

**ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT REPORT
FOR**

**PROPOSED HOSTELS FOR UMMA UNIVERSITY ON PLOT LR NO. KJD/KIPETO/2419
AT KISAJU AREA, KAJIADO WEST SUB COUNTY IN KAJIADO COUNTY**



**PROPONENT:
UMMA UNIVERSITY TRUST (REGISTERED TRUSTEES)
P.O BOX 70803 - 00400
NAIROBI**

**REPORT SUBMITTED TO:
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
NAIROBI COUNTY**

*This report is done in accordance with the requirements of the Environmental Impact Assessment and
Audit Regulations, 2003,
Pursuant to the Environmental Management and Coordination Act, (EMCA) Cap. 387*

AUGUST-2026

Declaration and Professional Certification

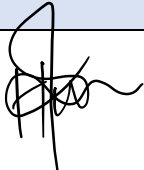
This Environmental and Social Impact Assessment (ESIA) has been prepared by a duly registered EIA/EA Expert in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387, the Environmental (Impact Assessment and Audit) Regulations (Legal Notice No. 101), and the EIA Technical Guidelines. All information contained herein is accurate to the best of the expert's knowledge and professional judgment.

The expert takes full responsibility for the contents of this report and affirms that the assessment was conducted objectively and without undue influence.

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Date: <u>21st August 2026</u>	Date: <u>18th August, 2026</u>

REPORT UNDERTAKEN BY

This Environmental Impact Assessment study report is submitted to the National Environment Management Authority (NEMA) pursuant to the Environmental Management and Coordination Act, CAP 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003.

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PROJECT SUMMARY

Project Title	Construction of Student Hostels at UMMA University
Proponent	UMMA University Trust (Registered Trustees)
Project Location	UMMA University Main Campus, Kajiado
County	Kajiado County
Sub-County	Kajiado West Sub-County
GPS Coordinates	Latitude -1.778186, Longitude 36.821622
Total Project Cost	KSh 770,845,522
Report Type	Full ESIA Study Report
Date of Study	August, 2026
TOR Approval	NEMA/ENVIS/EIA/TOR/ Approval 0224
Legal Basis	EMCA Cap 387

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ACRONYMS AND ABBREVIATIONS

CUE	– Commission for University Education
CIDP	– County Integrated Development Plan
CPP	– Consultation and Public Participation
EA	– Environmental Audit
EHS	– Environmental, Health and Safety
EIA	– Environmental Impact Assessment
EMCA	– Environmental Management and Co-ordination Act
EMP	– Environmental Management/Monitoring Plan
GHG	– Greenhouse Gas
KEBS	– Kenya Bureau of Standards
KNEC	– Kenya National Examinations Council (reference only)
Km	– Kilometres
KPLC	– Kenya Power and Lighting Company
L.R.	– Land Registration/Reference
NCA	– National Construction Authority
NEMA	– National Environment Management Authority
OSHA	– Occupational Safety and Health Act
PPE	– Personal Protective Equipment
PWD	– Persons With Disability
ToR	– Terms of Reference
WRA	– Water Resources Authority

EXECUTIVE SUMMARY

Introduction

UMMA University proposes to construct student hostels within its main campus situated on L.R. No. Kjd/Kipeto/2419, along the Nairobi-Namanga Road, at Kisaju area in Kajiado County. The proposed development is intended to expand on-campus student accommodation in response to growing enrolment, and will comprise two (2) hostel blocks with a capacity of 316 bed spaces, together with associated ablution blocks, common rooms, laundry areas and support infrastructure.

The total project cost is estimated at Kenya Shillings Seven Hundred and Seventy Million Eight Hundred and Forty Five Thousand Five Hundred and Twenty Two (KES 770,845,522.00), out of which a sum of KES 770,846.00, being 0.1% of the project cost, is payable to NEMA as prescribed under the Environmental (Impact Assessment and Audit) Regulations.

Kenyan law requires that an Environmental Impact Assessment (EIA) be carried out at the planning stage of any project likely to have a significant effect on the environment, to ensure that environmental concerns are integrated into the design, construction, operation and eventual decommissioning of the project. This study has therefore been undertaken in compliance with Section 58 of the Environmental Management and Coordination Act (EMCA), CAP 387, and in line with the approved Terms of Reference for the project.

Scope

The scope of this assessment covered the baseline environmental and socio-economic conditions of the study area, a description of the proposed hostel development, the applicable legal and institutional framework, identification of the anticipated positive and negative impacts associated with the project's construction, operation and decommissioning phases, and the formulation of appropriate mitigation measures presented in an Environmental Management Plan (EMP).

Methodology Outline

- Review and approval of the Terms of Reference (Ref: NEMA/ENVIS/EIA/TOR/Approval_0224)
- Environmental screening of the project against the Second Schedule of EMCA, CAP 387
- Environmental scoping to identify key environmental and social issues
- Desktop review of applicable policy, legal and institutional frameworks
- Physical site inspection and reconnaissance of the surrounding area
- Consultation and public participation through key informant interviews and questionnaires
- Data analysis, impact identification and formulation of mitigation measures
- Compilation and reporting

Positive Impacts

The project is expected to generate a number of positive impacts including: employment opportunities during construction and operation, improved access to safe and affordable on-campus student housing, optimal utilization of institutional land, stimulation of local businesses supplying goods and services, enhanced security and welfare for students, and increased revenue to the County and National Government.

Negative Impacts and Mitigation Measures

Table 1 below presents a summary of the anticipated negative impacts of the proposed hostel development together with the corresponding proposed mitigation measures. A detailed discussion, together with a comprehensive Environmental Management Plan (EMP), is provided in the main body of this report.

Table 1: Summary of Anticipated Impacts and Proposed Mitigation Measures

Possible Impact	Proposed Mitigation Measure(s)
Soil erosion and disturbance of the campus landscape	• Control earthworks • Install drainage structures • Progressively re-vegetate disturbed areas
Dust and air quality impacts	• Water spraying of exposed surfaces • Use of dust screens • PPE for workers
Noise and vibration affecting learning environment	• Schedule noisy works outside lecture/ exam hours • Have sound barriers in place • Undertake equipment maintenance
Increased water demand	• Use water-efficient fittings • Undertake rainwater harvesting • Have storage tanks • Have a borehole as back-up
Increased wastewater/ sewage generation	• Connection to existing campus waste water treatment system
Solid waste generation (construction and occupation)	• Segregation at source • Have a contracted NEMA-licensed waste handler • Utilize the 3R (reduce, reuse, recycle) programme
Occupational health and safety risks to workers and students	• Have PPEs in place • Site fencing/hoarding to separate works from active campus areas • OSHA-compliant site management • Have an emergency preparedness plan
Disruption to ongoing university academic activities	• Phased construction • Scheduling of high-noise activities during recess periods • Have clear signage • Traffic routing
Fire risk in hostel occupancy	• Fire detection and suppression systems • Fire assembly points • Regular fire drills
Climate change related risks (flooding, heat stress, water stress)	• Have a climate-resilient design in place • Ensure energy efficiency • Ensure water conservation

Conclusion

Having regard to the positive socio-economic benefits anticipated from the proposed

development, the institutional need for additional student accommodation, and the finding that no significant unmitigable adverse impacts will arise, it is recommended that the project be permitted to proceed on condition that the proponent implements the mitigation measures recommended in this report and the accompanying Environmental Management Plan.

Recommendations

- The proponent should strictly implement the measures outlined in the EMP and comply with all applicable national and county environmental, health, safety and higher-education regulatory requirements throughout the project cycle.
- Positive impacts should be maximized, in particular local employment and procurement opportunities during construction.
- NEMA grant conditional approval, subject to strict implementation of the ESMMP.
- Climate-resilient design features – passive cooling, rainwater harvesting, permeable paving, storm water retention – be incorporated before construction drawings are finalized.
- A NEMA-registered EHS Officer be appointed before construction commences.
- Annual independent environmental audits be conducted throughout the project life cycle.

CHAPTER ONE

1.0 INTRODUCTION

UMMA University is a chartered institution of higher learning in Kenya, with its main campus located along the Nairobi-Namanga Road at Kisaju area in Kajiado County. In response to a growing student population and the institution's strategic plan to improve on-campus welfare and retention, the University proposes to construct additional student hostels within its main campus land, on L.R. No. Kjd/Kipeto/2419.

The proposed hostel development will comprise of two (2) hostel blocks with a capacity of 316 bed spaces, together with ancillary facilities such as game rooms, prayer rooms, common rooms, laundry and drying areas, ablution blocks, and associated external works including walkways, parking and landscaping.

Currently, a section of the university's students relies on accommodation outside the campus, within the surrounding Kajiado township and along the Nairobi-Namanga corridor, which presents challenges related to commuting safety, cost, and the University's ability to guarantee a consistent, values-aligned residential learning environment. The proposed hostels are intended to address this gap.

As the proposed development is likely to have both direct and indirect impacts on the site and its surrounding environment, an Environmental Impact Assessment (EIA) Study was necessary to identify these impacts and propose appropriate mitigation measures, in fulfilment of the requirements of the Environmental Management and Coordination Act (EMCA), CAP 387 and its subsidiary regulations.

An ESIA is a mandatory regulatory requirement for any project listed under the Second Schedule of EMCA that is likely to have significant environmental or social effects. Its purpose is to systematically identify, predict, and evaluate potential impacts — both positive and negative — and to prescribe mitigation and enhancement measures that ensure the project is environmentally sustainable and socially responsible.

1.2 Scope, Objectives and Criteria of the EIA

1.2.1 Scope

The scope of this EIA covered:

- Baseline environmental and socio-economic conditions of the study area
- Description of the proposed hostel project and its associated activities
- Provisions of the relevant environmental, planning, and higher-education regulatory framework
- Identification and discussion of anticipated adverse and beneficial impacts
- Formulation of appropriate mitigation measures
- Development of an Environmental Management/Monitoring Plan (EMP)

1.2.2 Objectives of the EIA

- To identify and assess the potential environmental, social, health and safety impacts of the proposed hostel development.
- To propose feasible and cost-effective mitigation measures for identified negative impacts.
- To enhance and maximize the anticipated positive impacts of the project.
- To fulfil the statutory requirement for EIA licensing under EMCA CAP 387 prior to commencement of construction.
- To provide an Environmental Management Plan to guide the proponent and contractor during construction, operation and eventual decommissioning of the hostels.

1.2.3 Terms of Reference (ToR) for the EIA Process

The Terms of Reference for this EIA Study were submitted to and approved by the Authority under Ref: NEMA/ENVIS/EIA/TOR/Approval_0224 on 15th May, 2026

1.2.4 Data Collection Procedures

Data collection was carried out through site visits and physical inspection, review of institutional and design documents provided by the proponent, key informant

interviews, students and neighbors, desktop review of secondary data and applicable legislation, and photographic documentation, in the manner specified under Part V (Sections 31-41) of the Environmental (Impact Assessment and Audit) Regulations.

1.2.5 Reporting and Documentation

This EIA Study Report has been compiled in accordance with the format and guidelines issued by NEMA, for submission by the proponent for consideration and approval. The consultant maintained continuous engagement with the proponent's representatives throughout the exercise.

