in natural resources management and environmental protection to enable them to carry out their responsibilities satisfactorily.
- Prepare and issue an annual report on the state of the environment in Kenya and in this regard may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency and,
- Perform such other functions as government may assign to the Authority or as are incidental or conducive to the exercise by the authority of any or all of the functions provided under EMCACAP 387.

4.7 EMCA, Cap 387 Administrative Framework

4.7.1 National Environmental Tribunal

The National Environment Tribunal (NET) created under Section 125 of EMCA Cap 387 has the following functions:

- To hear and determine appeals from NEMA's decisions and other actions relating to issuance, revocation or denial of (EIA) licenses or amount of money to be paid under the Act and imposition of restoration orders;
- To give direction to NEMA on any matter of complex nature referred to it by the Director and
  General; and

If the proponent disagrees with NEMA decisions in exercising the above-mentioned functions, then they may lodge a case at the NET to seek to overturn the decision. Should this avenue not lead to a favorable ruling from the NET, an appeal may be lodged in the Environment and Land Court.

4.7.2 National Environmental Complaints Committee

The National Environmental Complaints Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Cabinet Secretary.
- Prepare and submit to the Cabinet Secretary periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and
- To undertake public interest litigation on behalf of the citizens in environmental matters

This committee will act as a safeguard for members of the public who feel aggrieved by actions taken under the proposed project, and can exercise their constitutional rights to launch a complaint should they have exhausted all other grievance redress mechanisms available to them.

4.7.3 National Environment Action Plan Committee

The Authority is responsible for the development of a 6-year National Environment Action plan and shall ensure that it has undertaken public participation before the adoption of the plan. The National Environment Action Plan shall:

- Contain analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.

- Contain analytical profile of the various uses and value of the natural resources incorporating
- Considerations of intergenerational and intragenerational equity.

4.7.4 County Environment Committees

Governors shall by notice in the gazette constitute a County Environment Committee that shall be responsible for the proper management of the environment within the County for which it is appointed. They should also perform such additional functions as prescribed by the Act or as may, from time to time be assigned by the Governor by notice in the gazette. The decisions of these committees are legal and it is an offense not to implement them.

4.7.5 National Environment Restoration Fund

The objective of the Restoration Fund shall be to serve as supplementary insurance for the mitigation of environmental degradation where the perpetrator is not identifiable or where exceptional circumstances require the Authority to intervene towards the control or mitigation of environmental degradation.

4.7.6 National Environment Trust Fund

The trust fund is vested in NEMA and subject to EMCA Cap 387. A board of five trustees appointed by the Cabinet Secretary administers it. These funds may be received from donations, endowments, grants and gifts from whatever source or sums of money or from monies designated by NEMA for this fund.

ADMINISTRATIVE AND INSTITUTIONAL FRAMEWORK

There are several institutional arrangements responsible for development control in different sectors. In this project, some of the institutions whose mandates fall within the assignment include:

I. National Environmental Management Authority (NEMA)

Established under EMCA, 1999, NEMA acts as the lead agency in regulating development in relation to conservation, utilization, and management of environmental resources in the country. The objectives and purpose of the NEMA are stipulated in Section 9(1) of EMCA, 1999 that charges the Authority with the responsibility of general supervision and coordination of all matters relating to the

environment and representation of government in the implementation of all policies and regulations relating to the environment.

Relevance to the Project

NEMA is responsible for conditional issuance of Environmental Impact Assessment license. Besides, the authority has the responsibility to follow up on project development to ensure compliance to conditions set out in the license, and it has the power to revoke EIA license upon conviction that project component violates the provisions of the license.

II. County Government Mombasa

Constituted under the First Schedule of the CoK, 2010, the County Government Mombasa is responsible for initiating local and development projects within its jurisdiction. Some of the roles of the County government include the provision of county planning needs in the development arena; provision of health services; and provision of water and sanitation service. Similarly, Mombasa County government is responsible for development control in the local sub-counties, regulation of housing development through control and supervision measures; and maintenance of an inspectorate department for regulation and supervision of all development projects in the county.

Relevance to the Project

Local Governance: As the local government authority in the area, the County Government plays a role in regulatory oversight, land use planning, and environmental management within Konza Technopolis, which may indirectly impact C-BECE activities.

Community Engagement: The County Government facilitates engagement with local communities to ensure their participation in and benefit from C-BECE initiatives. It may also address any social or environmental concerns raised by community members.

Promotion of Innovation and Development: The County Government may support initiatives aimed at promoting innovation, entrepreneurship, and economic development within the Technical University of Mombasa, including those associated with C-BECE research and innovation activities.

III. Ministry of Health

This is the agency charged with the responsibility of ensuring adequate health and sanitation programs in the country on behalf of the national government. In the water and sanitation services, the ministry is responsible for supervising the development of health and sanitation policies for effective management of wastes. The ministry is also responsible for provision of community health service, promotion of healthy behaviors, reproductive health campaigns, and ensuring food hygiene among other functions.

Relevance to the Project

The county government institutions in collaboration with the ministry provide relevant advice on the location of water and sewerage treatment systems in the county. Consulting the national government before implementation of the project gives the project proponent a preamble of the expected systems of water and sewerage services provision in the county.

IV. Ministry of Labor and Social Security Services

As a government agency, this ministry seeks to enforce labor laws, maintain industrial peace, industrial training and promote safety and health of employees. The Ministry also has a responsibility to develop and coordinate implementation of policies and strategies for human resource development, micro, and small enterprise sector and productivity improvement.

Relevance to the Project

The ministry is responsible for implementation and enforcement of occupational, health, labor, and social service policies in the country.

Proponent's compliances to the safety, social security, and welfare of the persons employed in the project implementation will be supervised by the ministry of labor and social security services.

The department of occupational health and safety, the ministry will supervise the occupational health and safety policies set out by contractors to ensure conformity with the country's demands and expectations.

V. Water Resource Authority

This is an institution established under the Water Act 2002 as the principal authority of the government on all matters related to water utilization, resources, management and distribution. Part II, section 18, of the Water Act 2002 provides for national monitoring and information systems on water resources. Additionally, sub-section 3 allows the Water Resources Authority (WRA) to demand from any person or institution, specified information, documents, samples or materials on water resources.

Relevance to the project

The proponent and all the allied stakeholders to the project shall ensure proper water use, management and conservation. In the event of borehole drilling WRA shall be consulted by the project hydro geologists for the purpose of obtaining permits for borehole sinking. Besides, specific records may require to be kept by a facility operator and the information thereof furnished to the Authority

4.8 Policy framework

Kenya Vision 2030

The Kenya Vision 2030 is the new country's development blueprint covering the period 2008 to 2030. It aims at making Kenya a newly leading industrializing "middle income country providing high quality life for all its citizens by the year 2030" The vision has been developed through an all-inclusive stakeholder consultative process, involving Kenyans from all parts of the country. The vision is based on three "pillars" – economic, social and political.

The construction of the proposed Proposed Center of Excellence for Research & Training in Blue Economy & Civil Engineering enhances the objectives of the policy paper of reforming the blue economy and Civil Engineering sectors to play a key role in the country's socio-economic development. The sub-project shall offer the people a chance to access service delivery by ensuring efficiency, quality, speed, convenience, and dignity in service delivery with a global competitiveness.

4.8 African Development Bank Operation Safeguards

4.9.1 African Development Bank Polices on Environment and Social OperationalSafeguards

The African Development Bank's environmental policy framework is strongly anchoredin the concept of sustainable development. This concept defines sustainability as "development that meets the needs of the present without compromising the needs of the future".

The AfDB Operational Safeguards (OS) include:

4.9.1.1 OS 1: Environmental and Social Assessment.

This OS governs the process of determining a project 's environmental and social category and the resulting Environmental and Social Assessment requirements. The requirements cover the scope of application, categorization, use of Strategic Environmental and Social Assessment (SESA) and Environmental and Social Impact Assessment (ESIA) where appropriate, Environmental and Social Management Plans, climate- change vulnerability, public consultation, community impacts, treatment of vulnerable groups, including indigenous peoples, and grievance procedures.

The OS requires:

- Screening of the project for environmental and social impacts including climate change impacts, potential adaptation and mitigation measures, and the vulnerability of populations and their livelihoods—to determine the specific type and level of environmental and social assessment;
- Scoping of the project's components, including delineating the project's geographic and temporal area of influence, consideration of alternatives, and assessment of cumulative impacts, where relevant. Scoping activities also determine the range of likely potential risks and impacts and also determineswhether specific requirements of the Bank's OSs apply. All relevant directand indirect environmental and social risks and impacts, including those specifically covered the other Operational Safeguards would be addressed inan integrated manner;
- Consideration of real alternatives to the project's location and/or design to avoid

adverse impacts. The mitigation hierarchy to be applied includes: if avoidance is not possible, reduce and minimize potential adverse impacts; if reduction or minimization is not sufficient, mitigate and/or restore; and as a last resort compensate for and offset;

- Assessment to comply with the relevant legislation and standards applicable in the local jurisdiction, bearing in mind the equivalence of standards with those of the Bank. Assessment to also take into consideration national or regional- level programming documents that are under implementation or in preparation;
- Assessment process to support and strengthen existing country systems for environmental, climate, and social risk management, including those specifically related to OSs 2-5, such as systems and institutions covering resettlement, biodiversity protection, pollution control, and labor standards;
- The assessment to be conducted according to the principles of proportionality and adaptive management. The level of assessment and management required should be proportionate to the level of risk that the project poses as identified during categorization and scoping—and the management measures adopted should be capable of being adapted tochanging circumstances during the full project cycle;
- Assessment to include the development of a comprehensive and implementable ESMP with a realistic timeframe, incorporating the necessary organizational capacity (including further training requirements) and financial resources to address and manage the environmental and social risks that may occur during the full project cycle;
- Categorization of projects following the principle of using the appropriate type and level of environmental and social assessment for the type of operation. The categories include:
    - **Category 1-** projects likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect

      environmental or social components that the Bank or the borrowing country considers sensitive
    - **Category 2:** Projects likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects. Likely impacts are few, site-specific, largely reversible, and readily minimized

by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards

- **Category 3:** Projects that do not directly or indirectly affect theenvironment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment. Beyond categorization, no action is required.
- **Category 4:** Projects that involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts.

- The Proposed Project component will trigger this safeguard. The Project isCategory 2 since its site-specific with moderate interaction with the physical, biological, and social setting within the immediate surroundings

4.9.1.2 OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.

This safeguard consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement and incorporates several refinements designed to improve the operational effectiveness of those requirements. In particular, the OS embraces comprehensive and forward-looking notions of livelihood and assets, to account for their social and cultural dimensions, as well as their economic ones. Italso adopts a progressive understanding of community and common property thatemphasizes the crucial need to maintain social cohesion, community structures and the social inter- linkages that common property provides.

- The Proposed Project will not trigger this safeguard since there will be no resettlement of population since the consent to use the land for theproposed project is already issued.

4.9.1.3 Biodiversity and Ecosystem Services

This safeguard aims to conserve biological diversity and promote the sustainable use of natural resources. It also translates the commitments in the Bank's policy on integrated water resources management into operational requirements. It reflects the importanceof biodiversity in the

African continent and the value to the population of key ecosystems. Its content has benefited from recent joint work among the MDBs toimprove their approach to assessing how the potential impacts of projects on different types of habitats can be avoided, minimized or offset.

- Project activities have no direct linkage to biological diversity and ecosystem services. OS 3 shall be applied in isolated minor cases of biodiversity and ecosystem services.

4.9.1.4 OS 4: Pollution prevention and control, hazardous materials and resource efficiency.

This safeguard covers the range of key impacts of pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry-specific and regional standards, including greenhouse gas accounting, that other multilateral development banks follow. It also introduces a GHG emission threshold for projects to trigger a detailed analysis of feasible reduction or offset measures and reporting on emission levels. Borrowers or clients are required to consider measures to improve resource efficiency.

- The project shall utilize raw materials both during construction and operation phase that could result to pollution of biophysical environment if not handled appropriately. Project activities shall not result to significant amount of greenhouse gases. The EMSP has proposed measures of ensuring that any greenhouse gas generated shall be collected and flaredappropriately. The project triggers OS 4.

4.9.1.5 OS 5: Labour conditions, health and safety

This safeguard establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It also ensures greater harmonization with most other multilateral development. It also covers workers' organizations, and avoidance of child or forced labour and occupational health and safety.

- The Project shall involve workers both during construction and operation phases of the project. This policy reads together with OSHA 2007 and IFC Performance Standards. Labour and Working Conditions shall form integral instruments to be

used in ensuring that health, safety and working conditions of both workers and community is maintained. The project triggers OS 5.

The following table summarizes the project activities checked against the operational safeguards, and how the project activities are likely to trigger each of the operational safeguards.

Table 4.1: Summary of operational safeguards and whether it's being triggered

Policy	Triggered bythe project	Discussions
OS 1: Environmental and Social Assessment.	Yes	The project components will trigger EA safeguards and is Category 2 since its site specific with moderate interaction with the physical, biological and social setting withinthe immediate surroundings.
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.	NO	The C-BECE block will be constructed within the premises of Technical University of Mombasa where consent has already been issued.
OS 3: Biodiversity andEcosystem Services.	No	Project activities have no direct linkage to biological diversity and ecosystem servicesOS 1 shall be applied in isolated minor cases of biodiversity and ecosystem services.
OS 4: Pollution Preventionand Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency.	Yes	The project shall utilize raw materials both during construction and operation phase that could result to pollution of biophysical environment if not handled appropriately. Project activities shall not result to significant amount of greenhouse gases, EMSP has proposed measures of ensuringthat any greenhouse gas produced is collected and flared appropriately. The project design has ensured that both clean water and sewer flows through the distribution

		lines by gravity hence reducing the need for pumping.
OS 5: Labour Conditions,Health and Safety.	yes	The Project shall involve workers both during construction and operation phases ofthe project. This policy read together with OSHA 2007 and IFC Performance Standards 2 on Labour and Working Conditions shall form integral instruments tobe used in ensuring that health, safety and working conditions of both workers and community is maintained.

4.9.1.6 Project Implementation Institutional Structure

The Technical University of Mombasa has established implementation units for the project with project engineers in charge for various county projects, the Agency hires on case-by-case basis the services of environment specialist to oversee implementation of the EMSP developed for projects.

i. The Contractor

The contractor will be required to establish an environmental office to continuously advise on environmental components of the project implementation. Elements in the environmental and social management plan are expected to be integrated in the project with appropriate consultations with Technical University of Mombasa through the supervising environmental expert. The environmental officer of the contractor is also expected to fully understand the engineering and management aspects of the project for effective coordination of relevant issues.

ii. The Supervisor

The supervisor will be engaged by the Technical University of Mombasa (as the project proponent) to ensure effective implementation of the environmental management plan. It is expected that supervisor engages the services of an environmental expert who should in return understand the details of the recommendations on environment management and especially the proposed action plans, timeframes and expected targets of the management plan. The environmental supervisor expert should also be the liaisonperson between the contractor and the Technical University of Mombasa on the implementation of environmental concerns as well as issues of social nature associated with the Project.

