ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

FOR
THE PROPOSED ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI



Submitted By:

University of Nairobi Enterprise Services (UNES) Limited,
P.O. Box 68241 – 00200,
NAIROBI – KENYA

May 2026

FACT SHEET

Project Name	Construction of the Engineering and Science Complex of the University of Nairobi
Assignment Name	Environmental and Social Impact Assessment (ESIA) for the Engineering and Science Complex of the University of Nairobi
Location	Chiromo Campus, University of Nairobi
GPS Coordinates	Latitude: -1.2664° S Longitude: 36.8086° E (UTM Zone 37M, Easting: ~251230m, Northing: ~9859920m)
Project Description	The Engineering and Science Complex will be developed at the University of Nairobi's Chiromo Campus as a flagship facility to advance multidisciplinary research, innovation, and teaching in engineering, life sciences, environmental studies, and emerging technologies. The Complex is envisaged as a cornerstone of the University's STEM strategy, aimed at bolstering both national and institutional capacity for cutting-edge science and technology education. Accordingly, the Complex will feature dedicated Centres of Excellence in Artificial Intelligence, Green Engineering, and Advanced Manufacturing, offering state-of-the-art laboratories, incubation hubs, and collaboration platforms for industry partners, government agencies, and collaborating universities.
Main Water Source	Nairobi City Water and Sewerage Company (NCWSC) water main within Chiromo Campus
Sewerage Connection	The building will be connected to the NCWSC sewers within Chiromo Campus
Proponent	University of Nairobi
Address of the Proponent	P.O. Box 30197-00100, Nairobi, Kenya

CERTIFICATION

For and on Behalf of:

The Vice Chancellor,

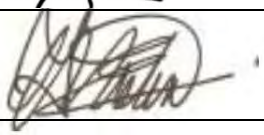
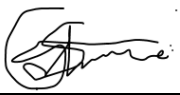
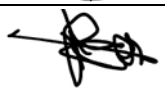
University of Nairobi

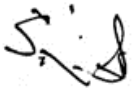
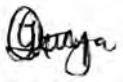
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Nairobi, Kenya

This Environmental Impact Assessment (ESIA) report was prepared in accordance with the Environmental Management and Coordination Cap 387 and the Environmental Impact Assessment and Audit (Amendment) Regulations 2019, World Bank Environmental and Social Safeguard Policies and the Environmental Impact Assessment and Audit Regulations 2003 in order to meet the statutory requirements for implementation of projects under schedule ii.

We, the undersigned, confirm that the contents of this report are a true representation of the ESIA process for the proposed construction of the Proposed Construction of Engineering and Science Complex of the University Of Nairobi at Chiromo Campus.

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PROPONENT

For and on behalf of

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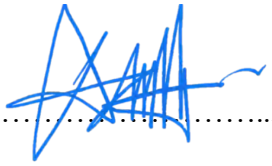
Signature:  ……... Date: 19th June 2026 ……...

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LIST OF ACRONYMS AND ABBREVIATIONS

ADD	Architecture and Design Department
AFD	Agence Française de Développement
AMR	Antimicrobial Resistance
BIM	Building Information Modeling
BOD	Biochemical Oxygen Demand
CAE	College of Architecture and Engineering
CBPS	College of Biological and Physical Sciences
COD	Chemical Oxygen Demand
CoEs	Communities of Excellence
DOSHS	Directorate of Occupational Safety and Health Services
DVC	Deputy Vice-Chancellor
EBESA	Environmental and Biosystems Engineering Students Association
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESC	Engineering and Science Complex
ESHS	Environmental, Social, Health and Safety
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESS	Environmental and Social Standard (World Bank)
FGD	Focused Group Discussion
GPS	Global Positioning System
GRM	Grievance Redress Mechanisms
HVAC	Heating, Ventilation, and Air Conditioning
IAPs	Interested and Affected Parties
IFC	International Finance Corporation
ILO	International Labour Organization
IDF	Intensity-Duration-Frequency (rainfall analysis)
ICT	Information and Communication Technology
KALRO	Kenya Agricultural and Livestock Research Organization
KEBS	Kenya Bureau of Standards

KFS	Kenya Forest Service
KMS	Kenya Meteorological Service
KWS	Kenya Wildlife Service
LAPSETT	Lamu Port-South Sudan-Ethiopia-Transport Corridor
LEED	Leadership in Energy and Environmental Design
LOTO	Lock Out-Tag Out
LR	Land Registry
MASW	Multichannel Analysis of Surface Waves
NBS	Nature-Based Solutions
NCA	National Construction Authority
NCCG	Nairobi City County Government
NEMA	National Environment Management Authority
NCWSC	Nairobi City Water and Sewerage Company,
ODK	Open Data Kit
OHS	Occupational Health and Safety
OHSP	Occupational Health and Safety Plan
OSHA	Occupational Safety and Health Act
PAYE	Pay As You Earn
PM	Particulate Matter
PME	Project Management Entities
PS	Performance Standard (IFC)
PWD	Persons With Disability
QA	Quality Assurance
QC	Quality Control
R & D	Research and Development
RAP	Resettlement Action Plan
RFP	Request for Proposal
RGS	River Gauging Station
SEP	Stakeholder Engagement Plan
SGR	Standard Gauge Railway
SPSS	Statistical Package for the Social Sciences
STEM	Science, Technology, Engineering and Mathematics
SUDS	Sustainable Urban Drainage Systems
UN	United Nations