1.2.6 Methodology Outline

The general steps followed during this assessment were:

- Formulation and approval of the Terms of Reference
- Environmental screening, confirming that the project falls among those requiring an EIA under the Second Schedule of EMCA, CAP 387
- Environmental scoping to identify key environmental and social issues associated with the campus setting
- Desktop studies, review of institutional plans, and interviews with University administration
- Physical inspection of the proposed site and the surrounding campus and neighbourhood
- Public participation using key informant interviews and consultative meetings
- Analysis of findings and reporting

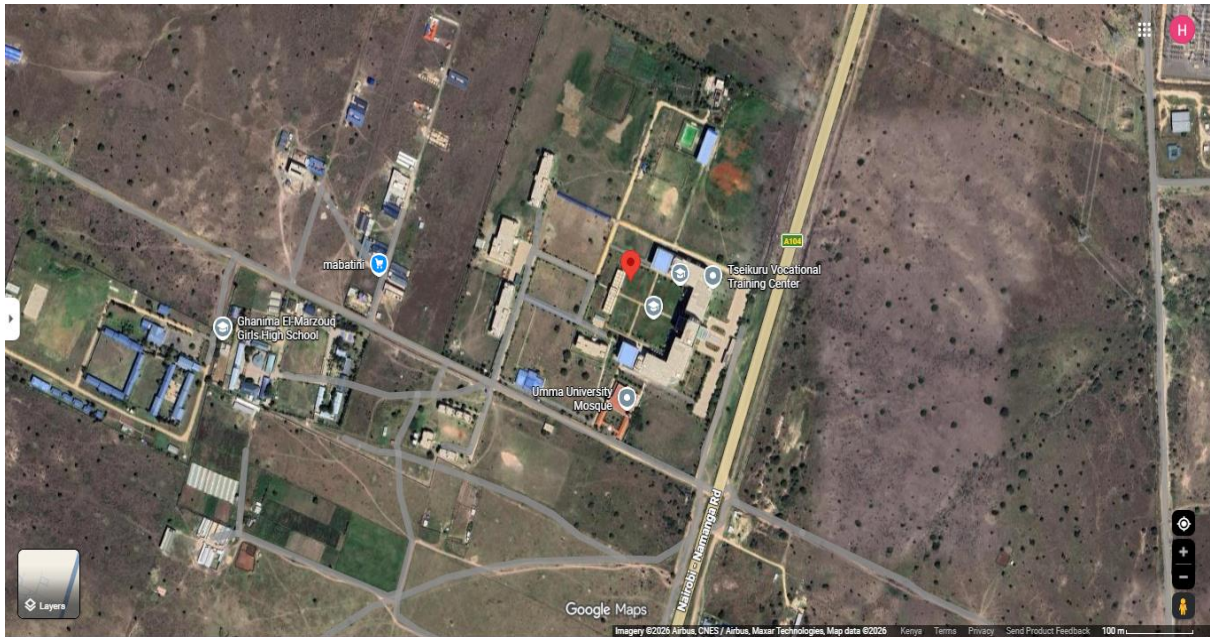
2. PROJECT DESCRIPTION

2.1 Location

The proposed hostel development is to be established on L.R. No. Kjd/Kipeto/2419, within the UMMA University main campus, situated along the Nairobi-Namanga Road in Kajiado County. The proposed site lies within the existing university land holding and is bordered by other institutional developments, including existing library, hostels, staff housing and the campus perimeter.

The proposed project is located at approximate coordinates **Latitude -1.778186**, **Longitude 36.821622**. The site is in line with the institutional master plan/zoning of the University and the immediate neighbours comprise of commercial and residential development.





2.2 Project Cost

The total project cost is estimated at Kenya Shillings Seven Hundred and Seventy Million Eight Hundred and Forty Five Thousand Five Hundred and Twenty Two (KES 770,845,522.00), out of which a sum of KES 770,846.00, being 0.1% of the project cost, is payable to NEMA as prescribed by law.

2.3 Design of the Project

The proposal is to construct purpose-built student hostel block(s) within the UMMA University campus, designed to be gender-appropriate, in keeping with the University's values-based residential model, and compliant with applicable building and higher-education facility standards.

Table 2: Features of the Proposed Project

Feature	Description
Number of hostel blocks	2
Number of floors per block	Ground plus four upper floors (G+4)
Bed capacity (male wing)	158
Bed capacity (female wing)	158
Total bed capacity	316
Room typology	4-in-1 and 2-in-1 rooms
Ancillary facilities	Game rooms, laundry/ drying yards, locker rooms, prayer rooms

The design will incorporate the following environmentally and socially responsive features:

- Energy conservation through use of natural lighting and cross-ventilation
- Water conservation through water-efficient sanitary fittings, rainwater harvesting and storage.
- Accessibility features for Persons with Disability (PWD), including ramps, accessible rooms and sanitary facilities, in line with the Constitution of Kenya and the Persons with Disabilities Act.
- Segregated, secure and appropriately supervised accommodation wings in keeping with the University's institutional values.

2.3.1 Electrical System

The hostels will be connected to the existing campus electrical reticulation, sourced from the Kenya Power and Lighting Company (KPLC) grid, supplemented where feasible by solar photovoltaic installations for common area and security lighting and

solar water heating. Standard electrical safety installations including distribution boards, earthing, lightning protection and emergency lighting will be provided.

2.3.2 Water Reticulation System

Water for construction will be sourced from registered water vendors and existing campus boreholes. During operation, the hostels will be served by the existing campus water supply system, sourced from the boreholes, water vendors, supplemented by rainwater harvesting and storage tanks to ensure sufficiency, particularly given the semi-arid conditions typical of Kajiado County.

2.3.3 Sewerage and Storm Water Management

Effluent from the hostels will be connected to the existing campus wastewater treatment system. Storm water will be managed through a combination of graded surfaces, drains and attenuation, discharging into the existing campus storm water infrastructure.

2.4 Description of the Project's Construction Activities

2.4.1 Site Clearance, Excavation and Foundation Works

Site clearance, excavation and foundation works will be undertaken using a combination of earthmoving machinery and manual labour, to prepare the site for the hostel foundations, pavements and drainage systems.

2.4.2 Storage of Materials

Building materials will be stored on a designated section of the site. Bulky materials will be ordered in manageable quantities to minimise on-site stockpiling, while materials such as cement and finishes will be stored in temporary weatherproof structures.

2.4.3 Masonry, Concrete Works and Related Activities

General masonry works will include stone shaping, concrete mixing, plastering, slab construction, and erection of building walls, supplemented by mechanical equipment such as concrete mixers.

2.4.4 Structural Works

The hostel blocks will be reinforced with structural steel and/or reinforced concrete framing for structural stability, involving steel cutting, bending and fixing works.

2.4.5 Plumbing and Electrical Installation

Installation of water supply, drainage and electrical works will be undertaken concurrently with the building works, including pipe-work, cabling, and fixture installation.

2.4.6 Products, By-products and Waste Generated During Construction

- Dust emissions from excavation and other construction activities
- Formwork off-cuts, packaging waste (cement bags, wrapping) and construction debris
- Oil and fuel spills from improperly maintained machinery and vehicles
- Sewage and greywater from construction workers on site

2.5 Description of the Project's Occupational (Operational) Activities

2.5.1 Student Accommodation and Welfare Activities

Once operational, the hostels will host resident students engaged in typical residential activities including sleeping, studying, laundry, and recreation, under the supervision of hostel wardens/matrons.

2.5.2 Solid Waste and Wastewater Management

The University will provide facilities for handling solid waste generated within the hostels, including bins/skips for temporary holding before disposal by a NEMA-licensed waste handler. Sewage and wastewater will be channeled into the campus treatment system.

2.5.3 Cleaning, Repairs and Maintenance

Routine cleaning, repairs and maintenance of the hostel buildings, fittings and grounds will be undertaken by the University's facilities/estates department.

2.5.4 Products, By-products and Waste Generated During Operation

- Food and drink remains
- Laundry wastewater and solid waste from washing of clothes and beddings
- Sewage waste from ablution facilities
- General solid waste including paper, plastics and packaging from student use

2.6 Description of the Project's Decommissioning Activities

2.6.1 Demolition Works

Should decommissioning ever become necessary, hostel structures, pavements and associated facilities will be demolished, with resultant solid waste reused where possible or disposed of through a licensed waste handler.

2.6.2 Dismantling of Equipment and Fixtures

Electrical installations, furniture, fittings and fixtures will be dismantled and, where possible, reused elsewhere within the University or donated to other institutions.

2.6.3 Site Restoration

Following removal of demolition waste, the site will be restored through replenishment of topsoil and re-vegetation, in keeping with the University's landscaping and master plan.

3. BASELINE INFORMATION OF THE STUDY AREA

3.1 Physical Environment

3.1.1 Location

Kajiado County lies in the southern part of Kenya, bordering Nairobi and Kiambu Counties to the north, Narok to the west, Taita Taveta and Makueni to the east and south-east, and the Republic of Tanzania to the south. The University's main campus is situated along the Nairobi-Namanga Road, in Kisaju area within Kajiado town and its environs.

3.1.2 Climatic Conditions

Kajiado County generally experiences a semi-arid to arid climate, with lower and more erratic rainfall than neighbouring Nairobi County. Rainfall occurs in two seasons: the long rains (March to May) and the short rains (October to December). Mean annual rainfall in much of the County ranges from approximately 500 mm to 800 mm, with localized variation. Temperatures are generally warmer than Nairobi, with mean daily maximum temperatures in the range of 25°C to 30°C and mean minimum temperatures of approximately 14°C to 18°C, depending on altitude and season.

The area experiences predominantly easterly to south-easterly winds, with the strongest winds typically preceding the long-rains season. Sunshine hours are generally high given the semi-arid setting, averaging in excess of seven hours per day for much of the year.

3.1.3 Water Resources

Kajiado County has limited surface water resources compared to Nairobi, with reliance on boreholes, seasonal rivers, and piped supply where available. Water scarcity is a recognized challenge in the County, making rainwater harvesting and water conservation particularly important design considerations for the proposed hostels.

3.1.4 Soils and Ecological Conditions

Kajiado County's soils are generally characterized by well-drained sandy to loamy soils in the plains, interspersed with black cotton soils in localized low-lying areas. The County falls within the wider Athi-Kapiti and Amboseli ecosystem, historically supporting rangeland and wildlife dispersal areas, particularly around the Nairobi National Park dispersal corridor and the greater Amboseli-Kilimanjaro landscape further south. The immediate campus environment is a developed institutional setting with limited natural vegetation cover beyond landscaped grounds.

3.2 Socio-Economic Environment

3.2.1 Population

Kajiado County has experienced significant population growth in recent years, driven substantially by its proximity to Nairobi and associated urban sprawl along the Nairobi-Namanga, Nairobi-Magadi and Nairobi-Isinya corridors. The County's population as per the 2019 Kenya Population and Housing Census was approximately 1,117,840 persons, with continued growth anticipated to 2030.

3.2.2 Land Use

Land use within Kajiado County has traditionally been dominated by pastoralism and rangeland use, but has increasingly diversified to include institutional, residential, commercial and industrial development, particularly along the major transport corridors radiating from Nairobi. The UMMA University campus represents an established institutional land use within this broader mixed-use setting.