CHAPTER FIVE: ANALYSIS OF ALTERNATIVES

This section examines alternatives to construction of these residential developments in terms of the site, products, materials, technology and waste management. Also, impacts of each alternative are identified, discussed and compared with those of this development proposal. With such information, reviewers have a basis for decision making.

5.1 Sub-Project Activities during Operation

5.1.1 Nil Project Alternative

The "No-action project" alternative represents the potential scenario if the construction of the proposed sub-project works is not implemented in the project area. Under this alternative, no construction activities of the proposed Center of Blue Economy and Civil Engineering at the Technical University of Mombasa will be done in order to influence the local physical environment, biological, socio-economic, land use patterns and no investment in enhancing fisheries management in the County shall be done. This option is suitable from an environmental and social management perspective with no negative impacts or changes to the status quo but not good for social-economic purposes within the project area. The opportunity cost incurred will imply that the challenges affecting training of fisheries and civil engineering related courses and delivery in the Coastal region shall continue. The proposed project is therefore anticipated to address these challenges by improving the existing situation by centralizing the Center of Blue Economy and Civil Engineering. From a socio-economic perspective the "no action" alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realized and the resources in the area would continue to be underutilized since the land lies idle.

The 'Nil Project Option' is the least preferred from the socio-economic and partly environmental perspective since if the project is not done:

- The economic benefits especially during constriction i.e. provision of jobs for skilled and non
  skilled workers will not be realized
- There will be no generation of income by the developer and the Government. The social-economic status of Kenyans and local people would remain unchanged.
- The local skills would remain underutilized

- No employment opportunities will be created for Kenyans who will work in the project area.

5.1.2 Proposed Project alternative

The development area for the proposed Center of Excellence for Blue Economy and Civil Engineering will see some changes to its environmental attributes (physical and biological). Ecologically there will be loss of habitat and species diversity in the area. While not discounting the value of the ecology that persists in the area, the loss to be incurred will be significant but not major as the species diversity in the area is not very high. Moreover, the proponent plans to retain most of the ecological sensitive areas. Drainage patterns, groundwater, surface water and soil quality may also be affected. From a Socio-Economic perspective the proposed development would contribute significantly to a partial national, regional and institution income generation. In addition, numerous jobs would be created by the development either directly or indirectly as well as community growth and development for the surrounding communities.

5.1.3 Alternative Site Selection Option

Relocation to a different site is another option available for consideration, but currently, the proponent does not have an alternative site since the proposed point is on land earmarked for construction of TUMs Center of Excellence and Civil Engineering. The physical plan for Technical University of Mombasa showed that zoning of the land has been done and the site is allotted for government offices. Considering the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. Besides, it is not easy to find a similar suitable site to accommodate the proposed development. This is because the site is already developed and has connection to most social amenities, which could not be a guarantee if an alternative plot is sought.

5.1.4 Alternative Technologies

The application of the best technology is important in reducing the impacts of the project to the environment. Therefore, the project design team took cognizance of appropriate technology existing on the market in the proposed project facilities and activities. Sun shading around the windows to reduce heating as well as use of large sizes window, energy saving appliances, use

of renewable energy, use of recyclable construction material for instance metallic doors instead of wood, use of water saving appliances and cleaning of gray water through a bio-digester are some of the technologies that have been incorporated in the design of the project to improve green building concepts and climate change adaptations.

5.1.4.1 Waste Water/Sewage Management Alternatives

The following available technologies can be alternatives to be considered for project:

1. **Septic Tank and/or Bio-digesters**: Septic tanks are underground chambers that separate solids and liquids in wastewater, allowing anaerobic bacteria to break down organic matter. Bio-digesters, on the other hand, utilize aerobic bacteria to decompose organic waste. Both options offer decentralized treatment solutions suitable for the C-BECE project, particularly in areas where centralized wastewater treatment infrastructure may be impractical or costly. Implementing septic tanks and bio-digesters can help manage wastewater onsite, minimizing the need for extensive piping and reducing the environmental footprint of the facility.
2. **Stabilization Ponds/Lagoons**: Stabilization ponds, also known as lagoons, are shallow ponds designed to treat wastewater through natural processes such as sedimentation, biological degradation, and solar disinfection. In the context of the C-BECE project, stabilization ponds could serve as a relatively simple and low-cost treatment option, especially in regions with favorable climate conditions. These ponds can effectively reduce organic pollutants and pathogens in the effluent, providing a reliable treatment solution with minimal energy requirements.
3. **Constructed/Artificial Wetland**: Constructed wetlands mimic the natural processes of filtration and purification that occur in natural wetlands. In the context of the C-BECE project, a constructed wetland could serve as an eco-friendly and cost-effective method for treating effluent. By using plants and microorganisms, the wetland can remove contaminants from the wastewater through biological and physical processes. This option aligns with the project's emphasis on sustainable practices and could potentially provide additional ecological benefits such as habitat creation and biodiversity enhancement.

4. **Waste Treatment Plants such as Bio-box or the Vex-P System**: Advanced waste treatment plants like Bio-box or the Vex-P system utilize innovative technologies to treat wastewater efficiently and meet stringent discharge standards. These systems typically incorporate processes such as filtration, biological oxidation, and disinfection to remove contaminants from the effluent. While more complex and expensive compared to some other alternatives, waste treatment plants offer high treatment efficiency and are suitable for projects like the C-BECE where strict environmental regulations or water quality standards must be met. These systems can ensure that the treated effluent meets the required quality standards before discharge or reuse.

Note: The C-BECE shall connect to the Mombasa County wastewater treatment Plant within Kipevu in Mombasa.

5.2 Design and Technology Alternative

5.2.1 Alternatives to Achieving Green Building

The areas of concern have been categorized as shown below:

- Proper and efficient use of resources. These include power, water and other sources of energy
- Reducing waste and pollution
- Improving occupant health

Green buildings can take on various forms. From the basic housing level to the national level, efforts are being put to reduce reliance on the costly fossil fuels. Some of the methods that can be adopted in this include:

i. **Adoption of Water Harvesting, Treatment and Reuse**

Large development projects should adopt water treatment and re-use to cut on costs. With demanding clientele who want green compounds all year round, this technology is quite handy. The used water is collected and treated in collection tanks placed within the project areas. This water is then re-used for irrigation of lawns and also in flushing toilets. Hence this calls for the adoption of sewage treatment systems. In addition, water harvesting should also be taken more seriously. Methods include tanks and also water pans in areas having

space. Trenches in gardens are also dug up with the sole intention of trapping run-off water. Hence, the proposed project should entail rainwater harvesting without failure.

ii. Adoption of Natural Lighting and Ventilation

Strategic building of windows and porches goes a long way in enhancing natural lighting. Sun roofs are also becoming a common feature in many modern buildings, allowing much sunlight into the rooms. These are just some of the few methods that could be adopted in going green in building the proposed project

iii. The Use of Renewable Energy

Many buildings are powered up using solar panels. The availability of the technology and ease of setting up the panels have gone a long way in encouraging its adoption. Generation and use of wind power is also a viable source of energy. Waste (such as papers, plastics, and so forth) is also being used in an ingenious pilot project in areas to produce heat energy.

CHAPTER SIX: PUBLIC CONSULTATION AND PARTICIPATION (STAKEHOLDER ENGAGEMENT)

6.1 Introduction

The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on EIA for the purpose of achieving the fundamental principles of sustainable development. This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed project.

Public consultation was carried out in this Project with the objectives of minimizing probable adverse impacts of the project through alternate working hours and to achieve speedy implementation of the project by creating awareness amongst the community on the benefits of the project. The purpose of the public consultation includes the following:

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

6.2 Stakeholder Engagement Plan

The overall purpose of this Stakeholders Engagement Plan is to ensure that a consistent, comprehensive and coordinated approach is taken in stakeholder engagement and Project disclosure throughout the project implementation phase. It is further intended to demonstrate the commitment to engage each stakeholder during the implementation phase of the Project. This is in line with the financier African Development Bank (AFDB) Principles on Stakeholder Engagement (2015).

In line with Stakeholders Engagement Plan best practice, stakeholder engagement is conducted based on timely, relevant, and accessible information. In this way, the Stakeholders Engagement Plan seeks to ensure that stakeholders are given sufficient opportunity to voice their opinions and concerns, and that these concerns influence project decisions. The Stakeholders Engagement Plan therefore:

- Provides the approach to stakeholder engagement, showing how this will be fulfilled throughout the project cycle;
- Identifies the main categories of stakeholders and how they will be included in the implementation of the Project; and
- Identifies the ways to document engagement undertaken with the stakeholders throughout the project.

6.2.1 Objectives of the Stakeholder Engagement Plan (SEP)

The SEP seeks to define an environmentally, technically and culturally appropriate approach to stakeholder consultation and public participation process. The goal of this SEP is to improve and facilitate decision-making and create a platform for communication that actively involves, and fosters promptly, a common understanding between all project stakeholders and project-affected persons/neighbors. The SEP ensures that all groups of affected persons are provided sufficient opportunities to voice their opinions and concerns regarding the proposed project, which will importantly help the Authority with decision-making on the sound development of the proposed project. The key objectives of the SEP in ESIA are to:

- Understand the stakeholder engagement requirements
- Identify key stakeholders that are affected by the development project
- Identify the most effective methods and structures through which to disseminate project information (potential environmental impacts and proposed mitigation measures) to ensure regular, accessible, transparent and appropriate consultations and public participation,
- Develop a stakeholders' engagement and public participation process that provides stakeholders with an opportunity to positively influence project planning and design
- Establish formal grievance/resolution mechanisms
- Define roles and responsibilities for the implementation of the SEP, and

- Define reporting and monitoring measures to ensure the effectiveness of the SEP and periodical reviews of the SEP based on ESIA study findings:

6.3 Methods of Stakeholder Engagement

The stakeholder engagement process for the C-BECE project involved the following key methods:

- Stakeholder Identification: Identification of relevant stakeholders, including local communities, government agencies, non-governmental organizations (NGOs), academic institutions, and industry stakeholders.
- Stakeholder Engagement: Engagement with stakeholders through various communication channels, including public meetings, focus group discussions, online platforms, and written submissions.
- Information Dissemination: Provision of project information, including project documents, reports, maps, and visual aids, to stakeholders through multiple channels, such reports and public notices.
- Consultation and Feedback: Facilitation of consultations and feedback mechanisms to gather stakeholder input, concerns, and suggestions on the project's environmental and social aspects.
- Collaboration and Partnerships: Collaboration with local authorities, community leaders, civil society organizations, and other stakeholders to facilitate meaningful engagement and foster partnerships for sustainable development.

6.4 Stakeholder Analysis and Identification

Stakeholder analysis determines the likely relationship between stakeholders and the proposed project and helps to identify the appropriate consultation methods for each stakeholder group during the various project phases. To this purpose, a process for identifying the environmental and social risks and impact of the proposed project will be established, along with identification of affected persons and the proposed mitigation measures.

C-BECE stakeholders were identified and grouped as follows:

Group 1—High Impact and High Interest:

These pivotal stakeholders wield significant influence over the project's outcomes and are deeply invested in its progress. Close collaboration with them is imperative to mitigate potential risks and ensure project sustainability. They include:

- Proponent-The driving force behind the project, whose vision and resources are crucial for its success.
- Design Team- Responsible for translating conceptual ideas into actionable plans, ensuring alignment with project objectives.
- Investors- Financial backers whose support is fundamental for project execution and viability.
- Project Employees- Individuals directly involved in project implementation, whose expertise and dedication are vital for achieving milestones.

Group 2—Low Impact and High Interest:

While these stakeholders may not directly impact project outcomes, their engagement and satisfaction are important for maintaining positive relationships and managing reputational risks. They encompass:

- Community Groups/ Associations: Representatives of local communities whose support or opposition can influence public perception and project acceptance.
- Groups with Special Interests: Organizations or associations advocating for specific causes or interests relevant to the project's scope.
- Leaders: Figures of influence within communities whose endorsement or concerns can impact public sentiment and project acceptance.
- Politicians: Elected officials whose support or opposition can sway regulatory decisions and public opinion.

Group 3—Low Impact and Low Interest:

Although these stakeholders may have minimal influence and interest in the project, keeping them informed and monitoring their sentiments is essential to preempt any potential issues. This group comprises:

- The Local Community: Residents within the project vicinity whose daily lives may be indirectly impacted by project activities.

- Neighbors: Individuals residing near the project site, whose concerns may arise due to construction or operational activities.
- Landowners: Property owners whose assets may be affected by project development or infrastructure changes.
- Local Businesses: Commercial entities operating in the project area, whose operations may be tangentially impacted by project activities.

Group 4—High Impact and Low Interest:

Despite their significant influence on project outcomes, these stakeholders may not be actively engaged or interested in project developments. However, providing them with the necessary information is crucial to ensure compliance and regulatory adherence. This category includes:

- National Environment Management Authority: Regulatory body overseeing environmental compliance and permitting, whose approvals are essential for project progression.
- County Government Departments: Local governmental bodies responsible for regulatory oversight and permitting within the project's jurisdiction

Table 6.1: Stakeholder Analysis and Identification

Stakeholder	Area Of Influence	Area Of Influence	Stakeholder Manager	Engagement Approach	Engagement Tools	Frequency
National Environment Management Authority (NEMA)	Regulatory Compliance Environment Monitoring	All	Lead Expert	Consult and Report	Reports, Letters, Email	Questionnaires Interviews
Proponent and design team	Project design and implementation on	All	Lead Expert	Consult and inform	Meetings, Emails,	Questionnaires Interviews
Coast Development Authority (CDA)	Regulatory Compliance Approval of new developments	All	Lead Expert	Consult and inform	Meeting and Reports	Frequent
County Department of Planning	Regulatory Compliance Approval of new developments	Construction	Associate Expert	Consult	Information Boards/ Approval documents;	Occasional
Local Leaders/Chief	Local Impacts and opportunities	All	Lead & Associate experts	Consult	Meeting & Interviews	Periodic
Community/Residents Groups	Social and communal impacts	All	Sociologists Associate experts	Consult	Consultative Meetings	Periodic
Neighbors	Direct impacts of project Implementation	All	Sociologists ESIA experts	Consult and inform	Meetings and Questionnaire	Frequent
Businesses and Institution	Socio-economic Impacts	All	ESIA experts	Consult and inform	Questionnaire Interviews	Less frequent

6.5 The Consultative Process Adopted

The environmental survey team recognized the significance of the assignment findings to intended project users and in this regard, considered active involvement of all potential project stakeholders. To attain this objective, the consultant adopted a participatory approach in the identification of environmental and social impacts that are related to the project cycle. Several methods were used to engage stakeholders in the process of capturing their views, issues and concerns on the proposed project during data collection. The levels of project stakeholder engagement during data collection approaches and procedures were through:

6.5.1 Focused Group Discussions

Taking into account the geographical scope of the Technical University of Mombasa, we conducted a comprehensive focus group discussion. Additionally, representatives from diverse demographics such as men, women, youth, and people with disabilities from all these locations were actively engaged in the discussion.