UNES	University of Nairobi Enterprise Services
UNGPs	UN Guiding Principles on Business and Human Rights
UNSA	University of Nairobi Students Association
UNCTV	University of Nairobi Channel TV
UoN	University of Nairobi
UTM	Universal Transverse Mercator
VAT	Value Added Tax
VC	Vice-Chancellor
WBG EHSG	World Bank Group Environmental, Health and Safety Guidelines
WHO	World Health Organization
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Background

The University of Nairobi proposes to develop an Engineering and Science Complex (ESC) within its Chiromo Campus. The project aims to address inadequate and outdated laboratory and teaching infrastructure that constrains research, innovation, and Science, Technology, Engineering and Mathematics (STEM) education in Kenya. Anchored in Kenya Vision 2030, the Big Four Agenda, and the Ministry of Education's Strategic Plan, the project will serve as a flagship center of excellence for training engineers, scientists, and innovators. It will also strengthen industry–academia partnerships and promote Kenya's competitiveness in science and technology at both regional and global levels.

Specific objectives

The proposed complex is envisaged to provide, among others:

- Teaching facilities for engineering and science-related courses to undergraduate and graduate students,
- Modern laboratories with modern equipment to support the state-of-the-art research in engineering and sciences,
- Incubation and innovation centres for promoting entrepreneurial spirit, enhancing the University-Company links and commercializing the intellectual outputs, and,
- Continuous professional development for engineers and technical staff working in flagship projects such as LAPSETT, SGR, and Lake Turkana Wind Power Project and Geothermal projects.
- A platform for collaborations with industry and companies, government, and international Universities; leasing out the Labs to multinational corporations for Research & Development (R & D).
- Research and consultancy services in engineering and related courses.
- Faculty training and development.
- Exchange programmes and internships for students; and
- Government and donor-funded scholarships for full-time engineering/science courses.

Project Components

The proposed Engineering and Science Complex (ESC) has been designed to host eight (8) Centers of excellence"- (CoEs) and 1 sub-CoE, which will take the form of a team and a shared facility that provides leadership, best practices, research, support, and/or training for a focus area.

4 initial CoEs have been defined in priority and supported by AFD in the ESC Project: Computer Sci/AI/Data, Innovation, Green & Blue Engineering, and Advanced Manufacturing (Industry 4.0, Robotics, automation. The University of Nairobi (UoN) will develop the other envisaged 4 CoEs from its source budget. In the long run, CoEs are aimed at building cutting-edge training and research platform capacities that will increase access to affordable, world-class training and research facilities to support science, technology, and engineering at the UoN.

Project Activities

The project will be implemented in two stages which include preconstruction and construction phase.

(i) Preconstruction phase

Project preconstruction activities are important in the lifecycle of the project. This phase sets the groundwork for successful project execution, ensuring that all necessary preparations are made before actual construction begins. The key activities involved in the preconstruction phase are:

- Project feasibility study and preliminary design
- Design, cost estimation and tender documents preparation
- Permitting and Approvals
- Procurements

(ii) Construction Phase

- Site clearing, soil stripping, excavation works and transportation of construction materials
- Excavation works will be carried out to prepare the site for construction of foundations for the various structures particularly the main complex and the parking area.
- Building materials storage on site, to avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in quotas. Materials such as cement, paints and glass among others will be stored in temporary storage structures built for this purpose
- Construction of the slabs, columns, beams, pavements, foundations, drainage systems among other components of the project involve some concrete works, masonry work and related activities
- Structural steel works involve steel cutting, welding and erection particularly during setting out and reinforced concrete works.
- Electrical ducts, earthing, electrical wiring, installation of building lighting, street lighting.

Project Alternative Analysis

The analysis of alternatives for the proposed Engineering and Science Complex (ESC) at the University of Nairobi considered site options, design and technology approaches, the "No Action" scenario, and solid waste management strategies. The proposed development alternative, supported by a comprehensive Environmental and Social Management Plan (ESMP), demonstrates compliance with EMCA and NEMA requirements while ensuring that anticipated academic and research benefits are achieved with minimal environmental harm.