3.2.3 Energy Access

Households and institutions in Kajiado County rely on a mix of grid electricity (KPLC), solar power, and, in more rural parts of the County, biomass fuels. The University campus is connected to the national grid, supplemented by solar installations in parts of the campus.

3.2.4 Infrastructure

The campus benefits from its location along the Nairobi-Namanga Road (a key

regional transport corridor linking Nairobi to the Namanga border and onward to Tanzania), providing good access for students, staff, and supply of construction materials. The area is served by mobile telecommunications infrastructure and is within reach of Kajiado town's commercial and public services.

3.2.5 Sanitation

Sanitation coverage in Kajiado County is mixed, with urbanizing areas served by septic systems, package treatment plants or emerging sewerage infrastructure, and more rural areas relying on pit latrines. The University campus currently manages its wastewater through a waste water treatment system.

3.2.6 Climate Change and its Effects in the County

Kajiado County is recognized as one of the counties most vulnerable to climate variability in Kenya, given its semi-arid classification. Effects already being experienced include recurrent and prolonged droughts, erratic and unpredictable rainfall, declining water availability, and increased temperatures, all of which affect both the pastoralist economy and the built environment, including institutional facilities such as the University campus.

4. LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Constitutional and Legal Framework

4.1.1 Constitution of Kenya (2010)

Article 42 - Environment: Every person has the right to a clean and healthy environment, including having the environment protected for present and future generations, and having obligations relating to the environment fulfilled under Article 70.

Article 43 - Economic and Social Rights: Every person has the right to accessible and adequate housing, reasonable standards of sanitation, and to education.

Article 55 - Youth: The State shall take measures to ensure that the youth access relevant education and training, consistent with the University's mandate to provide adequate, safe student accommodation.

Compliance: The proponent, as a chartered institution of higher learning, recognizes its obligation to provide a clean, healthy and safe living and learning environment for its students and staff, and has commissioned this EIA in fulfilment of that obligation.

4.1.2 The Environmental Management and Coordination Act, CAP 387 (EMCA)

EMCA and its attendant Environmental (Impact Assessment and Audit) Regulations, provide the principal legal and institutional framework for environmental management in Kenya, including environmental impact assessment (EIA) and environmental audit (EA).

Section 58(1) requires that any proponent of a project shall, before financing, commencing or proceeding with it, submit an EIA report to NEMA. Section 68(1) empowers NEMA to carry out environmental audits of projects likely to have significant environmental impacts.

Compliance: The proponent has commissioned this EIA in compliance with Section 58(1) of EMCA and will implement the recommended EMP, adhere to the conditions of the EIA licence, and undertake subsequent environmental audits and self-audits as

required.

4.1.3 Universities Act, No. 42 of 2012

The Universities Act establishes the legal framework for the establishment, accreditation and governance of universities in Kenya, and mandates the Commission for University Education (CUE) to set and enforce standards, including standards relating to physical facilities, student welfare and accommodation, for chartered universities.

The CUE Universities Standards and Guidelines prescribe minimum requirements for student welfare facilities, including hostel accommodation, sanitation ratios, recreational space and safety provisions, which chartered universities such as UMMA University are required to meet or exceed.

Compliance: The proposed hostel design will be developed in consultation with the University's Quality Assurance office to ensure conformity with CUE physical facilities standards and guidelines, in addition to NEMA and county planning requirements.

4.1.4 Physical and Land Use Planning Act, 2019

The Act provides the legal framework for spatial and physical development planning in Kenya, empowering county governments to prepare local physical development plans and to control land use and development, including institutional developments such as university campuses.

Compliance: The proponent will submit architectural and site development plans to the County Government of Kajiado's Physical Planning Department for approval prior to commencement of construction, and will ensure the hostel development conforms to the approved campus master plan.

4.1.5 Physical Planning (Building and Development Control) Regulations / Building Code

These regulations set standards for the design and construction of buildings to safeguard the safety and health of occupants, and require that building plans be

prepared by registered professionals, approved prior to construction, and inspected during and after construction.

Compliance: Building plans for the hostels will be prepared by registered architects/engineers, approved by the relevant County authority, and construction will be subject to periodic inspection, with a Certificate of Occupation/Completion obtained prior to student occupation.

4.1.6 The Public Health Act (CAP 242)

The Act empowers local authorities and the Ministry of Health to take measures to maintain sanitary conditions and abate nuisances, including nuisances arising from inadequate waste disposal, offensive smells, or unsanitary premises - provisions directly relevant to hostel/dormitory facilities.

Compliance: The University will ensure hostel sanitary facilities conform to Ministry of Health standards, that solid waste is handled by a licensed collector, and that wastewater is appropriately treated prior to discharge.

4.1.7 Occupational Safety and Health Act, 2007 (OSHA)

OSHA makes provision for the health, safety and welfare of persons at places of work, including construction sites and, by extension, institutional premises such as university hostels where support staff are employed. Key provisions relate to cleanliness, ventilation, fire precautions, first aid, and provision of protective clothing.

Compliance: The proponent will appoint a competent, OSHA-compliant contractor for the construction phase, and will ensure the completed hostels are registered as a workplace where applicable, fitted with fire detection/fighting equipment, and maintained to OSHA standards during operation.

4.1.8 The County Government Act, 2012

The Act empowers county governments, including the County Government of Kajiado, to establish and maintain sanitary services, undertake local physical planning, and enforce development control within their jurisdiction.

Compliance: The proponent will comply with all applicable directives and by-laws of the County Government of Kajiado throughout the project cycle.

4.1.9 The Environmental Management and Coordination (Waste Management) Regulations, 2024

These regulations provide guidelines for the handling, segregation, storage, transportation and disposal of different categories of waste, and require waste generators to adopt cleaner production principles and to use licensed waste handlers.

Compliance: The University will ensure that solid waste generated during both construction and operation of the hostels is segregated at source and transported by a NEMA-licensed waste handler to an approved disposal/recycling facility.

4.1.10 The Environmental Management and Coordination (Water Quality) Regulations, 2024

These regulations prohibit the discharge of pollutants into the environment other than in accordance with prescribed standards, and require dischargers of effluent to monitor and report discharge quality and quantity to the Authority periodically.

Compliance: Wastewater from the hostels will be managed through the campus waste water treatment system, with effluent quality monitored in accordance with the regulations.

4.1.11 The Sustainable Waste Management Act, 2022

This Act establishes the legal and institutional framework for sustainable waste management in Kenya, promoting waste segregation, extended producer responsibility, circular economy practices and reduction of waste sent to disposal sites.

Compliance: The University will develop a waste segregation and management programme for the hostels, incorporating reduction, reuse and recycling ahead of final disposal.

4.1.12 Noise and Excessive Vibration Pollution (Control) Regulations, 2009

These regulations prohibit the making of loud, unreasonable or unusual noise that

disturbs the comfort, health or safety of others, and are of particular relevance given the need to protect the University's teaching, learning and residential environment from construction-related noise.

Compliance: Construction activities will be scheduled, as far as practicable, outside of lecture and examination periods, and noisy works will be limited to designated hours, in compliance with the regulations.

4.1.13 Climate Change Act, 2016

The Act provides a regulatory framework for enhanced response to climate change and mechanisms to achieve low-carbon, climate-resilient development, and requires both public and private entities to integrate climate change considerations into their planning and reporting.

Compliance: The proponent has integrated climate change risk considerations into the design of the hostel development, as elaborated in Chapter 6 of this report, and will monitor climate-related risks throughout the project's operational life.

4.1.14 National Construction Authority Act, No. 41 of 2011, and NCA Regulations, 2014

These provide for the regulation of the construction industry, requiring that construction works, contracts and contractors be registered with the National Construction Authority (NCA).

Compliance: The proponent will engage an NCA-registered contractor and will ensure the hostel construction project is registered with the NCA prior to commencement of works.

4.1.15 Basic Education Act, 2013 and Sector Policy Context

While primarily applicable to basic education institutions, the Basic Education Act and associated Ministry of Education policy guidelines on institutional infrastructure inform general best-practice principles for safe, adequate and non-discriminatory learning and residential facilities that this project also has regard to, alongside the more directly applicable Universities Act, 2012 and CUE Standards and Guidelines.

4.1.16 Persons with Disabilities Act, No. 14 of 2003

The Act requires that buildings and public facilities, including educational institutions, be made accessible to persons with disabilities, through provision of ramps, accessible sanitary facilities and other reasonable accommodations.

Compliance: The hostel design will incorporate accessibility features for students living with disabilities, in line with the Act and applicable Kenya Bureau of Standards (KEBS) accessibility codes.

4.1.17 Water Act, 2016 and Water Resources Authority (WRA) Requirements

The Water Act provides for the regulation, management and development of water resources, and requires a permit from the Water Resources Authority for any borehole drilling or significant water abstraction.

Compliance: Should the proponent elect to drill a borehole to supplement campus water supply, a hydrogeological survey and WRA permit will be obtained prior to drilling, processed separately from this EIA.

4.2 Institutional Framework

The EIA for the proposed hostel development is of interest to, and will require engagement with, the following institutions:

- National Environment Management Authority (NEMA)
- Commission for University Education (CUE)
- County Government of Kajiado - Department of Physical Planning
- County Government of Kajiado - Department of Health/Public Health
- National Construction Authority (NCA)
- Water Resources Authority (WRA) / relevant Water Services Provider
- Directorate of Occupational Safety and Health Services (DOSHS)
- Kenya Power and Lighting Company (KPLC)

4.3 Development Policy Framework

4.3.1 Kenya Vision 2030

Kenya Vision 2030 identifies education as a key pillar of the social pillar, with the objective of providing globally competitive, quality education, training and research to Kenya's citizens. Expansion of quality student accommodation directly supports this national development objective.

4.3.2 Kajiado County Integrated Development Plan (CIDP)

The County's CIDP identifies education infrastructure development and improved access to social services as priority areas, within which the expansion of the University's student housing capacity is consistent.

4.3.3 Sustainable Development Goals (SDGs)

The project supports several Sustainable Development Goals, notably SDG 4 (Quality Education), SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).

5. WATER SUPPLY, DEMAND AND CONSERVATION SYSTEM

5.1 Water Requirement

Access to adequate, safe water is both a constitutional right under Article 43(1)(d) of the Constitution of Kenya and a fundamental requirement for a functioning student residential facility. Kajiado County is classified among Kenya's more water-stressed counties, given its semi-arid climate and limited surface water resources, making water demand management central to the design of the proposed hostels.

5.2 Water Resources in Kajiado County

Water supply in Kajiado County is sourced from a combination of boreholes, limited piped schemes, and, in parts of the County nearer Nairobi, bulk transfers from the Nairobi water supply system. The University's existing campus water supply is sourced from existing boreholes and supplemented as necessary by water vendors.