Questionnaires Administration within Project Neighborhood

Questionnaires were uniformly distributed around the proposed project site. The local people and neighbors were informed of the proposed project and requested for their views concerning the project. The sample area covered up to a radius of about 2 kilometres within the project area. The questionnaires were used to capture views in terms of the positive and negative impacts that the locals anticipate from the project and the mitigation measures. They were also requested to provide information about the area, focusing on aspects such as sensitive ecosystems, provision of various infrastructure facilities and socioeconomic environmental impacts of the project in the area amongst other issues

6.6 Key Stakeholder Input

Positive:

1. Job Creation: Stakeholders highlight the potential for the Technical University of Mombasa to generate employment opportunities, thereby contributing to economic growth and reducing unemployment rates in the region.

2. Improved Livelihoods: They emphasized the positive impact of the project on enhancing the quality of life for residents by giving them employment, generating income for better education, healthcare, and other essential services.
3. Urbanization: Stakeholders recognize the project as a catalyst for urban development, promoting infrastructure growth, and attracting investments in the surrounding areas.
4. Borrowing of Technology: They acknowledge the opportunity for knowledge transfer and technological advancement through collaboration with global partners, fostering innovation and competitiveness.
5. Economic Development: Stakeholders express support for the expansion of Technical University of Mombasa (C-BECE), recognizing its potential to become a hub for research, development, and entrepreneurship, driving economic diversification and regional integration.

Negative:

1. Hazardous Waste Management: Stakeholders express apprehension regarding the effective management of hazardous waste generated by the project, highlighting potential environmental risks and health hazards if not properly addressed.
2. Population Influx: There are concerns about the rapid influx of people into the area attracted by job opportunities, which could strain existing resources and infrastructure, leading to issues such as insecurity and other social challenges.
3. Solid Waste Management: Concerns are raised about the adequacy of waste management systems to handle the increased volume of solid waste resulting from the project operations, emphasizing the importance of sustainable waste disposal methods.
4. Community Engagement throughout the Project: Concerns are voiced regarding the level of community involvement and consultation throughout the project lifecycle, emphasizing the need for transparent communication and meaningful engagement to address community needs and concerns effectively.
5. Wastewater Disposal: Stakeholders express worries about the potential pollution of water sources due to inadequate wastewater disposal systems, underscoring the need for robust measures to mitigate environmental contamination.

6. Structural Integrity of Construction: Stakeholders raise concerns about the quality and safety standards of construction within the area, emphasizing the importance of ensuring structural integrity to prevent potential accidents or infrastructure failures.

6.7 Outcomes of Stakeholder Engagement

The outcomes of the stakeholder engagement process for the C-BECE project are summarized as follows:

- Increased Awareness: Enhanced stakeholder awareness and understanding of the C-BECE project, its objectives, and potential environmental and social impacts.
- Stakeholder Engagement: Active participation and engagement of stakeholders in the ESIA process, including the provision of valuable feedback, concerns, and recommendations.
- Improved Project Design: Integration of stakeholder input and considerations into the project design, mitigation measures, and management plans to address identified concerns and optimize project outcomes.
- Enhanced Trust and Collaboration: Building of trust, credibility, and collaborative relationships between project proponents, stakeholders, and affected communities through transparent and inclusive engagement practices.
- Compliance and Accountability: Demonstration of commitment to regulatory compliance, corporate social responsibility, and sustainable development principles through transparent and accountable public participation processes.

6.7 Highlights of Stakeholder Consultations

Environmental Impact Assessment / Audit Regulations 2019 and AfDB OS 2013 require that in the process of conducting Scoping, Environmental Impact Assessment, the proponent shall in consultation with the Authority herein referred to as the National Environment Management Authority (NEMA); seek the views of persons who may be affected by the project.

Table 6.2: Public participation meeting schedule

No.	Date	Venue	Location	No. of Participants	
1.	13th May 2024	Technical University of Mombasa	Tudor	Male	13
				Female	7

6.8 Summary of Comments and Responses from the Public Sensitization Meetings and KII Meetings

Table below present comments/ concerns that were raised during the public meetings and the responses that were given.

Table 6.3: Comments/ concerns raised during public meetings and the responses given

Comments	Response
Residents expressed worry about potential traffic congestion during the construction phase and increased traffic once the C-BECE block is operational.	Consultants assured residents that a comprehensive traffic management plan would be implemented during construction to minimize congestion. They also committed to exploring alternativetransportation options for workers to reduce traffic.
Many residents raised concerns about noise and dust pollution generated by construction activities, affecting their quality of life.	Consultants acknowledged the concerns about noise and dust pollution and committed to implementing measures such as noise barriers, dust control, and scheduling noisy activities during off-peak hours to mitigate these impacts.
Residents voiced concerns about the environmental impact of the project, including destruction of vegetation.	Consultants assured residents that environmental impact assessments would be conducted, and measures would be taken to destruction of vegetation. They committed to implementing erosion control measures and preserving green spaces where

	possible.
Some residents were worried about disruption to their daily lives, includingincreased noise and disturbance from operational activities.	Consultants emphasized their commitmentto open communication and engagement with the community throughout the project. They assured residents that their concerns would be addressed promptly through barricading of the construction site to avoid disruption to their daily lives.

6.9 Conclusion

Stakeholder engagement is a vital aspect of the ESIA process for the C-BECE project, providing an opportunity for stakeholders to contribute to decision-making processes, voice their concerns, and shape the project's outcomes. By fostering open dialogue, collaboration, and transparency, the public participation process has strengthened stakeholder engagement, improved project understanding, and enhanced the overall sustainability and acceptability of the C-EBEC project. Ongoing engagement with stakeholders will remain essential throughout the project lifecycle to ensure continued alignment with stakeholder interests, regulatory requirements, and best practices in environmental and social management

CHAPTER SEVEN: PROJECTED IMPACTS AND MITIGATION MEASURES

7.1 Potential Environmental Impacts

This Section identifies both negative and positive impacts associated with the proposed buildings. These are identified according to the proposed project phases namely: Construction Phase, Operational Phase and the Decommissioning Phase.

7.1.1 Physical Environment (Biophysical Impacts)

a) Water quality aspects for both surface water sources like piped water, storm water, and other related aspects
b) Soil conditions, soil contamination and landscape alterations/degradation (based on aesthetic aspects) associated with the proposed project.
c) Drainage patterns especially about wastewater effluents
d) Air quality aspects especially atmospheric emissions and related discharges from machinery like diesel run equipment etc.
e) Noise and vibrations where applicable

7.1.2 Natural Environment

a) Flora and fauna from the adjacent ecosystem (i.e. effects to natural plants and animals where applicable).
b) Adjacent river pollution indicators, impacts on water flow patterns and quality aspects, user interference and contamination.
c) Topography: effects on soil and landscape.

7.1.3 Social Welfare, Economic and Cultural Environment

a) Determination of implications to the human society distribution, demographic details, settlement patterns, changes to the cultural lifestyle and indigenous knowledge of the local society/public where applicable.
b) Notable changes in land use systems and the general land utilization types where applicable.
c) Aesthetic, landscape alterations and changes to infrastructural facilities, among others.
d) Effects associated with the construction and operation activities and related handling and disposal of wastes generated during the operations
e) Effects associated with income generation opportunities created by the project due to the upcoming operations.

f) Implications on the employees, visitors and public health, safety and related hazards/risks such as HIV/AIDS, consumption of contaminated intravenous infusion products due to disease outbreaks, sanitary facilities, etc.

g) Introduction of nuisances, such as pests, invasive species and related multiplication breeding site

7.2 Positive Impacts of the Project

- Job Opportunities**:** Several workers including casual laborers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site for a period that the project will start to the end.
- Provision of Market for Supply of Building Material**:** The project will require supply of large quantities of building materials most of which will be sourced locally within Mombasa town and the surrounding areas.
- Livelihood improvement, the project can also be an income generating project as the management will charge for use in order to ensure sustainability of the project. The profits can then form a source of income.
- Provision of the much-needed scientific research facilities

7.3 Specific Negative Impacts During Construction and Operational Phases and Mitigation Measures

7.3.1 Construction Phase

7.3.2 Impact associated with continued sourcing of raw materials

i. Increased traffic due heavy tracks transporting the construction materials
ii. Soil disturbance due to loosening of soil due to the construction activities
iii. Impact on the air (air pollution), increased noise levels
iv. Damage to flora and fauna because of the activities of people walking around
v. Pollution by waste due to human activity of throwing around wastes
vi. Food wastes from the workers increasing pressure on the local collection
vii. STIs
viii. Health and safety and non-compliance to safety standards causing accidents of workers

ix. Impact of conflicts between workers and community over various issues

Potential mitigation measures

- The contractor will obtain raw materials for construction from sources that are compliant with NEMA Regulations.
- The contractor will procure quantities that are sufficient for the intended works only and recycle as far as practical to curtail wastage.
- The contractor will commit to extensive use of recycled raw materials as appropriate and in a manner that does not compromise the safety of the development.

7.3.3 Occupational health and safety of workers

The immediate neighbors and workforce involved would be more subjected to these environmental hazards such as falling debris or materials, dust, vehicle accidents, falling from high areas, open pits etc. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise the health of the workers especially if foodstuffs are prepared in unhygienic conditions. To ameliorate against the above, the proposed mitigation measures include:

Potential mitigation measures

- The contractor will provide workers with appropriate (PPE and ensure their use
- First aid facilities to be available on site
- Contractor to comply with the requirements of the Occupational Safety and Health Act (OSHA) by registering the site as a work place
- All visitors to the site to be provided with PPE
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol and diseases.
- The contractor should have workmen's compensation cover. It should comply with the workmen's compensation Act, as well as ordinances, Regulations and Union Agreements.
- Food handlers preparing food for the workers at the site should be controlled and monitored to ensure that food is hygienically prepared.
- Construction sites should be well scaffolded with netting to take care of falling materials
- Control the speed of vehicles in and around the project site

7.3.5 Solid waste at construction stage

Metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, plastic paper bags, broken glass, empty paint containers among others will be generated during the construction phase of the project. These materials can cause injuries or if disposed of poorly can form breeding ground for disease causing organisms.

Potential mitigation measures

- Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time
- Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
- Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
- Use of construction materials containing recycled content when possible and in accordance with accepted standards.

7.3.6 Increased demand for water

It is expected that the complete construction works and future activities will lead to an increase in the demand for water as Construction projects utilize significant quantities of water for mixing, casting and curing concrete. Water will also be required for drinking and sanitation by the workforce.

Potential mitigation measures

- Provision of notices and information signs within the project site to notify on means and needs to conserve water resources.
- Installation of water conserving taps will be done.
- Encourage water recycling during both construction and occupation phases of the project.
- During the operational phase, water abstraction will be according to the amount stated in the abstraction permit.
- Practice rain water harvesting to supplement the borehole water.

7.3.7 Increased traffic and potential safety concerns

This will occur as contractors‟ vehicles bring in deliveries at the site and as workers leave or come to the site.

Potential mitigation measures

- Contractor will erect appropriate signage to designate the use of the Road by heavy commercial vehicles delivering raw materials
- Delivery of raw materials to be undertaken off-peak

7.3.8. Potential Noise Pollution

Activities related to the project implementation can lead to noise, which is the unwanted/undesirable sound that can affect job performance, safety and health, especially those residing around the project site. This can lead to psychologically related effects of noise that include annoyance and disruption of concentration. Physical effects may include loss of hearing, pain, nausea and interference with communications if the exposure is severe. The proposed project is expected to generate noise during the construction period. Since the proposed site is located within an already developed area, there should be a clear guideline on the working hours whereby construction work should be carried out strictly during the day. Other proposed mitigation measures include:

- Construction works should be carried out only during the specified time of 0800-1700 hrs.
- Machineries should be maintained regularly to reduce noise resulting from friction.
- There should not be unnecessary horning of the involved machinery
- Provision of bill boards at the construction site notifying of the construction activity and timings
- Sensitize drivers of construction machinery on effects of noise.
- Billboards will be suitably erected on the start of the project to psychologically prepare the people in the vicinity.
- Workers in the vicinity of high-level noise wear safety and protective gear.
- Provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- The proponent should comply with The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

7.3.9 Potential Loss of Biodiversity

The proposed National Physical Science and Research Laboratories (NPSRL) project entails the clearance of vegetation, including savanna grass and thorny shrubs, to make way for construction activities. This vegetation serves as a habitat for various organisms, necessitating careful consideration to minimize adverse effects.

Potential mitigation Measures:

- Implementation of landscaped gardens to mitigate habitat loss.
- Creation of artificial soil hills for tree planting, blending the project seamlessly with the natural landscape.
- Establishment of extensive vegetation cover across open areas to compensate for cleared vegetation.
- During the decommissioning phase, rehabilitation efforts will be prioritized, including the removal of any debris or materials obstructing the restoration of natural biodiversity.
- Adherence to the Technical University of Mombasa Biodiversity Management Plan.

7.3.10 Potential Impacts of Climate Change

Climate change presents various potential impacts on the project, which could affect its operational efficiency, infrastructure, and surrounding environment. These impacts include but are not limited to:

- Increased Temperature Extremes: Rising temperatures may lead to heat stress in personnel and affect the performance of equipment and infrastructure.
- Changes in Precipitation Patterns: Alterations in precipitation patterns may result in changes in water availability, affecting water supply for the project's operations.
- Extreme Weather Events: Increased frequency and intensity of extreme weather events, such as storms and floods, pose risks to project infrastructure, safety, and operations.

Mitigation and Adaptation Measures

To enhance the project's resilience to climate change and minimize its potential adverse impacts, the following mitigation and adaptation measures are recommended:

i. **Infrastructure Design and Planning**
    - Climate-Resilient Design: Incorporate climate-resilient design principles into project infrastructure, such as buildings, roads, and drainage systems, to withstand temperature extremes, heavy rainfall, and flooding.

- Elevation and Flood Protection: Elevate critical infrastructure above projected flood levels and implement flood protection measures to reduce vulnerability to inundation.

ii. Water Management

- Water Conservation: Implement water conservation measures, such as rainwater harvesting and efficient irrigation systems, to mitigate the effects of changing precipitation patterns and ensure sustainable water use.
- Diversification of Water Sources: Explore alternative water sources, including groundwater and recycled water, to reduce reliance on surface water sources vulnerable to climate variability

iii. Energy Efficiency and Renewable Energy

- Energy Efficiency Measures: Improve energy efficiency in project operations and facilities to reduce greenhouse gas emissions and minimize the project's carbon footprint.
- Integration of Renewable Energy: Integrate renewable energy sources, such as solar and wind power, into the project's energy supply to reduce dependence on fossil fuels and enhance energy security.

iv. Monitoring and Adaptive Management

- Climate Monitoring: Establish a climate monitoring system to track key climate variables, such as temperature, rainfall, and sea level, and incorporate climate projections into project planning and decision-making processes.
- Adaptive Management: Adopt an adaptive management approach to continually assess and adjust project operations and strategies in response to changing climate conditions and emerging risks.

7.3.11 Potential Increased Runoff

Good drainage system is used to prevent land near human settlement from becoming saturated with water which collects or accumulates/floods after a downpour or from other sources. Poor drainage causes dampness to building structures as well as water stagnation. Dampness is influenced by poor drainage, in the presence of warmth and darkness, breeding grounds for malaria and other diseases can be directly traced to it. Hence, proper drainage of the general property/premise comes in handy to enhance effective flow of the much-anticipated surface

runoff emanating from the roof catchments and other newly paved areas within the site. To prevent bad effects of poor drainage, the following mitigation measures are proposed for this project:

- During construction, the design of the drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site.
- Drainage channels should be installed in all areas that generate or receive surface water such as driveways and along the building block-edges of the roofs.
- Channels should be covered by approved materials to prevent occurrence of accidents and entry of dirt that would compromise flow of run-off.
- Drainage channels should ensure safe disposal of run-off/surface water and should be self-cleaning.
- Paving of the side walkways, driveways and other open areas should be done using previous materials to encourage recharge and thus reducing water run-off volume.