5.3 Projected Water Demand

Assuming the hostels will accommodate approximately 1248 resident students, at an estimated consumption rate of 90-100 litres per person per day (in line with WHO/Kenyan design guidance for institutional accommodation), the projected daily water demand will be approximately 112,320 -124800 litres (112.3 – 124.8 m³) per day. This demand will be met through the campus borehole water supply, supplemented by rainwater harvesting and storage water tanks

5.4 Water Conservation Measures

- Installation of water-efficient/low-flow taps, showers and toilet cisterns in all hostel wet areas.
- Rainwater harvesting from hostel roof catchments into storage tanks, for use in cleaning, laundry and landscape irrigation.
- Prompt detection and repair of leaks through regular plumbing inspection.

- Student sensitization on responsible water use through hostel orientation and signage.
- Metering of hostel water consumption to monitor usage and identify anomalies.
- Water management plan with clear responsibilities assigned to the University's estates/facilities department.

5.5 Wastewater Management

Wastewater from the hostels will be conveyed to the existing campus on-site treatment system. The on-site system is sized based on the projected hostel population, designed in accordance with good engineering practice, and supported by a maintenance and desludging schedule to prevent failure and associated environmental/public health risks.

6. CLIMATE CHANGE RISKS AND VULNERABILITY ASSESSMENT

6.1 Climate Change Overview

Climate change is globally recognized as having significant and accelerating impacts on the natural and built environment, driven substantially by anthropogenic greenhouse gas emissions. Extreme weather events - including prolonged droughts, erratic rainfall, and heatwaves - are becoming more frequent and severe, with direct consequences for institutional infrastructure such as university campuses.

6.2 Climate Change and the Kajiado Context

Kajiado County is classified among the Arid and Semi-Arid Land (ASAL) counties of Kenya and is recognized as one of the counties most exposed to climate variability and change. Key climate-related vulnerabilities in the County include recurrent and prolonged drought, declining and increasingly unreliable rainfall, rising temperatures, and increasing water scarcity - all of which have direct implications for the design and operation of the proposed student hostels.

6.3 Climate Change and the Built Environment

Globally, buildings are estimated to contribute approximately 40% of total greenhouse gas emissions, primarily through energy use for heating, cooling and lighting. While the residential/institutional sector in Kenya has a comparatively lower cooling/heating energy burden than temperate climates, energy-efficient design remains an important consideration in reducing the hostels' operational carbon footprint and long-term utility costs for the University.

6.4 Climate Change Impacts to Key Sectors Relevant to the Project

6.4.1 Water

Given Kajiado's classification as a water-stressed county, climate-induced reductions in rainfall reliability directly threaten the University's water security, reinforcing the need for rainwater harvesting, storage and conservation measures incorporated into

the hostel design.

6.4.2 Energy

Kenya's hydropower generation capacity is sensitive to rainfall variability; reduced hydropower output during drought periods increases reliance on more carbon-intensive thermal generation and can affect grid reliability, underscoring the value of solar photovoltaic and solar water heating installations at the hostels to reduce dependence on grid supply.

6.4.3 Infrastructure

Increasing frequency of intense rainfall events (even within an overall drier trend) can generate flash flooding and erosion risk on institutional grounds if drainage infrastructure is inadequately designed, while rising temperatures increase demand for passive and active cooling in student accommodation.

6.5 Climate Change Risk Assessment

A climate change risk assessment for the proposed hostel development was undertaken by way of:

- (i) Identifying potential climate-related risks to the project
- (ii) Assessing and prioritizing these risks
- (iii) Formulating mitigation and adaptation measures to reduce the identified risks.

Table: Summary of Climate Change Risks and Adaptation Measures

Climate Hazard	Potential Impact on the Project	Proposed Adaptation/Mitigation Measure
Prolonged drought / water scarcity	Insufficient water supply for hostel occupants	• Encourage rainwater harvesting • Have storage tanks in place • Utilize existing boreholes • Have water-efficient fittings in place • Conduct water use monitoring
Erratic/intense rainfall events	• Localized flooding • Soil erosion • Drainage overload	• Have adequately sized storm water drainage • Attenuation where necessary • Permeable surfaces/landscaping
Rising ambient temperatures	• Heat stress in student rooms • Increased cooling demand	• Utilize passive design (orientation, cross-ventilation, shading, roof insulation) • Undertake tree planting for shade
Reduced hydropower reliability / grid instability	Power interruptions affecting hostel operations	• Use solar PV for common areas/security lighting • Solar water heating • Have a backup generator for critical loads
Increased fire risk during dry/hot periods	Fire hazard to hostel occupants and structures	• Have fire detection/suppression systems in place • Undertake regular drills • Utilize non-combustible materials for critical elements

6.6 Climate Change Mitigation Measures and Adaptation Strategies

- Water management: invest in rainwater harvesting, storage facilities, efficient water-use fixtures, and sustainable limits on any borehole abstraction.
- Energy efficiency: incorporate solar PV, solar water heating, natural lighting/ventilation and energy-efficient fittings to reduce reliance on fossil-fuel-derived grid power.

- Resilient infrastructure design: incorporate drainage and structural features able to withstand extreme rainfall events and high temperatures.
- Biodiversity and green infrastructure: retain and enhance tree cover and landscaped green space within the hostel precinct for shading, cooling and aesthetic value.
- Institutional preparedness: integrate climate risk considerations into the University's disaster preparedness and business continuity planning for the hostels.

7. TRAFFIC AND ACCESS ANALYSIS

7.1 Existing Access and Road Network

UMMA University's main campus is accessed from the Nairobi-Namanga Road (Kenya's principal southern trunk road connecting Nairobi to the Namanga border crossing with Tanzania), a strategic transport corridor also used for regional and international trade traffic. Internal campus roads provide circulation between existing academic, administrative and residential facilities.

7.2 Anticipated Traffic During Construction

Construction activities are expected to generate additional traffic associated with delivery of construction materials and equipment, and movement of construction personnel. Given the campus setting, care will be taken to minimize disruption to ongoing academic activities and existing campus traffic flow.

7.3 Proposed Mitigation Measures

- Scheduling of material deliveries during off-peak/non-academic hours where practicable.
- Engagement of traffic marshals to manage construction vehicle movement within the campus.
- Clear signage demarcating construction zones and safe pedestrian routes for students and staff.
- Development and implementation of a Construction Traffic Management Plan in coordination with the University's security and estates departments.
- Restriction of construction vehicle parking/idling to designated areas away from pedestrian and academic zones.

7.4 Parking and Circulation at Operation

At operation, the hostel development is not expected to introduce significant additional vehicular traffic, as resident students are largely pedestrian within the campus. Adequate provision for service vehicle access (e.g. waste collection, deliveries) and, where relevant, visitor/drop-off parking will be incorporated into the existing parking bays.

8.0 PUBLIC PARTICIPATION

8.1 Statutory Basis

Public participation is a statutory requirement under Section 58 of EMCA and Regulation 17 of the EIA Regulations. NEMA requires that public notices be issued prior before public meetings. Meaningful engagement ensures that community concerns, local knowledge, and social values are systematically incorporated into project planning and the EMP.

8.2 Stakeholder Identification and Mapping

Stakeholders were identified through a systematic stakeholder mapping exercise. Key stakeholder categories include:

- UMMA University Management, Faculty, Staff, and Student Representatives
- Local community leaders – Area Chief, Village Elders
- Women's and youth group representatives
- Neighboring property owners and residents
- Local businesses and service providers

8.3 Engagement Activities

Activity	Target Group
Key informant interviews (KIIs)	Chiefs, University Management, Student Representatives
Community baraza (public meeting)	General public, community leaders
Focus group – Students, neighboring residents	UMMA University students, neighboring residents
Public notice	Newspapers, Kenya Gazette & Radio

8.4 Key Issues Raised and Project Responses

Issue Raised	Stakeholder Group	Project Response
Increased construction traffic and road damage	Residents	- Traffic management plan to be in place - Have a road reinstatement budget
Dust and noise during construction	Neighboring community, Students	Dust suppression twice daily; work hours restricted to 8am–5pm on weekdays and 8am–1pm on weekends; dust screens; prior notices
Employment opportunities for local youth	Village elders	Contractor required to give preference to locals both skilled and unskilled
Water availability	Students	Borehole yield test done prior to construction; clean drinking water to be provided separately by the University
Security	Neighboring community, Students	Campus CCTV; Increase security patrols; fence off the construction site
Hostel design considerations such as cooking areas, biometric entrance/access door, roof plan, lighting	Students	No cooking within the hostels; no biometric doors considerations in the current design; roof shall be a flat roof to accommodate cleaning/drying areas; natural lighting shall be prioritized

Issue Raised	Stakeholder Group	Project Response
Access route	Students	The construction team shall use a different access to enter and exit the university
Price of the hostels	Students	The university shall come up with the hostel rates after completion
Repair of the current hostels	Students	Shall be done after the proposed hostels are completed
Cafeteria	Students	No provision of a cafeteria within the proposed designs; development committee shall plan for the same
Material supply	Community	Interested parties to link up with the university development committee

8.5 Grievance Redress Mechanism (GRM)

A Grievance Redress Mechanism will be established and communicated to all stakeholders before construction begins. The GRM will operate as follows:

- Designated GRM Focal Point
- Grievance log book at the site office; all complaints recorded within 24 hours of receipt
- Acknowledgement to complainant within 5 working days; resolution within 30 working days
- Escalation to Chief, NEMA and County Environment Department if not resolved at project level within 60 days
- All GRM records to be included in annual environmental audit reports

9. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

9.1 Positive Impacts During Construction

9.1.1 Employment Opportunities

The construction phase will create direct employment for skilled and semi-skilled workers, including masons, carpenters, electricians and plumbers, as well as casual labour, many of whom are expected to be sourced from the local Kajiado community.

9.1.2 Optimal Use of Institutional Land

The project represents efficient utilization of existing University land for a purpose directly aligned with the institution's core mandate, avoiding the need to acquire additional land.

9.1.3 Economic Stimulus

Procurement of construction materials and services will stimulate local suppliers, hardware and building material vendors, and informal traders (e.g. food vendors) serving the construction workforce.

9.2 Negative Impacts During Construction

9.2.1 Noise Pollution: Construction machinery, vehicles and activities are likely to generate noise that may disrupt ongoing lectures, examinations and studying within the active campus environment.

9.2.2 Dust Emissions: Site clearance, excavation and material handling may generate particulate matter affecting workers, students and staff in proximity to the works.

9.2.3 Soil Erosion: Exposed soil during excavation is susceptible to erosion, particularly given episodic intense rainfall typical of the semi-arid setting.

9.2.4 Generation of Construction Solid Waste: Packaging materials, off-cuts and rejected materials will require proper handling to avoid unsightly accumulation and pest attraction on campus.

9.2.5 Increased Water Demand: Construction activities (curing, dust suppression) will place additional demand on the already water-stressed campus supply.

9.2.6 Occupational Health and Safety Risks: Construction workers face risk of injury from falls, machinery, and handling of materials, requiring strict OSHA compliance.

9.2.7 Disruption to Academic Activities: Construction noise, dust, vehicle movement and altered pedestrian routes may disrupt the University's core teaching and learning functions if inadequately managed.

9.2.8 Exhaust Emissions: Construction vehicles and machinery will generate exhaust emissions affecting local air quality.

9.2.9 Risk of Accidents to Students and Staff: Uncontrolled access to the construction zone poses a risk of accidental injury to students, staff or visitors who are not construction personnel.