7.4 Social Impact Assessment

Social Impact Assessment (SIA) for the Center of Excellence for Research & Training in Blue Economy & Civil Engineering project (C-BECE) in Technical University of Mombasa encompasses a comprehensive examination of the project's potential social implications. This assessment delves into the effects on communities, social structures, and cultural heritage. It aims to understand how the project may influence local livelihoods, socio-economic dynamics, and community well-being.

Key components of the SIA include:

- Community Engagement: Rigorous engagement with local communities to gather insights, concerns, and aspirations regarding the project. This ensures that community perspectives are integrated into decision-making processes
- Socio-Economic Analysis: Thorough analysis of the project's potential socio-economic impacts, including employment opportunities, income generation, and local business development. This analysis helps identify both positive and negative effects on livelihoods and economic activities.
- Cultural Heritage Preservation: Assessment of the project's impact on cultural heritage sites, traditions, and practices. Measures will be proposed to mitigate adverse effects and preserve cultural integrity.

- Social Inclusion and Equity: Examination of how the project may impact marginalized or vulnerable groups, ensuring that their needs and rights are addressed. Strategies for promoting social inclusion and equity will be incorporated into project planning and implementation.
- Community Resilience and Capacity Building: Evaluation of community resilience and capacity to adapt to changes induced by the project. Capacity-building initiatives will be developed to enhance local skills, knowledge, and resources for sustainable development.

Through comprehensive SIA, the C-BECE project aims to proactively identify and address social concerns, promote community participation, and foster positive socio-economic development in the project area.

7.4.1 Potential Increased Runoff

Construction works and paved roads could result in additional runoff through creation of impervious areas and compaction of soils. Impervious areas and compacted soils generally have higher runoff coefficients than natural areas and increased flood peaks are a common occurrence in developed areas. Increased runoff from paved grounds and expansive roofs causing extreme flooding and overflows of drainage system shall be mitigated via the following:

- Surface runoff and roof water shall be harvested and stored in an underground reservoir for reuse or shall be directly channeled to storm water drains.
- A storm water management plan that minimizes impervious area infiltration by use of recharge area and use of detention and /or retention with graduated outlet control structures will be designed

The following is a summary of construction phase potential negative impacts:

- Stress on infrastructure as a result of increased population/vehicle traffic,
- Possible soil erosion,
- Possible surface and ground water hydrology changes and water quality degradation,
- Solid waste generation,
- Noise pollution,
- Dust emissions,
- Generation of exhaust emissions,
- Increased water demand,

- Increased energy consumption,
- Increased use of building materials,
- Likely accidents and diseases.

To ameliorate against the potential negative effects, the following is a summary of proposed mitigation measures:

- Use scaffold netting during the construction phase to reduce the spread of dust, debris and other particles to neighboring areas.
- Awareness creation and education of the project communities regarding HIV/AIDS and other diseases.
- The contractor to ensure that all machines are well tuned and maintained to reduce amount of exhaust emission
- All materials will be ordered as per need to avoid over piling on site which leads to destruction of materials and unnecessary obstruction.
- The construction will be done in design that will allow for natural ventilation and lighting as well as both vertical and horizontal ventilation. The incorporation of natural ventilation and lighting will contribute to the reduction of the amount of energy consumed in artificial ventilation and lighting.
- Landscaping and greening of the buildings will be a contribution to the ongoing beautification and greening of our urban centers, a factor that will subsequently be beneficial to carbon sequestration.
- Emergency escape routes will also be incorporated during this stage
- To save on water, the construction could also incorporate water saving designs such as waterless urinals, self-timing taps and low volume water closets.
- To protect the health of workers on the site, they should be provided with protective gears and the contractor ensures that they make full use of them. Workers should not be forced or allowed to lift heavy loads.
- First Aid kits and emergency numbers should be conspicuously displayed. This means that someone trained in administering first aid should be present at the construction site all the time of the work.
- An insurance cover by the contractor should be acquired to compensate for any unforeseen medical emergencies and injuries or destructions.

- Provisions should be included during the construction period to allow for greening of public places.

7.5 Operation Phase

7.5.1 Increased demand for water

The construction phase of the development might place a strain on an already limited supply through the construction of buildings and other infrastructural works proposed for the development. Water availability is an important factor in the maintenance of sanitation. The water is used for cleaning and for washing of hands after visiting the toilet. Inadequate clean water will reduce health standards in the community and can lead to spread of diseases.

Potential mitigation measures

- Practice rain water harvesting to supplement the borehole water.
- Water-saving mechanisms such as self-canceling taps to avoid unnecessary flows.
- Provision of notices and information signs within the project site to notify on means and needs to conserve water resources.
- Encourage water recycling during both construction and occupation phases of the project.

7.5.2 Security of the facility and related fixtures

Security of the site and those working within is of utmost significance and those operating within the facility must be assured of their security at all times. Security lapses that may lead to injury of occupants of the building and loss of personal property should be taken care of.

Potential Mitigation measures

- The management shall strategically install lighting as well as security alarms and backup systems including surveillance of the area on a 24 hours basis.
- Security guards shall guard the property in a 24-hour basis and document any suspicious movement within the facility and its environs
- The proposed project site will be completely under a fence

7.5.3 Solid waste disposal (sanitary)

Most of the solid waste comes from paper and plastic packaging containing detergents and other supplies. Solid wastes lead to blockage of drains, they can form breeding ground for pests and vermin, plastics can also be fatal if ingested by animals that browse within the neighborhood.

Potential Mitigation measures

- Sanitary waste bins should be availed in the ladies' section of the toilet
- Ensure that conveniently accessible, clean, orderly, adequate and suitable washing facilities are provided and maintained within the site
- There should also be a waste bin inside the toilet for disposal of any wastes.

7.5.4 Risk of fire.

The operations that lead to fire outbreaks include poor handling of electricity systems, faulty electrical equipment, carelessness etc. These should be avoided both during construction and operation phases of the project.

Potential Mitigation measures

- Installation of an automatic fire alarm system for the building
- Provision of firefighting equipment and hydrant points
- Display fire excavation procedures and emergency at the buildings
- Regular maintenance of fire electrical and first aid equipment
- Provision of sufficient fire exit points and fire assembly points

7.5.5 Ground and surface water pollution

This is a sanitation facility that will handle human waste. Any fugitive discharge into the environment can lead to pollution of surface waters and or ground water. Human wastes may contain pathogens and vectors that can cause diseases such as cholera, typhoid, dysentery, and diarrhea.

Potential Mitigation measures

- Wastes will be evacuated from the bio digester only after thorough decomposition
- Proper maintained of plumbing and associated works

7.5.6 Risk of disease spreading

Communal toilets are a source of pathogens mainly from use without washing hands, and poor waste disposal. Diseases such as cholera, typhoid, dysentery and diarrhea can be spread through contact with dirty material. Dirty toilets also are home to various vectors (flies, cockroaches) and disease-causing organisms.

Potential Mitigation measures

- Sinks for hand washing after visiting toilet,
- Notices inside the toilet advising on the importance of hand washing.
- Toilets kept clean/ regular cleaning

7.5.7 Oil Leaks and Spills

It is important to note that oil/grease spills are prevalent in construction sites and in most areas that make use of petroleum products. Such products contain detrimental elements to the environment. They contain such heavy metals as mercury, lead, and Sulphur among others. Though this may not be common at the site, it is wise to control and observe the little that could occur especially during maintenance of the involved machinery.

Potential Mitigation Measures

- All machinery must be keenly observed not to leak oils on the ground. This can be affected through regular maintenance of the machinery.
- Maintenance must be carried out in a designated area (protected service bays) and where oils are completely restrained from reaching the ground.
- All oil products and materials should be stored in site stores or in the contractor's yard. They should be handled appropriately to avoid spills and leaks

7.5.8 Pest outbreak

Common pests attracted to a dirty environment are rats, cockroaches, and flies. These animals are also disease vectors. They transport germs from the toilet to nearby human settlements. When they come into contact with human food, they cause food spoilage and spread of diseases. Dirty environments also offer a perfect breeding ground for these pests to multiply.

Potential Mitigation measures

- Proper cleaning of the toilet
- Use of biopesticides

7.5.9 Climate Change impacts

i. **Extreme Weather Events**: Increased frequency and intensity of extreme weather events such as storms, floods, and heatwaves could pose risks to the infrastructure of the C-BECE. Mitigation measures may include:
    - Designing buildings to withstand extreme weather conditions through resilient construction techniques.
    - Implementing proper drainage systems to manage storm water runoff and reduce flood risks.
    - Installing backup power systems to ensure continuous operation during power outages caused by extreme weather

ii. **Rising Temperatures:** Increasing temperatures could impact indoor comfort levels and energy consumption within the C-BECE buildings. Mitigation measures may include:

- Designing buildings with energy-efficient features such as proper insulation, shading, and natural ventilation to reduce reliance on mechanical cooling systems.
- Installing energy-efficient HVAC systems and equipment to minimize energy consumption.
- Incorporating green roof systems or cool roof materials to mitigate the urban heat island effect and reduce indoor temperatures.

7.6 Decommissioning Phase

7.6.1 Solid waste

The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as benign since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

Potential Mitigation measures.

- The proponent is encouraged to re-use or sell any valuable materials
- Potentially hazardous material will be disposed off through registered waste transporters
- Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping.

7.6.2 Dust emission

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighboring residents.

Potential Mitigation measures

- The proponent and contractor should choose manual demolition methods as the dust produced will be less; this has an added advantage of enabling the recovery of as much scrap as possible.
  - Workers use masks when working in dusty conditions during the decommissioning process.
  - Use all means possible to suppress dust if considered to be a menace during demolishing of

obsolete walls or structures on-site

- Spraying the surfaces under demolition with water to suppress dust

7.6.3 Safety of workers

Workers at the site may be exposed to various workplace accidents especially during construction periods. These include being hit by falling objects and falling off from elevated heights among others. During the operation period, accidents may include exposure to exposed electrical parts.

Potential Mitigation measures

- Ensuring that the operational manuals are available and accessible for every equipment/machinery used at the site.
- Proper maintenance of all machinery and equipment to prevent premature failure or possible accidents
- Ensuring all electrical equipment and machinery are properly grounded
- Only properly trained employees to operate equipment or machinery and proper instructions in their safe operation is provided
- Workers to wear personal protective equipment (PPE)
- Naked wires should always be sealed

7.6.4 Noise and Vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. Prolonged exposure to such high-level noise can lead to temporary or permanent hearing loss. This phase of the development may likely have the most negative impact on the ambient noise and vibration in the development area. A number of measures may be undertaken by the developer to reduce the impact of noise on the existing and potential residents as well as the workers involved in the project. This is temporary, however, and the aim at this point is to make the increase in noise as small as possible until this phase is complete.

Potential Mitigation measures

- Equipment to be used should be selected on the basis of the noise minimization during acquisition.
- Equipment should also be properly maintained while in use during the construction phase

- The equipment to be used should be located far away from the receivers and also so as to prevent interference, the proponent should ensure that construction is done between 8:00am - 5:00pm.
- The proponent should also establish the noise levels during construction and install appropriate noise barriers and acoustic screens.
- Buffer zones of undeveloped land should be maintained between the project area and the neighbors.

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

This ESMP is developed with an aim to outlines actions necessary to prevent, mitigate and control possible negative impacts or disadvantages during the different phases of the project onto the environment and to analyze steps that could be taken in eliminating or minimizing this negative impacts. This chapter sets out an ESMP through which the proposed project will manage its Health, Safety and Environmental risks commensurate to the significance and magnitude of these risks. The purpose of this management plan is not only to ensure that the project complies with the relevant legislation and guidelines but also that it avoids (where possible), reduces or minimizes its risks. The Environmental actions proposed in the ESMP will synergistically enable the project to set environmental performance objectives, goals and targets and achieve them. This Management Plan is guided by both national Health Safety and Environment (HSE) /Occupational Safety and Health Act. And The Banks Environmental safeguards as well as the WHO Guidelines on indoor and outdoor Air Pollution.

The ESMP also fulfils the African Development Bank's environmental and social safeguards policy on borrower requirements to prepare a framework for Environmental and Social Management Plan (ESMP).

This ESMP sets out, in general, the mitigation and monitoring measures and institutional arrangements to address adverse environmental and social impacts. It provides the project implementers with an environmental and social management plan that enables them to mitigate potential environmental and social impacts. It covers all aspects that the project proponent has an influence over and all activities in the project's area of influence. This area of influence includes:

a. The project's main and ancillary activities in the project site;
b. Any works financed as part of the project that will be carried out outside the project's site;
c. Any works carried out by third parties or employees of the project, and
d. The areas where the project's direct impacts will be felt and will cause a Health safety and environment risk.

This area of influence delineates the proponent scope of liability as legally defined and the measures proposed will assign adequate management control over these aspects and activities in order to manage risks.

Based on the assessment undertaken as part of the ESIA, a series of mitigation measures have been identified which aim to reduce and / or eliminate the predicted impacts of the project. It is important that these mitigation measures are appropriately applied to the project mobilization, construction and operation phases, and decommissioning phase. This management plan provides a strategic framework for their implementation. Some of the mitigation measures related to engineering aspects, will be included in the detailed engineering design as appropriate and related costs will also be included in the engineering costs. The proposed environmental and social mitigation measures should be incorporated in the detailed engineering design and be part of the Bidding documents. The estimated costs for implementing the mitigation measures are just indicative to enable project proponent budget the necessary funds.

8.2 Proposed Environment and Social Management measures

The objectives of the proposed environmental and social management plan are to ensure smooth implementation of environmental protection measures, mitigate adverse impacts and ensure environmental protection activities are conducted efficiently at the project site.

The specific objectives include but are not limited to:

- Ensuring environmental health and safety within the living environment and *minimizing environmental risk* during the design, construction, and operation phases.
- Incorporating environmental principles into development planning, design, construction, and operation to enhance environmental management and protection as well as promote sustainable development.
- To provide mitigation measures against all identified and potential negative impacts resulting from the activities of the proposed development
- Reduce contamination
- Apply climate change adaptation measures
- Apply green building construction measures
- Apply measures required by Kenya regulations
- To assign duties to various actors in the management plan for purposes of

enhancing accountability in this project.

- To provide a logical framework for environmental management and monitoring.
- To provide a reference base for future environmental audits of the proposed development.

Although various potential adverse environmental and social impacts associated with the proposed sub-project will be identified, and an ESMP developed to guide in mitigating the negative impacts, the implementation of some of the ESMP actions will require a response beyond the project level. Table 8.1 to Table 8.3 below shows the anticipated impacts, proposed mitigation measures, the institutions responsible and the estimated possible cost of the action. Although the cost of ESMP implementation has been provided, future dynamics during project operation and decommissioning were a limiting factor and could not be well envisioned at this point in time. The contractor will be required to update the ESMP for operation by providing operation and maintenance guidelines.

The plan considers the following;

- Predicted environmental impact
- proposed mitigation measures,
- Responsible party / parties
- Timeframe, and
- Costs.

The ESMP will be in the following sections.

- Construction phase ESMP
- Operational Phase Management Plan
- Decommissioning Environmental Management Plan

The ESMP has been developed with project knowledge and information available to date. As project commencement and scheduling plans are developed and changed, components of the ESMP might require amending. This is therefore a life document, which can be updated whenever new information is received or there are changes on site conditions.

Table 8.1 Environmental and Social Management Plan (ESMP) for Construction Phase

Expected Negative impact	Mitigation measures	Responsible party	Monitoring Mechanism	Cost (KES
High Demand of Raw materials	● Source building materials from local suppliers who use environmentally friendly processes in their operations. ● Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered ● Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered ● Ensure that damage or loss of materials at the construction site is kept minimal through proper storage ● Use of some recycled/refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills. ● Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.	Resident Project Manager & Contractor	Throughout construction period	Part of the main budget

	• Designate access routes and parking within the site. • Introduction of more vegetation (trees, shrubs and grass) on open spaces and their maintenance., especially at the front side of the development. • Design and implement an appropriate landscaping program to help in re-vegetation of part of the project area after construction. This is to complement the existing one due the disturbance by construction activities.			
Occupational Health and Safety of Workers Working on a construction site comes with risks and accidents to the workers. The risk could be associated with falling objects, injury due to	• Contractor to develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency, and personnel responsible for safety inspections and controls. This shall be ready and approved by the joint supervising committee before commencing of the proposed works • Train workers on safety and first aid skills before commencing works • Ensure safety of the construction workers by putting first aid facility and injury reporting mechanism • Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. (Reflective	Contractor, workers and site supervisors	Throughout construction	600,000

the nature of occupational activities (ergonomic), operating or movement of machines and equipment, and falling off workers from heights.	jackets, helmets, face masks, ear plugs, gloves, safety boots, etc.) ● Adequate provision of requisite sanitation facilities for human waste disposal for workers on site ● Recording of all injuries that occur on site in the incident register, corrective actions for their prevention as appropriate. ● The contractor is required to have WIBA insurance policy to compensate workers in the event of injuries ● Provide clean drinking water for the workers to mitigate against dehydration.			
Increased solid waste generation The main sources shall be debris from construction activities	● Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials. ● Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. ● -Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of	Resident Project Manager & Contractor	One-off	

	● Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or homeowners. ● -Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. ● Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure. ● Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials. ● Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste ● Use construction materials containing recycled content when possible and in accordance with accepted standards. ● Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site. ● Dispose waste more responsibly by dumping at designated dumping sites or landfills only.	Resident Project Manager & Contractor	Throughout construction period	

	• Waste collection bins to be provided at designated points on site. • Contract a NEMA licensed private waste disposal company to transport and dispose of the solid waste from site. • Running educational campaigns amongst residents/workers, e.g. through use of posters, to encourage reuse or recycling of the solid waste.			
Dust emission	-Ensure strict enforcement of on-site speed limit regulations -Avoid excavation works in extremely dry weathers if/and when possible -Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles -Personal Protective equipment to be worn	Resident Project Manager & Contractor	Throughout construction period	200,000
Noise pollution The movement of construction vehicles to and from the site, general construction	• The contractor to use equipment with low noise levels or fitted with silencers where appropriate. • Regular servicing of the equipment to reduce the possibility of noise from worn-out parts. • Informing the public about the possibility of unusual noise levels, particularly to residents and nearby offices, whenever working on such activities.	Contractor and transporters	throughout construction period	300,000

activities on-site, and noise from conversation on site are anticipated to be the main sources of noise.	● Ensure adherence to PPE by workers10 working on excessive noise and vibration activities ● Minimize unnecessary hooting and speeding by construction vehicles. ● Restricting noisy activities to be during the day and no noisy activities should be conducted on site at night ● Regular measurement of noise levels and devising control measures.			
Exhaust emission	● Alternatively fueled construction equipment shall be used where feasible; equipment shall be properly tuned and maintained ● Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off engines at these points.	Resident Project Manager & Contractor	Throughout construction period	100,000
Air pollution Main source of air pollution will be exhaust fumes on site from operating of machines and moving of	● Vehicles to be used on-site to meet NEMA emission standards as required under NEMA air quality regulations. ● Reduce unnecessary speeding or idling of construction vehicles ● Use of non-lead paints during construction.	contractor and supervising consultant	Throughout construction period	300.000

construction vehicles transporting materials from the site or to the site, from dust particles on-site during foundation excavation activities and wind effect during mixing of cement on site.	• Adherence to proper uses of PPE by the workers, especially those working on activities requiring mixing of cement. • Inform the public and residents about activities with possibility of unusual air pollutants • Consider wetting all the sand or soil materials being transported to or from the construction site. Where appropriate, cover the materials being transported to avoid being blown by the wind during transportation.			
Increased Water consumption for construction. Water shall be used for the construction works particularly making motar and curing of the structures. It is expected that there shall be water losses	• Sensitization and awareness creation among construction workers on significance of water conservation measures. • Curing the structures during evening and early morning to reduce evaporation. • Covering the structures to be cured with sand or any water retaining material to shield from direct sunlight. • Regular maintenance and prompt response to leakage in the water system during the construction phase. • Use of alternative water sources if available, particularly rainwater if any during construction phase	Contractor and proponent	Throughout construction period	Part of construction and cost

during curing of the structures.				
Public health and safety (Accidents and Injuries) The public and any persons who visit the construction site can be at risk of injury from falling objects, accidents involving construction vehicles, personal falls, or sharp objects on the ground.	▪ Ensure the safety of officers with offices near the site by providing safety signs at strategic places around the access roads. ▪ Hording off working sites to protect the public or unauthorized persons from entry ▪ Use of signs and warnings on sites on areas with high risks ▪ Consider having a road marshal, particularly during delivery of construction materials to avoid any incidents. ▪ Reduce unnecessary speeding by construction vehicles to control accidents from the movement of pedestrians in the area. ▪ Prior creation of awareness and sensitization of the public and the officers of any activities that are likely to have an impact in adequate time (2 weeks) before commencement	Contractor and supervising consultant	Continuous	250,000
Increased traffic and potential	The contractor will erect appropriate signage to designate the use of the Road by heavy commercial vehicles delivering raw materials Delivery of raw materials to be undertaken off-peak4	Contractor and supervising	Continuous	

safety concerns				
Visual/ aesthetic Impacts The excavation activities and stockpile shall be the main source of visual/aesthetic value impact at the project site. Haphazard stocking of materials on site or clearing of Prosopis juliflora plant during construction is also anticipated	● Cleaning of the site and organized locating of different construction materials. ● Clearing of invasive species to be conducted in a manner that does not encourage regeneration, use of fire is encouraged ● Backfilling of soil cuttings ● Landscaping of the project site ● hoarding of the construction site using appropriate screening materials	Contractor and supervising		

to contribute to littering.				
Sexual Exploitation and Abuse (SEA) Under the working environment, women may be taken advantage off to offer sexual favors to receive or access that which is rightfully theirs. In addition, with increased influx of youthful labor, there is expected increase in the number of Sexual Exploitation and Abuse	● Develop and implement a SEA management action plan with an Accountability and Response Framework as part of the ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing. ● The SEA action plan will include how the project will ensure necessary steps are in place for: ● Prevention of SEA: including CoCs and ongoing sensitization of staff on responsibilities related to the CoC and consequences of noncompliance; project-level IEC materials; ● Response to SEA: including survivor-centered coordinated multi sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; ● Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ● Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management	Contractor and supervising consultant	Continuous	

cases. Most of them will be working away from their families for longer periods. Young girls could be vulnerable to the increase of cash in the area.				
Child Labor and Protection Due to provision of cheap labor and differentiation in bargaining power, the underage workers may be employed leading to exploitation.	● Ensure no children are employed on site in accordance with national labor laws. This can be done through incorporating prohibitive provisions in the code of conduct and also having recruitment policies that prohibits child labor. ● Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police	Contractor and supervising	Continuous	

Effects of Immigrant workers It was also observed that most youth are engaged in motorbike transport business and may not be willing to take up manual work. There is a likelihood therefore that most of the locals may not take up the construction jobs on site.	● Contractor should use the local workforce as much as possible (preference to local community members on skills locally available). ● Effective community engagement and strong grievance redress mechanisms on matters related to labor ● All workers to sign an employment contract including a Code of Conduct governing appropriate behavior ● The workforce should be sensitized to local social and cultural practices and be educated on the expected behavior and conduct ● Contractor should prepare and enforce a No Sexual Harassment and Non-Discrimination Policy ● Contractor should prepare and implement a gender action plan ● The contractor as part of the C-ESMP will Prepare labor Management Plan (LMP) that included mandatory requirement to procure all unskilled (and as much as possible, semi-skilled) labor as well as locally available materials from the local community while ensuring equal pay for equal work for men, women and people with disability.	Contractor and supervising	Continuous	
Grievance The local	● Establish grievance redress committees at the site ● Ensure contractor staff grievance structures exist ● Sensitization and awareness creation among workers and the public			

community members, contractor, contractor workers, client (SDFA&BE and the County government) or any other interested parties may be aggrieved due to project activities and need to be aware of the structures of expressing them grievances.	on grievance redress mechanisms in place			

Environmental and Social Management Plan (ESMP) for operation Phase

The necessary objectives, activities, mitigation measures, and allocation of responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of proposed Project are outlined in the table below.

Table 8.2 Environmental and Social Management Plan (ESMP) for operation Phase

Environmental impact	Mitigation measures	Responsible party	Monitoring mechanism	Cost
Fire hazards Fire hazard is anticipated with electrical faults and arson, being the main anticipated sources.	● Provide recessed swinging type hose reel complete with 30 meters of 20mm internal diameter rubber fire hose with nylon spray/jet shut off nozzle ● Provision of a Fire assembly point in the design ● Installation of fire extinguishers in the building ● Provide signages of fire hose Reel, fire exits and fire instructions. ● Provide for fire risk and response signage with short and clear information. ● Regular fire drills for the building users ● Regular awareness and sensitization on fire safety measures and response to the users of the building. ● Clear fire incidents reporting procedures and response. Ensure regular provision of operational emergency reporting contacts. ● Regular servicing and maintenance of the fire extinguishers. ● Ensuring availability of adequate water resources at the premise at all times for the hydrants.	Contractor and Proponent	Continuous	To be determined under operation and maintenance costs
Security of the facility and stock	● Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Security Officer, Manager & Police	Continuous	60,000

	● Body-search the workers on entry, to avoid getting weapons on site, and leaving site to ensure nothing is stolen. ● Ensure only authorized personnel get to the facility			
Release of sewage into the environment The main source of wastewater shall be during the operation phase of the project, with grey and black water being anticipated.	● Provision of adequate and safe means of handling sewage generated at the project via connection to the Mombasa County Water and Sewerage treatment plant ● Conduct regular inspections for sewage pipe blockages or damages and fix appropriately ● Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violate ● Apply for Effluent Discharge License in NEMA and comply with the license conditions	Resident Project Manager & Mechanical	One-off	10, 000.00 per month
Public health and safety (accidents and Injuries) Accidents and injuries at the operational phase can occur from slip, falling object or fire injuries.	• using signage during cleaning, maintenance, or repair to warn the public • Easily accessible fire risk information to the public visiting the premise	contractor and county government	Continuous	To be determined under operation and maintenance costs

Pests/ vermin outbreak	Proper cleaning of the toilet	Proponent	Continuous	No cost
Nuisance from bad odor	Regular cleaning of the facility using detergents Water for flushing the toilet should also be available Well-designed biodigester/ airtight	Proponent	Continuous	No cost
Solid waste generation and disposal The main source of wastes shall be General Consumption of materials by the occupants of the building or the guests that shall be visiting the building block seeking services.	● Sensitization and awareness creation among the office building users on the significance of waste separation and in addition provide for waste sorting bins at the premises with clear labeling. ● Promotion and adoption of the principles of waste avoidance, reduction, reuse and recycle. Through avoiding unnecessary generation of waste, use of debris for backfilling, use of waste materials on-site for other purposes where appropriate, or selling to recycling merchants. ● Sensitization and awareness creation among the building users on the significance of waste recycling. ● Designate proper waste transfer stations onsite with controlled access. ● Donate redundant but serviceable equipment to charities and institutions	Resident Project Manager and Contractor	Throughout construction period	50,000 per month

	● Ensure that occupants of the facility manage their waste efficiently through recycling, reuse and proper disposal procedures ● Seek appropriate approvals from NEMA and County Government on management and Disposal of the waste *(this may include using authorized disposal sites, use of NEMA authorized waste pickers/transporters, acquiring dumping certificates, and keeping proper records or use of authorized vehicles to ferry waste from site).* Consider formulating a site-			
Increased Water consumption The water on the building will be used in washrooms, for landscaping, cleaning and frequent personal cleaning. The design has provided for the treatment of waste water through a	● Promptly detect and repair water pipes and tank leaks ● Facility operators to conserve water e.g. by avoiding unnecessary toilet flushing ● Ensure taps are not running when not in use ● Install water conserving taps that turn-off automatically when water is not being used ● Install a discharge meter at water outlets to determine and monitor total water usage ● Create water conservation awareness among the office occupants ● Use of alternative water sources e.g. rain harvesting	Resident Project Manager & Mechanical Engineer	Continuous	10.000 per month

biodigester system that shall be used for landscaping purpose				
Impacts of climate change Changes in Precipitation Patterns: □ Increased Temperature Extremes: □ Extreme Weather Events:	• Incorporate climate-resilient design principles into project infrastructure • Elevate critical infrastructure above projected flood levels • Implement water conservation measures, such as rainwater harvesting and efficient irrigation systems • Explore alternative water sources • Improve energy efficiency in project operations and facilities • Integrate renewable energy sources, such as solar and wind power, into the project's energy supply • Establish a climate monitoring system to track key climate variables	Design team, Project Manager and Contractor		Part of design and construction n costs
Occupational Health and Safety (*accidents and Injuries* Accidents and injuries at the operational phase are commonly experienced by	• Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations standards • Provide personal protective equipment to operation and maintenance workers • Recording all injuries that occur on-site to workers while doing their daily duties in the incident register, corrective actions for their prevention should be initiated as appropriate • Cordoning off working sites to protect the public or unauthorized persons during repair and maintenance of the different utility systems on site • Creation of awareness and training of workers on site on safety and first aid skills. • Hiring employees with proper qualifications for	Resident Project Manager, Developer, and Site Safety Officer.	Continuous	500,000 pa

workers conducting routine maintenance and cleaning on the office building, the bio-digester or the landscape of the compound.	specialized and risky tasks during operation and maintenance of the various utility systems.			
Increased Energy consumption Energy shall be critical for the users of the proposed building either to run machines and equipment or lighting or for lighting purposes. The demand for energy resources will increase, and several measures have been provided	● Switch off electrical equipment, appliances and lights when not being used ● Install occupation sensing lighting at various locations such as storage areas which are not in use all the time ● Install energy saving fluorescent tubes at all lighting points within the offices instead of bulbs which consume higher electric energy ● Monitor energy use during the operation of the project and set targets for efficient energy use ● Sensitize office occupants to use energy efficiently ● Explore the possibility of using renewable sources of energy such as wind and solar energy ● Manually adjust temperature and humidity controls on equipment where appropriate in response to demand due to seasonal ambient temperature and humidity loads. ● Select lower-power settings for overnight ● Ensure freezers are operating at full capacity ● Use fume hoods wisely-Fume hoods and safety cabinets are essential and irreplaceable laboratory tools. However, the simple action of closing the sash whenever ● possibly can dramatically reduce the amount of energy consumed by the fume hood.	Resident Project Manager & Occupants	Continuous One-off Continuous One-of	Part of the main budget 500, 000

for the projects design to ensure efficient utilization of the resources	● Installing an advanced fume hood filtration system allows for efficient handling of a wide range of chemicals, including acids, bases and solvents, without increasing energy consumption			

Decommissioning Phase

In addition to the mitigation measures provided in tables above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined in the following table.