9.3 Positive Impacts During Operation

9.3.1 Improved Student Welfare and Retention: Provision of adequate, secure, values-aligned on-campus accommodation is expected to improve student welfare, safety, academic performance and institutional retention rates.

9.3.2 Employment Opportunities: The operational hostels will require support staff, including wardens, cleaners, security and maintenance personnel.

9.3.3 Enhanced Institutional Capacity and Reputation: Expanded, quality accommodation strengthens the University's competitiveness in student recruitment, both locally and internationally, given its unique positioning as an Islamic institution of higher learning.

9.3.4 Reduced Commuting-Related Risks: Students previously reliant on off-campus accommodation along the Nairobi-Namanga corridor will benefit from reduced exposure to commuting-related safety and cost burdens.

9.4 Negative Impacts During Operation

9.4.1 Increased Water Demand: A larger resident student population will increase pressure on the campus water supply system, particularly significant given Kajiado's

water-stressed status.

9.4.2 Increased Wastewater Generation: Additional sewage and greywater loads will need to be accommodated by existing or upgraded treatment infrastructure.

9.4.3 Solid Waste Generation: Occupied hostels will generate ongoing solid waste requiring systematic collection, segregation and disposal.

9.4.4 Increased Pressure on Campus Infrastructure: Additional demand will be placed on electricity supply, internal roads, and other shared campus facilities.

9.4.5 Fire and Life Safety Risk: Dense residential occupancy introduces fire risk requiring robust detection, suppression and evacuation systems.

9.4.6 Social/Behavioural Management Considerations: Communal student residency requires appropriate institutional rules, supervision and welfare support to manage social dynamics within the hostels.

9.5 Impacts During Decommissioning

Positive impacts during any future decommissioning would include site rehabilitation and temporary employment for demolition works. Negative impacts would mirror those of the construction phase (noise, dust, solid waste), together with potential temporary loss of accommodation capacity requiring transitional planning by the University.

10. MITIGATION MEASURES

10.1 Introduction

This chapter sets out the comprehensive mitigation measures to be implemented by the Proponent (UMMA University) and its appointed Contractor(s) to prevent, minimize or manage the significant environmental, health and safety impacts identified in the chapter above, across the construction, operational and decommissioning phases of the proposed hostel development. The measures are organized by phase and by impact area, and are drawn from established good practice for institutional developments in Kenya, tailored to the specific characteristics of the project site – an active university campus in the semi-arid, water-stressed environment of Kajiado County. The Proponent is committed to implementing these measures in full, to sensitizing and training all personnel engaged on the project accordingly, and to using this chapter as a checklist during routine site supervision and subsequent environmental audits.

10.2 Mitigation of Construction-Related Impacts

10.2.1 Air Quality

Controlling dust during construction is important both for the health of workers and for minimizing nuisance conditions for students, staff and neighbouring institutions within the active campus environment. A standard set of feasible dust control measures will be implemented across all construction activities, together with measures addressing other contaminants – including greenhouse gases and diesel-related particulate matter – present in the exhaust of heavy construction equipment. The Proponent is committed to implementing measures that will reduce air quality impacts associated with construction throughout the works.

All personnel working on the project will be trained, prior to the start of construction, on methods for minimizing air quality impacts. This training will focus specifically on minimizing dust and exhaust gas emissions from heavy construction vehicles, and construction vehicle drivers will be placed under strict instructions to minimize

unnecessary trips and to minimize unnecessary idling of engines. Dust emissions will be controlled through the following measures:

- Watering all active construction areas as and when necessary to lay dust, particularly during excavation, earthworks and material handling.
- Covering all trucks hauling soil, sand and other loose materials, or requiring that such trucks maintain at least two feet of freeboard.
- Paving, watering when necessary, or applying non-toxic soil stabilizers on all unpaved access roads, parking areas and staging areas within the construction site.
- Sweeping daily, using physical sweepers, all paved access roads, parking areas and staging areas at the construction site, particularly those adjoining pedestrian routes used by students and staff.

10.2.2 Noise Emissions

The significance of noise impacts depends on whether the project would raise noise levels above the existing ambient levels within an active academic environment. In the context of this project, noise impacts would be considered significant where the works result in:

- a) Exposure of students, staff or neighbouring occupants to noise levels in excess of the standards established under the Noise Prevention and Control Rules, 2005 (Legal Notice No. 24) and the Noise and Excessive Vibration Pollution (Control) Regulations, 2009, or applicable University policy;
- b) Exposure of persons to excessive ground-borne vibration or ground-borne noise, particularly during foundation and structural works;
- c) A substantial permanent increase (more than five decibels) in ambient noise levels in the vicinity of lecture halls, hostels or offices above levels existing without the project; or
- d) A substantial temporary or periodic increase in ambient noise levels during lecture, examination or study periods.

The Proponent will put in place several measures to mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise on the surrounding campus environment:

- Install portable noise barriers to shield compressors and other small stationary equipment, where necessary.
- Where feasible, use construction equipment designed with noise control elements (“quiet” equipment).
- Install sound barriers around pile driving or other high-impact structural activity.
- Limit idling of pickup trucks and other small equipment to a minimum, and encourage workers to switch off vehicle engines whenever practicable.
- Schedule the noisiest construction and demolition activities outside lecture and examination hours, and where possible during University recess periods, when the campus is least occupied.
- Coordinate all noisy construction activities with the University administration in advance, including issuing advance notices to affected faculties and hostels.
- Adhere strictly to the noise limits prescribed under the Noise Prevention and Control Rules, 2005 (Legal Notice No. 24) and the Noise and Excessive Vibration Pollution (Control) Regulations, 2009.

10.2.3 Exhaust Emissions

To control exhaust emissions, the following measures will be implemented during construction:

- a) Vehicle idling time will be minimized;
- b) Alternatively fueled construction equipment will be used where feasible; and
- c) Equipment will be properly tuned and maintained in accordance with manufacturer schedules.

These measures will be complemented by proper planning of the transportation of construction materials, to ensure that vehicle loads are optimized so as to reduce the number of trips and the number of vehicles operating within the campus at any one time.

10.2.4 Hydrology and Water Quality

Given the black cotton (vertisol) soils and episodic intense rainfall typical of Kajiado County, soil sampling and trial pit excavation will be conducted before construction begins, and the resulting soil information will be provided to construction crews to inform them of soil conditions and potential hazards. Should any hazardous substance be unexpectedly encountered during excavation or trenching for utility connections, work in that area will be stopped immediately until the material has been properly characterised and appropriate measures taken to protect human health and the environment. Where suspected contaminated groundwater is encountered, samples will be collected and submitted for laboratory analysis of petroleum hydrocarbons, metals, and volatile and semi-volatile organic compounds as appropriate. Appropriate personal protective equipment will be used throughout, and any resulting waste will be managed in accordance with applicable regulations. Oil-absorbent material and dedicated storage drums will be kept on site to contain and control any minor releases of engine oil or other equipment fluids, protecting the campus storm water drainage system and surrounding soils from contamination.

10.2.5 Worker Accidents and Hazards when Handling Waste

Adequate collection and storage of construction waste on site, together with safe transportation to licensed disposal sites, will be provided throughout the construction period. The Proponent is committed to strict adherence to the occupational health and safety rules and regulations stipulated in the Occupational Safety and Health Act (OSHA), 2007, including the provision of appropriate personal protective equipment and the maintenance of a safe and healthy working environment for all construction workers, as further detailed in the site-specific Health and Safety Plan.

10.2.6 Increase of Disease Vectors

Disease vectors such as rats, flies and cockroaches proliferate where refuse is exposed or left uncollected, posing a hazard to construction workers, students and staff in proximity to the works. A complete refuse collection and handling service will be provided by the Proponent/Contractor throughout construction, so that this does not become a hazard, in compliance with the Public Health Act and the hygiene provisions of the Occupational Safety and Health Act, 2007.

10.2.7 Possible Exposure of Workers to Diseases

Possible exposure of workers to diseases arising from handling of building materials at the construction site will be mitigated through strict enforcement of the occupational health and safety standards required under OSHA, 2007, including appropriate PPE, hygiene facilities and health surveillance where indicated.

10.2.8 Worker Accidents during Construction

Worker accidents, particularly those associated with trenching for water and sewer connections and any work in confined spaces, will be mitigated through strict enforcement of safety procedures and preparation of a contingency plan for accident response. Safety education and training will be emphasized for all site personnel, with particular focus on excavation and confined-space entry protocols.

10.2.9 Reduction of Impacts at Extraction Sites and Efficient Use of Raw Materials

The Proponent will source building materials such as sand, ballast and hardcore from registered quarry and sand mining firms whose operations have undergone satisfactory environmental impact assessment/audit and received NEMA approval. As such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated at source.

To reduce pressure on the availability and sustainability of construction materials, the Proponent will order only what is required, through accurate budgeting and estimation of actual construction requirements, ensuring materials are not extracted

or purchased in excessive quantities. The Proponent will further ensure that wastage, damage or loss of materials at the construction site – through run-off, wind or poor handling – is kept to a minimum, since such losses would otherwise generate additional demand for extraction or purchase. In addition, the Proponent shall, where practicable, consider reuse of building materials and use of recycled building materials, reducing both the quantity of raw materials extracted from natural resources and the impacts at extraction sites, consistent with the material sourcing approach set out in Chapter 11 of this report.

10.2.10 Minimization of Run-off and Soil Erosion

The Proponent will put in place measures to minimize soil erosion and associated sediment release from the project site during construction, given the erosion susceptibility of exposed black cotton soils under Kajiado's episodic intense rainfall. These measures will include terracing and levelling of the project site to reduce run-off velocity and increase infiltration of rainwater into the soil. In addition, construction vehicles will be restricted to designated routes to avoid soil compaction within the project site, and any compacted areas identified will be ripped to restore infiltration capacity and reduce run-off.

10.2.11 Minimization of Construction Waste

Demolition and construction waste will, as far as reasonably practicable, be recycled or reused, ensuring that materials which would otherwise be disposed of as waste are diverted for productive uses. The Proponent is committed to ensuring that construction materials left over at the end of the works are used in other University projects rather than disposed of. Furthermore, damaged or surplus construction materials – including cabinets, doors, plumbing and lighting fixtures, and glass – will be recovered for refurbishment and reuse, including through sale or donation of recyclable/reusable materials to construction companies, community groups, other institutions or individual residents.

The Proponent shall ensure that construction material requirements are carefully budgeted so that the quantity of material left on site after construction is kept minimal, and shall consider the use of recycled or refurbished construction materials where appropriate, both for financial savings and to reduce the volume of construction debris requiring disposal. Additional measures for the minimization of solid waste during construction include:

- a) Use of durable, long-lasting materials that will not need to be replaced as often, reducing the amount of construction waste generated over the life of the project;
- b) Provision of facilities for the proper handling and storage of construction materials, to reduce waste caused by damage or exposure to the elements;
- c) Purchase of perishable construction materials, such as paints, in manageable increments to reduce spoilage of unused stock;
- d) Use of building materials with minimal packaging, to avoid generation of excessive packaging waste; and
- e) Use of construction materials containing recycled content where feasible and in accordance with accepted KEBS standards.

10.2.12 Reduction of Energy Consumption during Construction

The Proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity, including switching off electrical equipment and appliances when not in use. Proper planning of the transportation of materials will further ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the Proponent shall monitor energy use during construction and set targets for its progressive reduction.

10.2.13 Minimization of Water Use during Construction

Given the water-stressed status of Kajiado County, the Proponent shall ensure that water is used efficiently at the construction site, through sensitization of construction staff to avoid irresponsible water use, installation of water-conserving automatic taps

and toilets at site welfare facilities, and prompt repair by qualified staff of any water leaks arising from damaged pipes or faulty taps.

10.2.14 Controlling Oil Spills during Construction

The Proponent will control the dangers of oil, grease and fuel spills during construction by restricting machinery maintenance to specific, designated areas of the site fitted with appropriate containment. On-site repair of machinery will be discouraged, with repair work instead restricted to approved garages, so as to avoid pollution of soil and storm water from oil, grease and fuel.

10.2.15 Public Health, Safety and Awareness

- a) The Contractor shall provide a small section of the construction site with a shed and a water stand where food can be served to construction workers, to promote hygiene and employee health.
- b) A fully equipped first aid kit shall be provided and maintained at the site at all times, with a trained first-aider on duty.
- c) The Contractor must maintain Work Injury Benefits cover for all workers as required under the Work Injury Benefits Act (WIBA), 2007, as well as any relevant collective agreements.
- d) Workers, immediate neighbours (including students and staff in adjoining buildings) and other stakeholders shall be sensitized on the dangers and risks associated with the construction works, to encourage self-responsibility for personal safety.
- e) The Proponent shall ensure that the completed hostel blocks are fitted with safety facilities including fire detectors, firefighting equipment, clearly marked fire exits, and adequate access and buffer between the hostel blocks and other campus facilities.
- f) Disabled access features and safety signage shall be placed strategically around and within the hostel buildings, in line with the Persons with Disabilities Act.

- g) Appropriate sanitation conveniences shall be provided at the construction site, as required under OSHA, 2007 and echoed in the Public Health Act.

10.3 Mitigation of Impacts during the Operational Phase

10.3.1 Ensuring Efficient Solid Waste Management

The Proponent will be responsible for the efficient management of solid waste generated by the hostels during operation. Waste handling facilities, such as clearly labelled waste bins and skips, will be provided for the temporary holding of domestic waste generated within the hostel blocks, and the Proponent will ensure that such waste is regularly and appropriately collected and disposed of by a NEMA-licensed waste handler.

An integrated solid waste management system is recommended, applying the following hierarchy of priority. First, priority will be given to reduction at source, supported by a solid waste management awareness programme targeted at hostel wardens and resident students. Recycling, reuse and composting of waste will be the second priority, supported by a source-separation programme at the hostel waste collection points, with recyclables sold to licensed waste buyers. Where residual non-recyclable waste cannot be diverted through these means, it will be directed to licensed disposal facilities as the final option in the hierarchy. The Proponent will adhere to the Sustainable Waste Management Act, 2022 and the Waste Management Regulations, 2024 throughout.

10.3.2 Wastewater Management

The Proponent will ensure adequate means for handling the quantities of sewage generated by the hostel facility, whether through connection to the existing campus treatment system. It will be important to ensure that sewage pipes are not blocked or damaged, so that wastewater is reliably directed to the intended treatment system, since such blockages or damage can lead to release of effluent and resulting land and water contamination. Any blockages or damage identified will be fixed expeditiously by qualified maintenance staff. Wastewater will be managed and, where applicable,

discharged in compliance with the Environmental Management and Coordination (Water Quality) Regulations, 2024.

10.3.3 Ensuring Efficient Energy Consumption

Resident students will be sensitized to ensure energy efficiency in their domestic activities within the hostels. Solar water heating equipment will be installed to reduce reliance on grid electricity for hot water. Security lighting that must remain on throughout the night will, where feasible, be solar-powered, further reducing overall electricity consumption. The use of incandescent bulbs will be discouraged in favour of energy-efficient LED lighting throughout the hostel blocks and common areas.

10.3.4 Ensuring General Safety and Security

A competent security firm will be engaged to ensure general safety and security within the hostel precinct at all times. The hostel precinct will be secured by a perimeter wall/fence, which may be enhanced by an electric fence or equivalent deterrent along vulnerable sections, consistent with campus-wide security standards. The Proponent is further advised to install CCTV cameras at strategic points around the hostel blocks and their approaches, integrated with the University's existing security monitoring system.

10.3.5 Ensuring Efficient Water Use

The Proponent will install water-conserving automatic taps and toilets within the hostel blocks, and any water leaks arising from damaged pipes or faulty taps will be fixed promptly by qualified staff. In addition, resident students will be sensitized on efficient water use, reinforced through visible signage and periodic awareness campaigns, given the water-stressed status of Kajiado County addressed in Chapters 5 and 6 of this report.

10.3.6 Traffic Management

During construction, the Proponent/Contractor will employ traffic marshals to control the movement of construction vehicles in and out of the site, ensuring there

are no construction vehicles idling around the site or parked along adjoining campus roads. During the operational phase, the Proponent will ensure adequate designated parking and drop-off provision for service vehicles, staff and visiting family members, together with clearly marked, adequate pedestrian routes and entry/exit points serving the hostel precinct, to minimize conflict with pedestrian traffic on the active campus.

10.3.7 Student Welfare and Social/Behavioural Management

In recognition of the communal residential character of the hostels, the Proponent will appoint qualified, gender-appropriate hostel wardens and matrons to provide day-to-day supervision and pastoral support. Hostel rules aligned with the University's institutional values will be developed and consistently enforced, and accessible grievance and reporting channels will be provided for resident students, coordinated through the University's Student Affairs Department.

10.4 Mitigation of Impacts during the Decommissioning Phase

10.4.1 Efficient Solid Waste Management

Solid waste resulting from any future demolition or dismantling works will be managed as described under 'Minimization of Construction Waste', applying the same waste hierarchy of reduction, reuse, recycling and, as a last resort, licensed disposal.

10.4.2 Reduction of Dust Concentration

Elevated dust concentrations resulting from demolition or dismantling works will be minimized through the same measures described under Air Quality, including watering of active work areas, covering of haulage trucks, and site hoarding.

10.4.3 Minimization of Noise and Vibration

Impacts on the acoustic environment arising from demolition or dismantling works will be mitigated as described under Noise Emissions, including scheduling of the

noisiest activities outside lecture and examination periods and coordination with the University administration.

10.4.4 Site Restoration

Following removal of demolition waste, the Proponent will implement a re-vegetation programme using appropriate plant species and restore topsoil and landscape features in line with the University's campus master plan.

11. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

11.1 Introduction

This chapter presents the Environmental and Social Management and Monitoring Plan (ESMMP) developed to guide the Proponent, Contractor and University Estates Department in preventing, minimizing and monitoring the significant impacts identified in Chapter 10, across the construction, operational and decommissioning phases of the proposed hostel development.

For each impact, the plan sets out the recommended mitigation measures, the parameters and indicators to be monitored to verify the effectiveness of those measures, the monitoring method and frequency, the party responsible for implementation and monitoring, and an indicative cost. The plan is to be used as a checklist during routine site supervision and subsequent environmental audits, and is subject to periodic review as project circumstances evolve.

Monitoring under this plan serves two complementary purposes:

- (i) Compliance monitoring: - to confirm that mitigation measures are being implemented as specified and that statutory standards (e.g. noise, air quality, effluent discharge) are being met
- (ii) Impact monitoring: - to track the actual environmental and social performance of the project over time and trigger corrective action where a parameter trends outside its acceptable range.

11.2 Construction Phase

Table 2: Construction Phase Mitigation Measures and Monitoring Programme

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
Noise pollution	- Schedule noisy works outside lecture/exam hours where feasible - Install temporary noise barriers around the works area - Sensitize workforce on noise minimization - Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Ambient noise level (dB(A)) at the site boundary and at the nearest lecture halls/hostels	Spot measurements using a calibrated sound level meter at identified sensitive receptors Weekly during high-noise activities (excavation, piling, concrete works) and immediately upon receipt of a complaint	Mitigation: Contractor / Project Manager Monitoring: Site EHS/Safety Officer	15,000
Dust emissions	- Water spraying of exposed surfaces and haul routes - Cover stockpiles and trucks hauling loose materials - Provide dust masks to workers in high-dust areas - Hoard the construction site to contain dust	Visible dust deposition on surrounding surfaces PM10 (where complaints warrant instrumented monitoring)	Daily visual inspection of haul routes, stockpiles and site boundary Dust deposit gauge readings monthly, or ad hoc if complaints are received	Mitigation: Contractor Monitoring: Site EHS/Safety Officer	20,000
Soil erosion	- Install temporary drainage/silt control structures - Progressively re-vegetate disturbed areas - Restrict vehicle movement to designated routes	Condition of silt fences/drainage structures Extent of erosion channels/gullies Vegetation cover on	Visual inspection after significant rainfall events and monthly thereafter, with photographic record	Mitigation: Civil Engineer / Contractor Monitoring: Site EHS/Safety Officer	15,000

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
		stabilized areas			
Generation of construction solid waste	- Segregate waste at source - Reuse/recycle materials where possible - Engage a NEMA-licensed waste handler for disposal - Provide clearly labelled waste collection points	Volume/weight of waste generated, segregated and removed from site Validity of waste handler license	Weekly waste tally at collection points Monthly review of NEMA-licensed handler transfer/disposal manifests	Mitigation: Project Manager / Contractor Monitoring: Site EHS/Safety Officer	15,000
Increased water demand (construction)	- Source construction water from registered vendors/approved sources - Install water-conserving fittings on site facilities - Monitor and minimize water wastage	Daily water consumption (m ³ /day) Source/vendor compliance documentation	Daily water use log or meter reading, reviewed weekly by the Site EHS/Safety Officer	Mitigation: Contractor Monitoring: Site EHS/Safety Officer	5,000
Occupational health and safety risks	- Provide and enforce use of appropriate PPE - Register the site under OSHA, 2007 - Maintain a site first-aid kit and trained first-aider - Develop and test an emergency response plan - Maintain a general register and accident reporting log	Accident/incident frequency rate PPE compliance rate Toolbox talk attendance	Weekly site safety inspection and PPE compliance check Monthly OSHA compliance audit Continuous review of the accident/incident register	Mitigation: Contractor / Site Safety Officer Monitoring: Site Safety Officer / Proponent	30,000
Disruption to academic activities	Erect secure hoarding separating the works area from active campus zones	Number of complaints/disruption	Weekly site walk-through with the University liaison officer	Mitigation: Proponent /	20,000