Table 8.3 Environmental and Social Management Plan (ESMP) for decommissioning phase

Environmental impact	Mitigation measures	Responsible party	Time frame	Cost (KES)
Occupational Health and Safety (accidents and Injuries) The risk will be associated with falling debris, walls, slabs or	Preparation of project decommissioning plan. • Ensure the safety of the decommissioning workers by putting first aid area and injury reporting mechanism • The contractor should consider having a WIBA insurance policy to compensate workers in an event of an accident on site. • Provide personal protective equipment to workers. • Recording all injuries that occur on site in the incident register, corrective actions for their prevention.	decommissioning Contractor Workers	Throughout decommissioning phase	To be determined under the decommissioning plan

any other object due to the demolition activities.	• Cordoning off demolition sites to protect the public or unauthorized persons • use of signs and warnings on sites with high risks • Creation of awareness and training of workers on-site on safety and first aid skills. Hiring employees with proper qualifications for specialized and risky tasks. Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations			
Leakages and spills The main source of leakages and spills anticipated are from decommissioning vehicles, machines or equipment with mechanical issues during the decommissioning	● In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose of contaminated soils. ● Disposing of contaminated soils in cutting pit if volumes are low. ● Use of NEMA licensed waste handlers to dispose of in licensed disposal sites. ● Development of site-specific incident management or response plan. ● Use of an authorized garage or fuel station in the project area by the contractor or specific concrete and oil traps should be constructed at the contractor's yard.			

activities.				
Solid waste generation The main sources of waste shall be debris from decommissioning activities.	Proper disposal of any hazardous waste from the decommissioned site. • Preparation of waste management plan to guide waste management and disposal activities of all debris from demolition activities. • Disposal of debris to NEMA authorized damping sites • Use of certified vehicles or NEMA licensed waste disposal firms for waste management and disposal	Project Manager and contractor	Throughout decommissioning phase	To be determined under the decommissioning plan -
Air pollution Decommissioning activities, notably demolition and transportation of the waste, could be sources of particulate matter on site in addition to the movement of the contractor's vehicles and machines undertaking the demolition	● Workers use masks when working in dusty conditions during the decommissioning process. ● Use all means possible to suppress dust if considered to be a menace during demolishing of obsolete walls or structures on-site ● Spraying the surfaces under demolition with water to suppress dust	Project Manager and Contractor	Continuous	-

activities.				
Excessive Noise and vibration The movement of vehicles to and from the site, during the general decommissioning activities on-site, and noise from conversation on site are anticipated to be the main sources of noise	● Demolition works should be conducted only during daylight hours (6am – 6pm) ● Adequate use of PPE by the workers e.g. earplugs ● Working on and restricting noisy activities during the day ● Reducing the duration of exposure of workers to high occupational noise levels during demolition ● Acquisition of permits/Licenses for any activity with high noise levels e.g. drilling of walls or slabs for demolition ● Using models of machines and equipment with low noise levels. ● workers using drilling or handheld pneumatic equipment to be provided with specialized antivibration gloves, ● Switching off vehicles and machines when not in use ● Avoiding unnecessary hooting, ● Warnings to be issued to the locals in case of any unusual noise levels, ● Ensure that NEMA noise and Vibration standards are observed in all project activities	Project Manager and Contractor	Continuous	300,000

8.3 Environmental and Social Impact Assessment Monitoring

The purpose of this section is to outline the key monitoring requirements identified through the ESIA process to monitor the environmental and social performance of the project. The overall objectives of the monitoring activities are to:

- Ensure regulatory requirements are met;
- Check that impacts do not exceed national environmental and safety standards
- Verify predictions made in the ESIA by obtaining real time measurements;
- Verify that mitigation measures are effective and implemented
- Provide early warning of potential environmental impacts; and
- Inform future operations and contribute to continuous improvement in the management of environmental and social issues related to the project.

Monitoring will be carried out by the project contractor pursuant to her/his contractual obligations to undertake inspections, monitoring and reporting.

The following three types of inspections and monitoring must be employed.

a. Inspections: planned and conducted on a regular basis to ensure that mitigation measures and commitments are properly maintained and implemented, and that specific management procedures are followed.

b. Receptor monitoring: undertaken to verify predictions made in the ESIA and to confirm that the activities at the site are not resulting in an unacceptable deterioration i.e. monitoring disturbance to affected residents (through a grievance mechanism).

c. Compliance monitoring: involving periodic sampling or continuous recording of specific environmental quality indicators or discharge levels to ensure compliance of discharges and emissions with project standards.

Monitoring results will be presented in regular reports and reviewed at monthly and quarterly sitemeetings. The results of the inspection and monitoring activities will be reported to the Client. Monitoring should check if and to what extent the impacts are mitigated, benefits have been enhanced, and new environmental, social and cultural heritage issues are adequately addressed.

The selection of the parameters to be monitored is based on the high likelihood of occurrences of the selected parameters. Monitoring of these parameters will be done in various stages of the project as follows:

Mobilization stage: Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area.

Construction stage: Monitoring at this stage is meant to establish the pollution levels and impacts in the community around the project site that arise from the construction activities. It is also to verify the effectiveness of the mitigation measures and to allow Contractor to take corrective and preventive actions if necessary.

Operation stage: Monitoring at this stage is meant to check on the impacts that might arise as the result of normal use of the infrastructure.

Decommissioning stage: Monitoring at this stage means the project is winding up the operational activities and is mainly concerned with impacts that might arise at the end of the project. The final disposal of the project and associated materials at the expiry of the project lifespan.

8.3.1 The role of AfDB in the Implementation of the ESIA/ESMP

The Safeguards and Compliance Department of the Bank plays a significant role in the ESMP implementation through reviewing and clearing of the ESIA and ESMP and through supervision missions. It is a mandatory requirement by the AfDB that all Bank funded projects undergo mandatory review processes at all the project cycles. The project ESIA must be reviewed and cleared prior to country and Bank disclosures. It is also a mandatory requirement that all Category 1 and Category 2 Projects that are funded by the Bank be supervised during implementation. As such the Bank will be monitoring ESIA/ESMP implementation through regular bi-annual supervision missions. The Safeguards and Compliance Department will also ensure that periodic environmental and social safeguards performance reports are regularly prepared and meet the required standards.

8.4 Grievance Redress Mechanism

The AfDB defines project GRM as a systematic process for receiving, evaluating and facilitating resolution of affected people's project-related concerns, complaints and grievances about the borrower's/client's social and environmental performance on a project. AfDB requires its clients to be aware of and respond to stakeholders' concerns related to the project in a timely manner. In OS 1, the Bank requires the borrower/client to establish a "credible, independent and empowered local grievance and redress mechanism to receive, facilitate and follow up on the resolution of the affected people's grievances and concerns regarding the environmental and social performance of the project. The localgrievance mechanism needs to be sufficiently independent, empowered and accessible to the stakeholders at all times during project cycle and all responses to grievances shall be recorded and included in project supervision formats and reports."

The process by which the GRM is designed should be integrated into the overall approach to project preparation as prescribed in the Bank's ISS. The Bank ISS through its (IESIA) Guidelines Notes provides guidance on development and Implementation of GRM. It should also be included in the concrete actions required in the Environmental and Social Management Plan (ESMP) for Category 1 projects and, on a case by case basis, for Category 2 projects that exhibit specific potential social tensions, in particular risks of mismanagement of compensation/resettlement schemes or the presenceof particularly vulnerable groups in the project's area of influence.

AfDB has also established its own accountability mechanism, the Independent Review Mechanism (IRM). The IRM seeks to assess whether a Bank approved project complies with relevant the AfDB's ISS. The IRM makes itself accessible to any group (a minimum of 2 persons living in the project's area of influence) actually or potentially negatively affected by a Bank- funded project. The IRM reports to the Bank's Board of Directors and is thus independent of Bank management. The IRM has been set up by the Bank to achieve more transparency. It is also a costly mechanism to trigger. The establishment of local GRMs can help to alleviate the need for plaintiffs to resort to the IRM, while problem-solving can be more rapidly and cost-effectively done locally. The cultural context in which GRMs operate also helps to defuse complaints and to find appropriate and commensurate solutions.

The grievance redress mechanism will make provision for two tier amicable mediation and settlement. The first tier will involve the grievance redress committee resolving the issue at the institution/community level. If the issue is not resolved at the local level, then the 2nd tier should involve the PMT to constitute an appropriate team including regional/national stakeholders including the Administration head for the area (or his/her representative) to resolve the matter. When these two tiers of amicable mediation arrangement fail, the complainant is free to seek redress at the court of law.

8.4.1 GRM at project level

The GRM in the AfDB-C-BECE project will be established under the guidance provided in the ISS Bank ISS through its (IESIA) Guidelines Notes. The first step is to determine the primary goal of the GRM which would generally be to resolve specific grievances in a manner that meets both project management and community needs, but with important local variations. The scope of the grievances that may legitimately be brought forward by the communities and/or individuals affected shall be defined in advance. That scope will generally cover most, if not all, of the issues raised in a typical Environmental and Social Assessment: natural resources, pollution, cultural property, land acquisition, the income of resettled/displaced populations, the welfare of vulnerable groups, etc.

The second step is to design the GRM by:

- Preparing a preliminary design.
- Selecting ways and means to receive, register, assess and respond to grievances.
- Select grievance resolution approaches.
- Design a means to track and monitor grievances.
- Develop the grievance mechanism infrastructure.
- Review and refine the design.

The GRM shall be designed based on the following principles:

1. Involvement of individuals of mixed levels and functions from the entity (e.g., operations, environmental affairs, community relations, legal affairs, contractors). Staffing the design team from just one function such as community relations or human resources is unwise.
2. The inclusion of a balanced group of representatives from the community, representing the range of constituencies and demographics that will be using the grievance mechanism, while keeping the team small enough to be responsive.
3. GRM Relying upon clear terms of reference and a work plan that outlines team goals, roles, and responsibilities, level of decision-making authority, reporting lines, tasks, time frame, and products.
4. Making the use of multiple channels (e.g., face to face, phone conversation, mail, textor e-mail, message on a dedicated website), sensitive to cultural customs and traditional methods that may influence or impede the expression of grievances.
5. The existence of a central point of contact that will receive complaints and log them into a central register.
6. Existence and operation of designated complaint resolution staff.
7. Processes for acknowledging the receipt of a grievance and informing the complainant about the time frame in which a response can be expected.

8.4.2 Procedures, complaints channels and time frame for Grievance Redress Mechanisms

As there is no ideal model or one-size-fits-all approach to grievance resolution, the best solutions to conflicts are generally achieved through localized mechanisms that take account of the specific issues,cultural context, local customs, and project conditions and scale. The process by which a complaint will be accepted or rejected needs shall be carefully designed, and shall maximize interactivity and cultural sensitivity. The acceptance/rejection of a complaint will go through a discussion stage where the plaintiff and the **GRM staff**

interact on the grounds and motives of the complaint, after which the plaintiff should clearly and transparently be told whether or not the complaint is eligible and will be processed.

The acceptance/rejection of the complaint shall be based on objective criteria that are posted by the GRM, including a written copy displayed in the public access area of the GRM in an appropriate language.

The processing of the complaint, if accepted should go through various phases:

- Filing of the complaint and labelling with an identification code communicated immediately to the plaintiff. (see annex 5 for sample Grievance Form)
- Assessment of the complaint (including severity of the risk/impact).
- Formulation of the response.

Selection of the grievance resolution approach is a key. There are four general approaches to choosefrom:

- The project's management proposes a solution.
- The community and the project's management decide together.
- The project's management and the community defer to a third party to decide.
- The project's management and the community utilize traditional or customary practices to reach a solution.

The Bank ISS recommends the application of a "Decide together" approach that is usually the most accessible, natural and unthreatening ways for communities and a project's management to resolve differences. With the potential to resolve perhaps the majority of all grievances, "decide together" should be the center-piece of any grievance mechanism's resolution options.

The grievance mechanism will comprise of the following primary components:

- ✓ Receive and register a complaint.
- ✓ Screen and validate the complaint (based on the nature and type of a complaint).
- ✓ Formulate a response.
- ✓ Select a resolution approach, based on consultation with affected person/group.
- ✓ Implement the approach.
- ✓ Settle the issues.
- ✓ Track and evaluate results.

Learn from the experience and communicate back to all parties involved

The channels of presenting complaints could include the presentation of complaints via third parties (e.g., village elites/traditional leaders, community-based organizations, lawyers, non- government organizations [NGOs], etc.); face-to-face meetings; facsimile, telephone, and email communications; written complaints; etc.

If the complainant is not satisfied, the complainant will have to appeal to the Project Management Unit.

Table 8.4 Grievance Redress Mechanism

Step	Process	Description	Time frame	Other information
1	Identification of grievance	Face to face; phone; letter, e- mail; recorded during community interaction; others	1 day	Emailaddress; hotline number; Responsible: community or town head.
2	Grievance assessed and logged	Significance assessed and grievance recorded or logged (i.e. in a log book)	4-7 days	Significance criteria Level 1 –one off event; Level 2–complaint is widespread or repeated; Level 3- any complaint (one off or repeated) that indicates breachof law or policy or this ESMFprovisions. Responsibility: Environmental Site Officer with the approval of the Region's Environmental Control Officer
3	Grievance is Acknowledged	Acknowledgement of grievance through appropriate medium	7-14 Days	Responsible: Environmental Control Officer
4	Development of response	Grievance assigned to appropriate party for resolution; -Response development with input from management/ relevant stakeholders	4-7 Days 7-14 days	Environmental Manager Environmental Manager
5	Response signed off	Redress action approved at appropriate levels	4-7 Days	PMTs
6	Implementation and	Redress action implemented and	10-14	Environmental Managers and

	communication of response	update of progress on resolution communicated to complainant	Days	Environmental Control Officers through the Environmental Site Officers
7	Complaints Response	-Redress action recorded in grievance log book -Confirm with complainant that grievance can be closed or determine what follow up is necessary	4-7 Days	Environmental Site Officers
8	Close grievance	-Record final sign off of grievance -If grievance cannot be closed, return to step 2 or refer to sector minister or recommend third- party arbitration or resort to court.	4-7 Days	PMTs,

8.5 General Costs for ESMP Implementation and Monitoring

The ESMP implementation budget refers to all costs that will be incurred to implement the requirements or recommendations in this Environmental and Social Management Plan (ESMP). In the ESMP the requirements are to ensure that implementation of the project integrates environmental and social issues for the sustainability of the project as well as its components and sub-components. Among other things the ESMP recommends the following key issues will be important in the implementation and management of this ESMPs,

- Preparation of site-specific ESIA Audits
- Training and capacity building,
- Reviewing and monitoring mechanisms.