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
and student/staff safety	• Provide clear signage and alternative pedestrian routes • Coordinate the construction schedule with the University's academic calendar • Restrict site access to authorized construction personnel only	incidents reported Integrity of hoarding, signage and access control	Continuous review of the complaints/grievance register	Contractor Monitoring: University Estates Department liaison	
Exhaust emissions	• Minimize vehicle idling time • Ensure regular servicing and maintenance of machinery/vehicles	Visible smoke opacity from vehicles/machinery Vehicle/machinery service and maintenance records	Monthly visual opacity check and review of service logs	Mitigation: Contractor Monitoring: Site EHS/Safety Officer	-
Traffic disruption within campus	• Deploy traffic marshals for construction vehicle movement • Schedule deliveries during off-peak/non-academic hours	Traffic incident reports Marshal deployment compliance during delivery/peak hours	Daily observation during delivery/peak hours	Mitigation: Contractor Monitoring: Site Safety Officer	10,000
Fire risk (construction materials/fuel storage)	• Provide standby fire extinguishers on site • Designate and clearly mark flammable material storage as no-smoking zones	Fire extinguisher service status Compliance of flammable storage areas with signage/segregation requirements	Monthly fire safety inspection checklist	Mitigation: Contractor Monitoring: Site Safety Officer	5,000

11.3 Operational Phase

Table 3: Operational Phase Mitigation Measures and Monitoring Programme

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
Increased water demand	• Install water-efficient taps, showers and cisterns • Rainwater harvesting and storage • Regular leak detection and repair • Meter and monitor consumption • Sensitize students on water conservation	Per capita water consumption (litres/student/day) Total metered consumption (m ³ /month) Number of leaks detected/repaired	Monthly water meter reading and comparison against design demand Quarterly leak-detection survey	Mitigation: Proponent / Estates Department Monitoring: Estates Department	20,000
Increased wastewater/sewage generation	• Ensure adequate connection/capacity of campus on-site treatment system • Regular inspection for blockages/damage • Periodic effluent quality monitoring • Comply with the Water Quality Regulations, 2024	Effluent quality: pH, BOD, COD, TSS, faecal coliforms (against NEMA Water Quality Regulations, 2024 discharge standards) Functional status of treatment system/sewer connection	Quarterly effluent sampling and laboratory analysis Monthly visual inspection for blockages/damage	Mitigation: Proponent / Estates Department Monitoring: Estates Department / Environmental Consultant	50,000
Solid waste generation	• Provide adequately sized, well-located waste bins/skips • Segregation programme (organic, recyclable, general)	Waste generation quantity (kg/day) Segregation compliance rate	Monthly waste audit Review of licensed handler collection records/manifests	Mitigation: Proponent / Estates Department Monitoring: Estates Department	10,000

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
	- Contract a NEMA-licensed waste handler for regular collection - Comply with the Waste Management Regulations, 2024				
Increased pressure on campus infrastructure (energy)	- Install energy-efficient lighting and occupancy sensors in common areas - Install solar water heating and, where feasible, solar PV - Sensitize students on responsible energy use - Monitor consumption and set efficiency targets	Electricity consumption (kWh/ month) Renewable energy contribution (%)	Monthly utility bill/sub-meter review Annual energy audit	Mitigation: Proponent / Estates Department Monitoring: Estates Department	5,000
Fire and life safety risk	- Install and maintain fire detection and suppression systems - Provide clearly marked fire exits and assembly points - Conduct regular fire drills - Ensure compliance with Building Code fire safety provisions	Fire drill participation and response time Fire equipment service/certification status Alarm system functionality	Quarterly fire drills Biannual inspection and certification of fire equipment	Mitigation: Proponent / Estates Department Monitoring: Estates Department / Security Department	20,000
General health, safety and security	- Provide 24-hour security staffing and adequate lighting - Install CCTV at strategic points	Security incident reports CCTV/lighting functionality First aid facility stock	Continuous incident logging Monthly security systems review	Mitigation: Proponent / Security Department Monitoring: Security Department	15,000

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Cost (KES)
	• Maintain a functioning perimeter/access control system • Provide a well-stocked first aid facility/sick bay access	levels			
Social/behavioural management considerations (student welfare)	• Appoint qualified, gender-appropriate hostel wardens/matrons • Develop and enforce hostel rules aligned with University values • Provide accessible grievance/reporting channels for students	Number and nature of grievances logged and resolved Warden/matron incident reports	Continuous grievance register review Termly student welfare review meeting	Mitigation: Student Affairs Department Monitoring: Student Affairs Department	-
Overall environmental compliance	• Undertake an environmental (self-)audit within 12 months of commencement of operation, and periodically thereafter as required by law	Status of EMP implementation Number of non-conformances raised and closed out	Annual environmental self-audit report submitted to NEMA, in line with EMCA and the Environmental (Impact Assessment and Audit) Regulations, 2003	Mitigation/Monitoring: Environmental Consultant / Proponent	50,000

11.4 Decommissioning Phase

Table 4: Decommissioning Phase Mitigation Measures and Monitoring Programme

Impact / Issue	Recommended Mitigation Measures	Monitoring Parameter / Indicator	Monitoring Method & Frequency	Responsible Party	Est. Cost (KES)
Demolition waste	• Apply an integrated waste hierarchy: reduce, reuse, recycle, then dispose • Recover and donate/resell reusable fixtures and materials • Dispose of non-recoverable waste through a licensed waste handler	Volume/weight of demolition waste generated, recovered and disposed	Waste tally at point of demolition; review of licensed handler disposal manifests on completion	Mitigation: Project Manager / Contractor Monitoring: Proponent / Estates Department	15,000
Site degradation	• Implement a re-vegetation programme using appropriate plant species • Restore topsoil and landscape features in line with the campus master plan	Vegetation cover/survival rate on rehabilitated areas Conformity of restored area with campus master plan	Site inspection at 3 and 6 months post-rehabilitation	Mitigation: Proponent / Contractor Monitoring: Estates Department	10,000
Noise, dust and vibration	• Apply the same mitigation measures as for the construction phase (Section 10.2)	As for the construction phase (ambient noise, visible dust)	As for the construction phase: weekly/monthly inspection during active demolition works	Mitigation: Contractor Monitoring: Site Safety Officer	-

11.5 Institutional Responsibilities for Monitoring

Implementation of the mitigation measures and monitoring programme set out above will be coordinated as follows:

- Contractor: responsible for day-to-day implementation of construction-phase mitigation measures and routine site-level monitoring (noise, dust, waste, OHS), reporting to the Project Manager and Site EHS/Safety Officer.
- Proponent (UMMA University) / Estates Department: responsible for operational-phase mitigation measures, ongoing infrastructure monitoring (water, energy, wastewater, solid waste, fire safety) and budgeting for the associated costs.
- Student Affairs Department: responsible for hostel warden supervision, grievance handling and student welfare monitoring during operation.
- Environmental Consultant: responsible for periodic environmental audits and technical monitoring (e.g. effluent quality) requiring specialist sampling and analysis.
- National Environment Management Authority (NEMA) and relevant lead agencies (e.g. County Government of Kajiado, WRA, water services provider, Directorate of Occupational Safety and Health Services): responsible for regulatory oversight, receipt of statutory reports (e.g. annual self-audit reports) and compliance verification through inspections.

11.6 Reporting and Review

Monitoring records (inspection checklists, meter readings, incident/grievance registers, laboratory results and audit reports) shall be compiled and retained by the Contractor during construction and by the Estates Department during operation, and shall be made available to NEMA and other lead agencies upon request. A summary monitoring report shall be prepared quarterly during construction and annually during operation, to be reviewed by the Proponent's management and used to update this plan where mitigation measures are found to be ineffective or where new impacts are identified. The self-audit report required under the Environmental (Impact Assessment and Audit) Regulations, will consolidate this monitoring record and shall be submitted to NEMA within twelve (12) months of commencement of operation, and periodically thereafter as required by law.

12. ANALYSIS OF PROJECT ALTERNATIVES

12.1 Introduction and Approach

Section 58 and the Second Schedule of the Environmental Management and Coordination Act (EMCA), CAP 387, and the Environmental (Impact Assessment and Audit) Regulations, require that an EIA study report consider reasonable alternatives to the proposed project, including the alternative of not proceeding with it. This chapter presents a comparative analysis of the reasonable alternatives considered for the proposed UMMA University hostel development, covering site, technology, design, construction method and material sourcing options, in addition to the no-action (no-project) alternative. Each alternative is assessed against environmental, social, technical and economic considerations, drawing on the baseline conditions, climate change context, and impacts and mitigation measures presented in this report.

12.2 Site Alternatives

12.2.1 Off-Campus Relocation

This alternative would site the hostels on land acquired outside the existing UMMA University campus. It is not considered reasonable as it would require capital outlay for land acquisition that is neither budgeted for nor contemplated in the University's current master plan. It would introduce a commute between the hostels and academic facilities that directly undermines the welfare and safety rationale for the project, and would forego the "optimal use of institutional land" benefit associated with developing within the existing land.

12.2.2 Alternative On-Campus Location

Siting the hostels on a different parcel within the campus, further from the existing academic block and staff housing, was also considered. This could reduce construction-phase disruption to ongoing lectures in the short term, but would likely require new road access, and extension of power, water and sewer lines over a greater distance, raising both capital cost and the extent of ground disturbance. It may also

encroach on land reserved for other uses under the University's master plan, and would increase walking distance and security lighting requirements for resident students, working against the welfare objectives of the project.

12.2.3 Proposed Site (Preferred)

The proposed site, adjacent to the existing academic blocks and staff housing within the campus, is preferred. It allows the hostels to connect to existing electrical, water and sewer infrastructure with minimal extension, keeps walking distance to academic facilities short (supporting the safety and retention objectives of the project), is consistent with the University's master plan and zoning, and avoids disturbance of undeveloped or ecologically sensitive land since it lies within land already committed to institutional development.

12.3 Technology Alternatives

12.3.1 Water Supply and Conservation Technology

- Existing campus water system: It has the lowest upfront cost, but increases pressure on an already water-stressed campus supply.
- Rainwater harvesting only: reduces reliance on external supply and recurrent cost, but Kajiado's low and erratic rainfall means harvested water alone cannot reliably meet demand through the dry season, and the storage capacity required would be costly.
- Preferred – hybrid supply: existing campus supply as the primary source, supplemented by rainwater harvesting and storage, water-efficient fittings, and consumption metering/leak monitoring. This balances reliability and cost against the water conservation and climate-resilience objectives.

12.3.2 Energy Technology

- Grid supply only (KPLC): simplest and lowest capital cost, but offers no resilience against outages and no incremental progress toward the University's energy efficiency and climate adaptation objectives.

- Solar PV as primary power source: reduces grid dependence and operating cost over time, but entails high upfront capital cost, land/roof area requirements, and ongoing inverter/battery maintenance that may exceed current in-house technical capacity.
- Preferred – hybrid supply: grid connection as the primary source, supplemented by solar photovoltaic and solar water heating for common-area and security lighting and hot water. This is consistent with the energy conservation features already proposed and balances cost, reliability and sustainability.

12.4 Design Alternatives

12.4.1 Room Typology and Occupancy Density

- High-density dormitory-style rooms (e.g. 6-in-1 or larger): lowest capital cost per bed and maximizes bed capacity, but reduces privacy and comfort, which works against the student welfare and retention objective.
- Low-density, semi-private rooms (e.g. 2-in-1): improves welfare outcomes but at materially higher capital cost per bed and lower overall bed capacity relative to the identified accommodation deficit.
- Preferred – moderate-density typology (e.g. 4-in-1 rooms): balances affordability and bed capacity against welfare and comfort considerations, and is consistent with common practice for Kenyan university hostel developments.