These issues have been amplified and are clearly described in this ESMP. The budget for ESMP monitoring awareness creation, capacity improvement, monitoring and evaluation and training programs for key stakeholders involved in the implementation of the Project is estimated

Table 10.1 the summary of the ESMP

Activity	Timeframe	Responsibility	Cost (USD)
Estimated Mitigation Measures	Design Construction implementation & decommissioning period	PMT/Proponent / Contractor, County Government and AfDB	99,000
ESMP Monitoring	Entire project period until hand-over	PMT/Proponent / Contractor, County Government Ministry of Education and AfDB	48,000
Establishing & Building Capacity of the GRM	Design Construction & implementation period	PMT/Proponent / Contractor, County Government, Ministry of Education and	25,000
Capacity building cost on ESMP (institutions identified in the report)	Project implementation period	PMT/Proponent / Contractor, County Government and AfDB	15,000
Annual Environmental audits	Entire project period until hand-over	PMT/Proponent / County Government, and NEMA	5,000
Regular supervisions – environmental aspects	Entire project period until hand-over	PMT/Proponent / County Government, NEMA and Ministry of Education	15,000
Sub Total			**197,000**
5% Miscellaneous			**9850**
			206850

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

10.1 Monitoring Guidelines

Continuous observations and assessment are essential so that if unforeseen dangers are noticed, alternatives are sought for. Risk assessment of fire outbreaks, and others should not be ignored in the construction plan. Waste management within the project site should be strictly followed. Mitigation measures of storm water management are essential. Safety standards should constantly be maintained, in brief, monitoring guidelines could be based on the following parameters:

- Health and safety measures using such standards as the laid down regulatory framework
- Water demand, availability and use
- Waste management
- Examine the changing land use patterns including those for residential, ecological and economic purposes
- Accidents and risk assessment arising from the use of water, roads, electricity and or any other amenity

Environmental audits

Conduct a regular environmental and safety audit to ensure that all necessary environmental and safety measures are being undertaken and that existing practices are still valid.

Staff training

There is no point in conducting full environmental audits and installing sophisticated environmental measures unless all staff members are committed to reducing the environmental impact of the labs. Staff training is therefore essential so that all employees understand what the goals are and what is expected of them.

Environmental protocols

Ensure that formal systems and protocols for different procedures are drawn up where appropriate, that staff are made aware of them, and that they are readily accessible in the building

Meetings

Hold regular lab meetings to discuss environmental issues and check progress. As well as a practical way of improving compliance, these meetings emphasize the importance of this issue.

10.2 Reporting

The site contractor must provide the architect with ongoing reporting to guarantee that the project is carried out by the architectural drawings. To promptly address any safety concerns, the safety officer should always be present on the scene. By the applicable laws, he should always enforce safety regulations. To ensure that they are fully aware of every facet of the project, the contractor and the architect must communicate.

10.3 Conclusions

The proposed project will have several positive economic impacts during its different phases that include: creation of employment; stimulating development through revenue, taxes and income, creating needed skills as well as developed innovations that will steer business development, provide investment opportunities expand goods and services, in the market, create business opportunities for various companies and individuals. These will contribute to the achievement of vision 2030 and contribute to making Kenya increase the infrastructure for developing the bloom economy and Civil Engineering. The project will also have high socio-economic benefits to the people along the project area and adjoining regions.

However, the project will present environmental and OSH risks similar to most building and infrastructure projects, which include: generation of wastes (municipal, construction and demolition wastes; vegetation clearing, changes in soil characteristics; emission of air pollutants amongst others. Specific mitigation measures have been suggested in this report to offset the specific inherent adverse impacts. In implementing these mitigation measures there would be an increase of environmental soundness and social acceptability of the project. These risks can be adequately managed and monitored through the proposed mitigation measures that includes frameworks for developing waste management plans, OSH plans and hazardous materials safety

plans. The total cost for implementing Environmental Management Plan including the Monitoring Plan is tuned to **USD 206,850** the identified adverse impacts shall be managed through the proposed implementation regime laid down in this ESIA. Technical University through PMT is committed in implementing all the recommendations given in the ESIA and further carrying out the environmental monitoring schedules.

Therefore, NEMA is advised to license the project subject to it following the proposed annual environmental audits and ESMP and complying with all other statutory requirements that the project subscribes to. The project should also develop a plan for continuous engagement with stakeholders that include members of the public (its neighbors) and government bodies. This will be in compliance with the country's environmental management policies and laws.

10.4 Recommendations

1. Aspect of the project will require a multi-sectoral and a multi-disciplinary approach in the overall implementation. Therefore, it is important that during the implementation, relevant stakeholders are effectively engaged.

2. The implementation of C-BECE Complex at the Technical University of Mombasa in Coastal Region of Kenya is likely to have multiplier effects and proliferation of other economic activities hence engaging other stakeholders, and especially the private sector may help in addressing some of the cross-cutting challenges.

3. The contractors and the project proponent should take into consideration all the legislative measures put in place so as to ensure the due process is followed.

4. The mitigation measures provided are based on the recommendations of this ESMP and they should be followed so as to address the environmental issues that may arise in the course of the implementation of this project. But contractors should enrich the ESMPs and develop their site specific ESMPs

REFERENCES

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4. Environmental (Impact Assessment and Audit) Regulations, Kenya Gazette Notice No. 56 of 13th June 2003,
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6. Local Government Regulations (1963),
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10. The Occupational Health and Safety Act, 2007
11. Penal code
12. Kenya gazette supplement (1999) Policy Paper an Environment and Development (Sessional Paper No. 6 of 1999)
13. Architectural Designs and notes as well as project cost projections,
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15. Kenya gazette supplement Acts 1999, Environmental Management and Coordination Act CAP 387. *Government printer, Nairobi*
16. Kenya gazette supplement Environmental Management and Coordination (Waste Management) Regulations, 2006. The Public participation Act 2016, Kenya gazette supplement No. 175 (senate bills No. 15) *Government printer, Nairobi.*
17. The Physical and Land Use Planning Act, 2019, Kenya gazette supplement No. 129 (Acts No. 13).

ANNEX I

List of Indicators for Monitoring

NO.	ASPECT	LIST OF POTENTIAL INDICATORS TO BE MONITORED
1.	Occupational Health and Safety (*accidents and Injuries*)	▪ Site safety action plan ▪ Trained workers on safety and first aid skills ▪ First aid facility and injury reporting mechanism put in place ▪ Appropriate use of personal protective equipment (PPE) *(Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, etc.)* ▪ Trained workers on appropriate use of PPE. ▪ Sanitation facilities provided on site for human waste disposal ▪ Incident register and training of how to use it ▪ Updated contractor WIBA insurance policy ▪ Watering points for worker on site with clean water ▪ Memorandum of Understanding with nearby health Centre. ▪ Adequate covid-19 PPE and use by all persons on site. ▪ Trained workers on covid-19 rules and requirements.
2.	Public health and safety (*accidents and Injuries*)	▪ Use of safety signs at strategic places with high risks to the public. ▪ Hoarding off working sites ▪ Speed limit measures in place ▪ Awareness creation and sensitization activities for the public
3.	Visual/ aesthetic Impacts	▪ Backfilling of soil cuttings ▪ Landscaping of the project site
4.	Leakages and spills	▪ Recorded incidents of hazardous waste leakage or spills. ▪ Site-specific incident management or response plan. ▪ Oil trap measures at contractors yard
5.	Excessive Noise	▪ Noise regulation measures on construction equipment. ▪ Construction equipment and Machine servicing records ▪ Records of public notices for high noise level activities ▪ Appropriate use of noise PPE by workers ▪ Measures in place to reduce unnecessary hooting and speeding. ▪ Records of regular measurement of noise levels
6.	Air pollution	▪ Identified potential sources of air pollution on site ▪ Measures put in place to control effect of wind on material being transported
7.	Solid Waste generation	▪ Site-specific waste management plan ▪ Measures of waste avoidance, reduction, reuse and recycle put in place. ▪ Designated waste transfer station on site. ▪ Records of approvals from NEMA and County Government on waste management and disposal

8.	Increased Water consumption for	▪ No. of sensitization and awareness creation among construction workers
NO.	**ASPECT**	**LIST OF POTENTIAL INDICATORS TO BE MONITORED**
	Construction	▪ Measures to conserve water during structure curing. ▪ Records of response to leakage in the water system. ▪ Alternative water sources
9.	Risk of Spread of HIV/AIDS	▪ No. of HIV/AIDS prevention messaging ▪ No. of workers having access to safe sex (condoms-Male and female) ▪ Installed HIV testing services or an MoU with an existing government health facility in the area. ▪ No. of supported infected workers with ARVs ▪ Peer counseling services put in place
10.	Grievances	▪ Grievance redress committees put in place ▪ Contractor staff grievance structures put in place ▪ Sensitization and awareness creation ▪ No. of grievance logged, resolved and pending resolution
11.	Effects of Immigrant workers	▪ No of local workforce ▪ Community engagement plan in place ▪ Signed Code of Conduct by all workers ▪ Sensitization meeting on local social and cultural practices on acceptable behavior ▪ Sexual Harassment and Non-Discrimination Policy ▪ Labor Management Plan (LMP)
12.	Child Labor and Protection	▪ Records of employees including copies identification cards ▪ Records of child sexual relations offenses reported to the police. ▪ Recruitment policy prohibiting child labor put in place ▪ Review of employee records
13.	Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	▪ Sexual Harassment and Non-Discrimination Policy ▪ No of women and men employed ▪ No of sanitation facilities per sex ▪ Records of reported harassment cases ▪ Trained and sensitized employees on appropriate behavior ▪ Signed code of conduct against SH ▪ Gender action plan
14.	Gender-based violence at community level	▪ Implemented measures to prevent GBV at community level ▪ No. of community engagement and consultation with women and girls; ▪ No. of sub-project activities identified to be of high GBV risk at community level. ▪ Referral mechanisms are in place in the event of GBV at Community level

15.	Sexual exploitation and abuse (SEA)	▪ SEA management action plan ▪ Signed code of conduct (CoC) by all workers and sub-contractors ▪ Workers trained on CoCs and responsibilities ▪ Project-level IEC materials put in place ▪ Survivor-centered mechanisms put in place ▪ Multi-sectoral referral and assistance plan put in place ▪ Disciplinary procedures at the project put in place ▪ Confidential community-based complaints mechanisms in place ▪ PSEA awareness-raising done ▪ Community-level IEC materials put in place ▪ No of community outreach to women and girls about social risks and their PSEA-related rights; ▪ Integration of SEA in job descriptions, employments contracts, performance appraisal systems, ▪ Whistle-blower protection and investigation and disciplinary procedures put in place ▪ No. of training of project staff on SEA conducted

ANNEX II

Minutes for public Consultation and Participation Meeting

CENTER OF EXCELLENCE FOR RESEARCH & TRAINING IN BLUE ECONOMY & CIVIL ENGINEERING (C-BECE) PROJECT

MEETING MINUTES

Meeting Title	MEETING OF CENTER OF EXCELLENCE FOR RESEARCH & TRAINING IN BLUE ECONOMY & CIVIL ENGINEERING STAKEHOLDER CONSULTATION AND PUBLIC PARTICIPATION FOR ESIA REPORT.
Meeting Date	13th MAY 2024
Meeting Time	10:00AM – 12:20PM
Venue	
Reference	

1. MEETING AGENDA

- Center of Excellence for Research & training in Blue Economy & Civil Engineering construction stakeholder consultation and public participation for ESIA report

OPENING COMMENTS FROM CHAIR

2. AGENDA DISCUSSIONS

Session	Activity	Responsible
1: Opening prayers and introductions	The participants to the meeting were welcomed by the day's chair, Mr. Omolo. Thereafter, the meeting was called to order by a prayer from Mr. Yakub Maalim at 10:00AM. After the prayers, the participants were asked to introduce themselves and the constituency they represent (youth, women, VMGs, CBOs, administration etc.). The officers present also took turns to	**Mr. Omolo**

	introduce themselves.	
2: Introduction to the C-BECE Project	The participants were taken through the C-BECE project overview. Specifically, it was mentioned that the project aims at improving the community, Provision of Market for Supply of Building Material, income generating, scientific research. The project design is divided into 2 components. Blue Economy, Marine Technology and Civil Engineering Having given the introduction to the project, the facilitator went ahead to explain that the day's meeting was under component 1, and the purpose of the meeting was to collect views from the community and stakeholders on the proposed construction of the Blue Economy Centre in Mombasa. Furthermore, it is a requirement by the Ministry of Education that the community and the stakeholders be consulted before such a project is funded by the Bank. A question was then posed to the participants on their perception on the proposed construction of the marine block at Technical University of Mombasa.	**Mr. Omolo**
3: Community perceptions and questions on proposed C-BECE construction	Mr. Abdallah Yusuf was the first to contribute to the discussion. He opined that the proposed construction was a good idea. He also requested that the cost and the building design be shared with them to have a look at it. The response given was that the designs are available but have not been approved yet. Also, all participants who wanted to view the designs can do so after the meeting. The project cost was estimated to amount to KES 808,700,000. Masko Buya was the second participant to give his opinions and he urged his fellows to not reject the proposed construction of C-BECE. Hassan Omari had a follow up question on the project cost. Seeing that the cost was a whooping KES 940,000,000 was all that money going to the construction alone? Response given was that that is the case. Government infrastructure projects cost a lot of money since the facilities are built to last for a long time. There ensued a short period of low tone discussions amongst the participants and from the facilitator's observation, there was a unanimous agreement by the participants that the C-BECE construction was indeed a desirable thing. Seeing the good responses so far, the facilitator asked about the perceived positive impacts/advantages of the proposed C-BECE	**Mr. Omolo**

	construction.	
4. Positive impacts / advantages	The advantages the community perceived are as follows: 1. Labor force expected to come from the community. 2. Transfer of skill sets to the community during construction 3. Bring people together creating harmony in the community through such things as marriages, exchange of ideas 4. Expected local business to boom e.g. food vending, tea 5. Improved time management as early risers will be getting jobs first at the construction site 6. Improved livelihood conditions arising from the employment opportunities and the construction site. Suggestions from the community: ✓ Proposed to have a local contractor. ✓ Groups to take initiative to be service/material providers at the construction site. The facilitator did acknowledge the possibility of these suggestions, but noted that the community will have to show that they have the necessary qualifications. E.g., food vending will be a function of quality and hygiene to attract customers. Having given the positive impacts, the facilitator asked the community about the perceived negative impacts/disadvantages of the proposed fisheries office block construction.	**Eng. Oyola**
5. Negative impacts / advantages	The disadvantages the community perceived are as follows: 1. Occurrence of injuries to the workers on the site. 2. Local workforce not being employed. This was the community's main concern with the proposed construction project. 3. Increased conflicts resulting in marriage breakups due to expected sexual relations at the construction site 4. Increase prevalence of sexually transmitted infections such as STIs. 5. Increased prevalence of early pregnancies, abortion, and school dropout rates by the girl child. 6. Increased prevalence of child labor e.g. vending food Suggestions to mitigate injuries and STIs. ✓ First aid kit, safety equipment, fencing. ✓ Awareness creation among community members on STIs.	**Mr. Omolo**

6. Environmental concerns	The community raised concerns on environmental pollution especially on increased air pollution (increased dust and smoke) which may reduce visibility, as well as increased noise pollution from the machinery that will be used. They suggested the use of masks and personal protective equipment should help to reduce the effects of air pollution and noise pollution by the workers on the site. Another issue raised was cutting down mangrove, an invasive tree species, hence not an environmental risk in their assessment.	**Mr. Omolo**
7. Way forward	Having endorsed the C-BECE construction, the community members gave the following suggestions going forward. John Jillo – to have rules instituted governing the conduct of the construction workers before the commencement of the construction activities. Abdallah Yusuf – no discrimination in giving jobs e.g. tribalism, gender discrimination etc. Mataro – raised concerns on the soil quality of the site. Advised a thorough site survey of the soil to make sure it can hold the storey building Masko Buya – warned about corruption incidents at the construction site. Isaya Katana – have awareness campaigns to girls to avoid such emerging issues as early pregnancies. Mataro- noted that the projects take time to be implemented. what they sensitize the community about such that the community forgets what they were told. He asked the facilitator to comment on that. Response: C-BECE is a unique project and asked the community not to judge it based on their previous experiences with other projects, but to judge it based on the project's deliverables.	**Mr. Omolo**
8. Grievance redress mechanisms	The facilitator mentioned that there will be a grievance register book for the community to register their grievances. He further noted that there will be privacy maintained on the persons logging complaints to maintain their confidentiality. This will avoid causing the complainant being targeted or	**Mr. Omolo**

	discriminated against. Mr. Hasan asked whether the building belonged to the government or Technical University of Mombasa since he had come late to the meeting. He also wanted to know if the community will be represented in the construction committee. **Response**: The facilitator answered that the building will belong to the Technical University of Mombasa and that people will get to have services offered to them from the institution in terms of courses offered. Employment will also be given to the local community based on their competencies.	
9. Meeting Closure	After such a fruitful discussion, Mr. Mataro gave a vote of thanks and said a prayer to conclude the meeting at 12:20PM.	**Mr. Omolo**

ANNEX III

GRIEVANCE RESOLUTION MECHANISM

1. **Steps in dealing with grievances**
    - Complaint received in writing from affected person
    - Recording of grievance in standard form
    - Reconnaissance site visit with the complainant.
    - Submission of detailed complaint to Resident Engineer for resolution bynegotiation.
    - Submission of detailed complaint to the Grievance Committee for resolutionby mediation.
    - Submission of complaint to CWWDA for resolution.
2. **Composition of grievance committee**

No	Designation	Organization	Position
1.	EHS officer	Technical University of Mombasa	Chair
2.	Resident Engineer	Consultant	Committee Secretary
3.	EHS officer	Consultant	Committee Assistant Secretary
4.	Site Administrator	Contractor	Member
5.	EHS officer	Contractor	Member
6.	Chief	Community Representative	Member

ANNEX IV

Pollution Management PlanPollution Control Plan

1. Introduction:

The pollution control plan for the proposed project aims to mitigate potentialenvironmental impacts associated with the construction and operation phases of theproject. This plan is developed in accordance with environmental regulations and bestpractices to ensure the protection of natural resources and the health of the community. Project construction activities have the potential to generate a range of pollution sourcesthat require proper planning from the outset to avoid resulting in impacts to human,biological or other environmental receptors. These includes accidental emissions to air,water and soil, amongst others. The Project seeks to proactively manage such potentialpollution sources and to this effect has included specific obligations regarding pollutionprevention.

This CESMP defines the actions and measures necessary for the overall managementof pollution.

2. Purpose of the Pollution Prevention CESMP

The potential pollutants that could arise from the Project requires careful managementto avoid negative impacts on human health, and environmental factors such as groundwater, soils, surface water and ecology. This Construction Environmental & Social Management Plan (CESMP) therefore:

This CESMP therefore:

- Outlines the key policies, legislation and standards relating to pollutionmanagement;
- Defines roles and responsibilities;
- Outlines actions and measures necessary for the effective prevention ofpollution;
- Covers both accidental and intended emissions to air, noise, water and soils;
- Details specific control measures to be
- Incorporates the requirements of the ESIA findings, Supplemental Environmental Assessment, international standards and Project-specific construction permits.

3. Scope of the pollution prevention CESMP

This CESMP covers all construction activities and is applicable to all the staff, Contractors and Sub-contractors. Whilst this CESMP will act as a 'framework' to determine what the Contractors will be expected

4. Key role and responsibilities

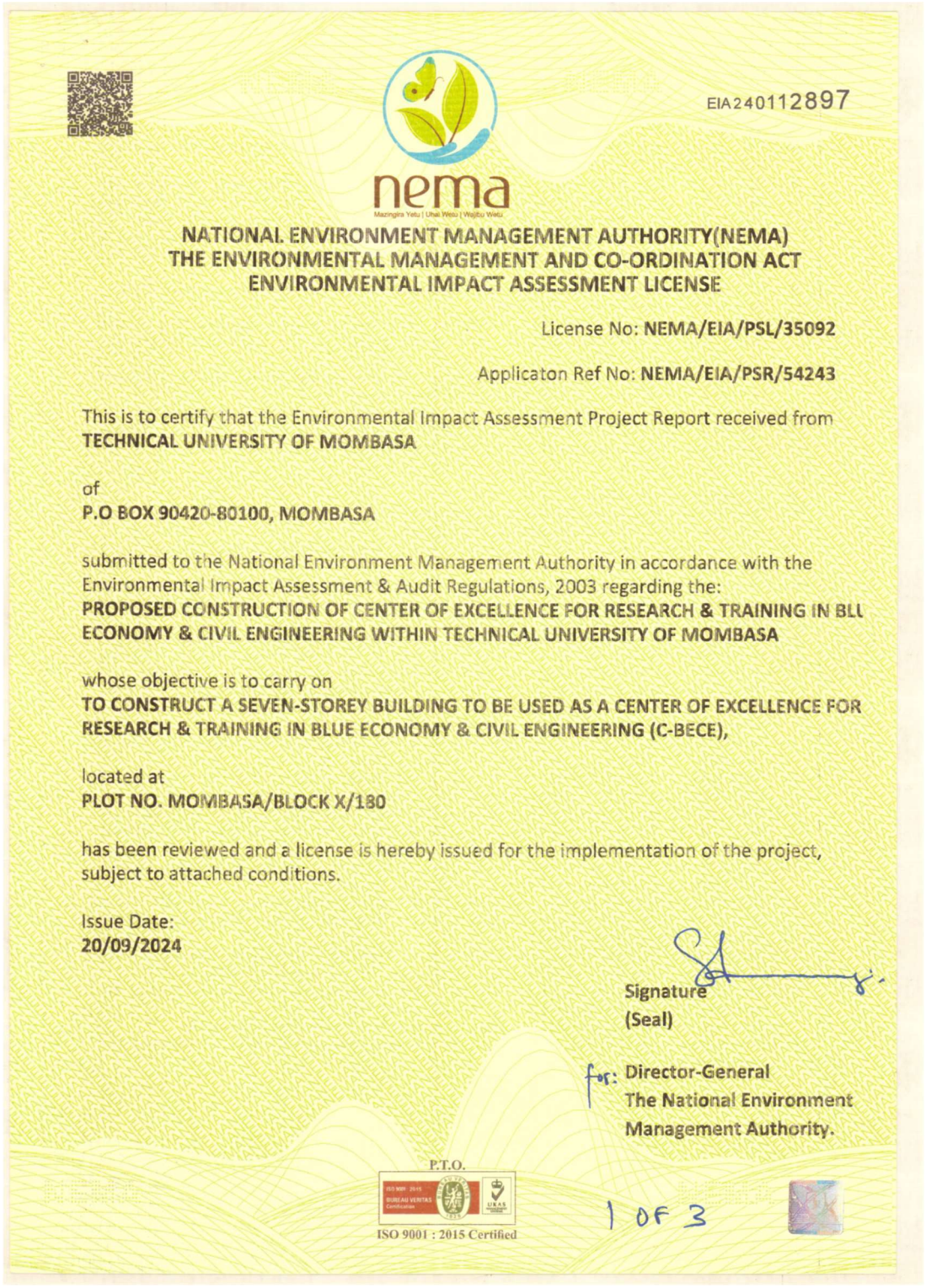
An integrated approach to pollution prevention involves a range of stakeholders, including the Client, Consultant, the Contractors (and subcontractors), local authorities, regulatory agencies and the general public. Such a system therefore requires robust processes regarding information dissemination, training, and designation ofresponsibility, management actions, monitoring, control, and remedial actions. The general roles and responsibility are highlighted in the table below;

Activities	Consultant	Contractors	Client
Planning	x	X	
Dissemination of Information	x	X	
Management of Pollution	x	X	X
Spill response & Treatment		X	X
Professional training	x	X	X
Surveillance and Control	x	X	
Monitoring and audit	x	X	
Corrective actions	x	X	
Management of Cooperation	x	X	

5. **Pollution Sources:**

Identify and categorize potential sources of pollution associated with the project, including construction activities, operational processes, and wastewater discharge.

NEMA CERTIFICATE



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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT LICENSE

License No: **NEMA/EIA/PSL/35092**

Applicaton Ref No: **NEMA/EIA/PSR/54243**

This is to certify that the Environmental Impact Assessment Project Report received from
TECHNICAL UNIVERSITY OF MOMBASA

of
P.O BOX 90420-80100, MOMBASA

submitted to the National Environment Management Authority in accordance with the Environmental Impact Assessment & Audit Regulations, 2003 regarding the:
PROPOSED CONSTRUCTION OF CENTER OF EXCELLENCE FOR RESEARCH & TRAINING IN BLU ECONOMY & CIVIL ENGINEERING WITHIN TECHNICAL UNIVERSITY OF MOMBASA

whose objective is to carry on
TO CONSTRUCT A SEVEN-STOREY BUILDING TO BE USED AS A CENTER OF EXCELLENCE FOR RESEARCH & TRAINING IN BLUE ECONOMY & CIVIL ENGINEERING (C-BECE),

located at
PLOT NO. MOMBASA/BLOCK X/180

has been reviewed and a license is hereby issued for the implementation of the project, subject to attached conditions.

Issue Date:
20/09/2024

Signature
(Seal)

for: **Director-General**
The National Environment Management Authority.

P.T.O.

ISO 9001 : 2015 Certified

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3. **General Conditions**

3.1 The license is given for the **proposed construction of a seven storey university block on PLOT L.R.No. MSA/X/180 , Mombasa County.**

3.2 Without prejudice to the other conditions of this license, the proponent shall Implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve Compliance with the requirements and conditions of this license.

3.3 The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Co-ordination Act, 1999 and regulations there under.

3.4 This license shall not be taken as statutory defense against charges of pollution in respect of any manner of pollution not specified herein.

3.5 The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

3.6 The proponent shall submit an Environmental Audit Report in the first year of operation to confirm the efficacy and adequacy of the Environmental Management Plan.

3.7 The proponent shall comply with NEMA's improvement orders throughout the project cycle

3.8 The proponent shall provide final accounts (final project cost) on completion of construction phase. This should be done prior to project commissioning/operation/occupation.

4. **Construction Conditions**

4.1. The proponent shall ensure that the proposed project is registered with the National Construction Authority (NCA) before commencement of the project

4.2. The proponent shall ensure that the proposed project is implemented by qualified and registered engineers and contractor

4.3. The proponent shall ensure that appropriate and adequate storm water management system is incorporated in the design of the proposed project and implemented in accordance with the requirements of the County Government of Mombasa

4.4. The proponent shall ensure that an appropriate on site waste water treatment plant is incorporated in the designs of the proposed project and implemented. The engineered design of the onsite waste water treatment facility to be submitted to NEMA before commencement of the project.

4.5. The proponent shall ensure that a riparian reserve of at least 6 metres and a maximum of 30 metres is observed from the highest water mark (depending on the width of the water resource) and no permanent structures are erected on this riparian land.

4.6. The proponent shall ensure that a shoreline setback of 30 metres from the highest water mark is observed if the site of the proposed project is along the shoreline.

4.7. The proponent shall ensure that the proposed project does not encroach on any road reserve storm water drain, water course, water body and or any public utility service lane reserve.

4.8. The proponent shall ensure that construction activities are undertaken during the day (and not at night) between 0800Hrs and 1700Hrs; and that transportation of construction material to and from the site is undertaken during weekdays (off peak hours)

4.9. The proponent shall ensure that appropriate and functional efficient air pollution Control mechanisms are installed in the facility to control all air emissions

4.10. The proponent shall ensure that all excavated material and debris is collected, re used and where need be disposed off as per the Environmental Management and Coordination (Waste Management) Regulations 2006.

4.11. The proponent shall ensure strict adherence to the provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulations 2009.

4.12. The proponent shall ensure appropriate dust arrestors/screens are incorporated during the construction phase to minimise dust in the neighbouring facilities.

4.13. The proponent shall ensure adequate parking space is provided within plot boundary

4.14. The proponent shall ensure that a comprehensive traffic management plan is developed and implemented

4.15. The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.
4.16. The proponent shall ensure strict adherence to the Environmental Management Plan developed throughout the project cycle.
4.17. The proponent shall ensure that adequate and appropriate sanitary facilities are provide for the workers during construction phase and that proper decommissioning of the facilities is carried out once construction is complete.
4.18. The proponent shall ensure that construction workers are provided with adequate personal protective equipment (PPE), as well as adequate training
4.19. The proponent shall provide a waste receptacle accessible for County Government/Private waste collectors to collect the solid waste
4.20. The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of County Government of Mombasa, Ministry of Health, Ministry of public works and other relevant Authorities.

5. Operational Conditions

5.1 The proponent shall ensure that any ground water abstraction for use in the proposed project shall be authorised by Water Resource Management Authority and an EIA license obtained from NEMA.
5.2 The proponent shall ensure that an effluent discharge license is obtained from NEMA for the waste water treatment plant within the first year in operation.
5.3 The proponent shall ensure that an occupation certificate is issued by relevant Authority(s) before occupation of the building
5.4 The proponent shall ensure that all equipment used are well maintained in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations 2009
5.5 The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations 2006.
5.6 The proponent shall ensure that all waste water is disposed as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations 2006
5.7 The proponent shall comply with the relevant principal laws, by-laws and Guidelines issued for development of such a project within the jurisdiction of County Government of Mombasa, Ministry of Lands, Physical Planning Department and other relevant Authorities
5.8 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration are designed, constructed and employed simultaneously with the proposed project.

6. Notification Conditions

6.1 The proponent shall seek written approval from the Authority for any operational changes under this licence
6.2 The proponent shall keep records of all pollution incidences & notify the Authority within 24 hrs.
6.3 The proponent shall notify the Authority of its intent to decommission three months in advance in writing.

7. Decommissioning Conditions

7.1 The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning
7.2 The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

The above conditions will ensure environmentally sustainable development and **must** be complied with

NEMA/MSA/EIA/PSR/54243

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