12.4.2 Building Height and Footprint

- Low-rise, spread-footprint development: simpler construction and evacuation logistics, but consumes more land, increases the area of site clearance and ground disturbance, and requires longer service (water, power, sewer) runs.
- Multi-storey, compact-footprint development: reduces land take and disturbance, and better reflects the "optimal use of institutional land" benefit, but increases structural cost and requires more careful fire evacuation planning.

- Preferred – a moderate-height, multi-storey configuration: reduces the development footprint and associated site disturbance while remaining within a height range that keeps evacuation and structural costs manageable.

12.4.3 Accessibility and Universal Design

- Minimum-compliance accessibility: meets the letter of the Persons with Disabilities Act at lowest cost, but risks excluding some students and would be costly to retrofit later.
- Preferred – universal design integrated at the design stage: ramps, accessible rooms and accessible sanitary facilities distributed throughout the hostel blocks rather than as token, isolated units. Integrating these features at design stage carries a modest incremental cost compared with later retrofitting.

12.5 Construction Method Alternatives

12.5.1 Structural System

- Conventional cast-in-situ construction (stone/block masonry with reinforced concrete framing): uses construction methods and skills familiar to the local contractor and labour pool, with materials readily available locally, but results in a longer on-site construction period and correspondingly longer duration of noise, dust and disruption to academic activities.
- Prefabricated/modular construction: shortens on-site assembly time and reduces the duration of on-site noise, dust and waste generation, but prefabrication capacity is not well established near Kajiado, raising transport cost and lead time, entails higher upfront capital cost, and reduces the local employment generation identified as a key positive impact.
- Preferred – conventional cast-in-situ construction with selective use of precast elements (e.g. precast lintels and slab units) where this offers a genuine time or quality advantage: retains the local employment and economic stimulus benefits of conventional construction while capturing some efficiency gains from precasting.

12.5.2 Construction Sequencing

- Single-phase construction (all blocks built concurrently): shortens the overall disruption period but concentrates noise, dust, traffic and workforce presence at peak intensity, increasing the risk of disruption to lectures and examinations.
- Phased construction (blocks built sequentially): reduces the peak intensity of construction impacts and allows the works programme to be coordinated with the University's academic calendar, consistent with the mitigation measures proposed, though it extends the total disruption period and may increase overall cost through remobilization.
- Preferred – phased construction, timed so that the noisiest and most disruptive activities are scheduled outside lecture and examination periods, consistent with the mitigation measures already proposed for the construction phase.

12.6 Material Sourcing Alternatives

12.6.1 Local versus Imported Materials

- Predominantly locally sourced, KEBS-compliant materials: lower cost, shorter lead times, lower transport-related emissions, and supports local suppliers and vendors, reinforcing the economic stimulus benefit.
- Predominantly imported materials and fittings: may offer higher durability or specialized performance for certain components (e.g. specific sanitary or electrical fittings), but at materially higher cost, longer lead times and exposure to foreign exchange fluctuation, with no equivalent local economic benefit.
- Preferred – predominantly local, KEBS-compliant materials, with imports limited to specialized components that are not reasonably available locally.

12.7 No-Action (No-Project) Alternative

Under the no-action alternative, the proposed hostel development would not proceed, and the status quo would be maintained, with students continuing to rely on off-campus accommodation along the Nairobi-Namanga corridor.

Avoided impacts: This alternative would avoid all construction-phase impacts associated with the project, including noise, dust, soil erosion, construction waste generation, increased construction-phase water demand, and occupational health and

safety risks. However, all of these impacts are assessed elsewhere in this report as low to moderate in significance and manageable through the mitigation measures set out.

Foregone benefits: The no-action alternative would forego the substantial positive impacts associated with the proposed development, including: improved student welfare, safety and academic performance associated with secure, values-aligned on-campus accommodation; reduced exposure to commuting-related safety and cost burdens for students currently reliant on off-campus housing; direct employment during construction and operation; stimulation of local economic activity through procurement; and enhanced institutional capacity and competitiveness in student recruitment.

On balance, the no-action alternative does not address the University's identified on-campus accommodation deficit and is the least preferred alternative from a socio-economic and institutional development perspective, notwithstanding that it is the only alternative that avoids construction-phase environmental impacts entirely.

12.8 Comparative Summary and Conclusion

Considered together, the preferred alternatives across each category are: the proposed on-campus site; a hybrid approach to water and energy; a moderate-density, moderate-height design incorporating universal accessibility features; conventional cast-in-situ construction with selective precasting and phased to align with the academic calendar.

This combination of alternatives represents the option that best balances environmental impact, technical feasibility, cost, and the University's institutional and welfare objectives. Weighed against the no-action alternative, the low and manageable environmental impacts of the proposed development are clearly outweighed by its socio-economic and institutional benefits. The proposed development, incorporating the preferred alternatives identified in this chapter, is therefore recommended over the no-project and off-campus relocation alternatives.

13. CONCLUSION AND RECOMMENDATIONS

13.1 Summary of Findings

This Environmental Impact Assessment (EIA) study has examined the proposed construction and operation of student hostels within the UMMA University main campus at Kajiado County. This chapter draws together the findings of those preceding chapters into overall conclusions and recommendations regarding the proposed development.

13.2 Conclusions

- 1) **Institutional need and benefit:** The proposed hostel development is a worthwhile institutional investment that directly addresses UMMA University's identified on-campus accommodation deficit, and is expected to significantly enhance student welfare, safety and academic outcomes, consistent with the University's values-based residential model.
- 2) **Positive impacts are significant:** Key positive impacts identified in this assessment include: improved, secure and gender-appropriate on-campus accommodation for resident students; direct employment during both construction and operation; stimulation of local economic activity through procurement of materials, goods and services; reduced exposure of students to the safety and cost burdens associated with off-campus commuting; and enhanced institutional capacity and competitiveness in student recruitment, both locally and internationally.
- 3) **Negative impacts are manageable:** The negative impacts identified – principally construction noise, dust and soil erosion; increased construction- and operational-phase water and wastewater demand; solid waste generation; occupational health and safety risks; and fire and life safety considerations during operation – are, without exception, assessed as low to moderate in significance. This report demonstrates that each of these impacts can be adequately prevented, minimized

or managed through implementation of the comprehensive, phase-specific mitigation measures set out herein.

- 4) **Water and climate considerations are central, not peripheral:** Kajiado County's semi-arid, water-stressed and climate-vulnerable status means that water conservation and climate-resilient design are of particular importance to the long-term sustainability of the project. This has been addressed throughout the report.
- 5) **The proposed development is the preferred alternative:** The comparative analysis of alternatives undertaken confirms that the proposed development, sited on the existing campus land and incorporating the preferred alternatives identified in that chapter, represents the option that best balances environmental impact, technical feasibility, cost, and the University's institutional and welfare objectives.

On the basis of the findings summarized above, it is concluded that, subject to strict implementation of the mitigation measures and monitoring programme set out in this report, the proposed hostel development can proceed without significant adverse residual impact on the biophysical, social or economic environment of the project area.

13.3 Recommendations

1. **Issuance of EIA Licence:** The National Environment Management Authority (NEMA) should issue an EIA Licence to UMMA University to enable implementation of the proposed hostel development substantially as described in this report.
2. **Implementation of the Environmental Management Plan:** The Proponent and its appointed Contractor should strictly implement, throughout the project cycle, the mitigation measures set out in this report, and should adhere to all relevant national and county environmental, health, safety and higher-education sector standards, policies and regulations, including EMCA and its subsidiary regulations, OSHA 2007, the Work Injury Benefits Act 2007, the Water Quality

Regulations 2024, the Waste Management Regulations 2024, and the Persons with Disabilities Act.

3. **Adoption of preferred alternatives:** Consistent with the findings, the Proponent should adopt the preferred alternatives identified– including the hybrid water supply, energy and wastewater technology approach, the moderate-density and moderate-height design incorporating universal accessibility features, phased construction sequencing coordinated with the academic calendar, and predominantly local, durable material sourcing – in finalizing the project design and construction programme.
4. **Maximization of positive impacts:** The Proponent should take active steps to maximize the positive impacts identified in this report, including prioritizing local employment and local procurement of goods and services during both construction and operation, in order to maximize the socio-economic benefit of the project to the surrounding Kajiado community.
5. **Priority on water security:** Given the water-stressed status of Kajiado County, the Proponent should prioritize early installation and commissioning of the rainwater harvesting, water-efficient fittings and consumption monitoring systems recommended, ahead of or concurrent with hostel occupation, rather than as a retrofit.
6. **Fire and life safety readiness:** The Proponent should ensure that fire detection, suppression and evacuation systems, together with clearly marked fire exits and regular fire drills, are fully operational prior to occupation of the hostels, given the fire and life safety risk associated with dense residential occupancy.
7. **Environmental auditing:** An environmental (self-)audit should be undertaken within twelve (12) months of commencement of hostel operations, and periodically thereafter, in compliance with EMCA and the Environmental (Impact Assessment and Audit) Regulations, to verify the effectiveness of the mitigation measures implemented and identify any corrective action required.

8. **Institutional responsibility for implementation:** The Proponent should designate a specific officer or department – such as the University Estates Department, in coordination with the Student Affairs Department – with clear responsibility for day-to-day implementation of the operational-phase mitigation measures set out in Chapter 10, and for maintaining the monitoring records necessary to support the environmental audit referred to above.
9. **Compliance with other statutory approvals:** This report should be read together with, and does not substitute for, the applicable building approval, fire safety certification and other statutory approvals required from the relevant County Government of Kajiado departments and other lead agencies prior to commencement of construction and occupation of the hostels.

Having regard to the findings presented throughout this report, it is the professional opinion of the undersigned Lead Expert that the proposed construction and operation of student hostels at UMMA University main campus, Kajiado County, will not result in significant adverse environmental or social impacts that cannot be adequately mitigated through implementation of the Environmental Management Plan. The substantial institutional, welfare and socio-economic benefits of the project, weighed against its manageable environmental impacts and assessed in light of the alternatives considered, support a recommendation that NEMA issue an EIA Licence to enable the Proponent to proceed with the project as described in this report, subject to the conditions and recommendations set out above.

REFERENCES

- Republic of Kenya. The Constitution of Kenya, 2010. Attorney General, Nairobi.
- Republic of Kenya. Environmental Management and Coordination Act, CAP 387 (2015 Revised Edition).
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- Republic of Kenya. Occupational Safety and Health Act, 2007.
- Republic of Kenya. Physical and Land Use Planning Act, 2019.
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- Kenya National Bureau of Statistics. 2019 Kenya Population and Housing Census.
- Government of Kenya. Kenya Vision 2030.
- IPCC (2013). Climate Change 2013: The Physical Science Basis.

ANNEXES

- Terms of Reference (TOR) Approval
- Site photographs
- Architectural/Site Development Plans
- Public Participation Minutes and Invitation letters
- Lead Expert(s) Practising Licenses
- Proponent's Details

SITE PHOTOGRAPHS



UMMA University



Proposed site



Access Road



Power line



Existing Hostels



Existing storage tanks