Two potential sites were evaluated: Site 1 at Kirichwa Kubwa Valley and Site 2 near the Nairobi River/Expressway. Site 1, though featuring a terraced terrain with a steep lower slope constrained by riparian reserve, provides stronger academic integration, lower exposure to traffic noise and pollution, and opportunities for riparian rehabilitation and biodiversity gains. Site 2 offers gentler slopes and easier construction but suffers from expressway adjacency and higher operational exposure to noise and soot. After comparison, Site 1 was preferred due to its environmental compliance, alignment with stakeholder expectations, and suitability for sustainable development.

The study also assessed the "No Action" alternative, which would avoid construction impacts but perpetuate outdated facilities, constrain research growth, and increase maintenance costs—rendering it unviable. The project further integrates sustainable design strategies such as passive solar orientation, natural ventilation, and modular layouts; low-carbon materials including pozzolana concrete and recycled steel; and green technologies like solar PV, heat pumps, and Building Management Systems. Solid waste will be managed through reduction at source, reuse, recycling, and safe disposal. Collectively, these measures ensure the preferred option at Site 1 is environmentally sound, socially beneficial, and aligned with Kenya's Vision 2030 and international best practices.

Project Location

The Engineering and Science Complex project will be situated within the Chiromo Campus of the University of Nairobi, which currently hosts the Faculty of Science and the Examination Centre. The location is easily accessible from both the Faculty of Engineering and the Faculty of Architecture and Built Environment. Therefore, this proposed landmark development will be strategically located to support multidisciplinary research, innovation, and teaching in engineering, life sciences, environmental studies, and emerging technologies. Approximate GPS coordinates of the main entrance are Latitude: -1.2664° S, Longitude: -36.8086° E (UTM Zone 37M, Easting: ~251230m, Northing: ~9859920m).

The property under which Chiromo University sits, and which formed the Area of Interest is registered as LR No. 209/346/40/R and LR No. 209/346 /40/51.

Baseline Environmental and Social Conditions

The Chiromo valley sites present contrasting physiographic conditions: Site 1 is terraced with steep and moderate slopes, while Site 2 is more uniformly sloped. Geotechnical studies confirm competent trachyte from approximately 4 to 6 m depth, making both sites suitable for heavy development if weak surface soils are stabilised and robust drainage provided. The steep valley setting lowers direct flood risks, though Nairobi's intense bimodal rainfall necessitates Sustainable Drainage Systems. Air quality is generally compliant, with dust signatures near Site 1 and traffic-related black carbon near Site 2. Both rivers, especially Kirichwa Kubwa, are highly polluted, reinforcing the need for strict construction-phase controls and effluent management.

Ecologically, the sites sit within a fragmented riparian forest mosaic of indigenous and exotic species, bamboo belts, and urban fauna including vervet monkeys, diverse birds, and common reptiles. Despite overall urban disturbance, the riparian corridor provides valuable habitat and ecosystem services such as stormwater buffering and microclimate regulation. Key sensitive receptors include riverbank stability, remnant indigenous trees, and wildlife breeding/roosting niches. To safeguard biodiversity, no permanent works should occur within the riparian reserve, invasive species should be controlled, and native planting and monitoring programmes maintained.

Socio-economically, Chiromo is a high-density, mixed-use area shaped by the University of Nairobi's approximately 49,000 students, with strong demand for housing, services, and mobility. A stakeholder survey highlighted strong support for the project's educational and national development role, alongside concerns about dust, noise, waste, and access disruptions. Vulnerable groups—including women, children, and persons with disabilities—require targeted safeguards. Recommended measures include dust and noise control, safe fencing and signage, accessibility features, and continuous community engagement, ensuring that development enhances academic capacity while protecting environmental and social well-being.

Institutional and legal framework

a) Project Management Entities (PME)

Summary of PIE

Institution	Management Role
University of Nairobi Project implementation team	Will be charged with the responsibility of ensuring that the proposed development has been put up in an environmentally sound manner. This can be achieved by inclusion of environmental specifications in the tender documents, selection of renowned environmentally conscious contractors and supervision to ensure that the objectives of this ESMP are met.
National Environment Management Authority (NEMA)	NEMA's responsibility is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government of Kenya in the implementation of all policies relating to the environment.
The Contractor	The persons/firms contracted to construct the proposed Project will be required to comply with the requirements of the ESMMP within this report. To ensure strict compliance environmental specifications of this ESMMP should form part of the contract documents
Consultant	The sourced consultant will have to ensure that the proposed ESMMP is up to date and is being used by the contractor. Periodic audits of the ESMMP will have to be done to ensure that its performance is as expected.
County Government of Nairobi	The relevant departmental officers should be called upon where necessary during Project implementation to provide the necessary permits and advisory services to the Project implementers.

b) Policy, Legal and Regulatory Framework

The Kenya Government policy on all new projects or activities requires that an environmental impact assessment be carried out at the planning stages of the proposed undertaking to ensure that significant environmental and social impacts are taken into consideration during the planning/design, construction, operation and decommissioning of the facility. The project underwent screening process which identified the proposed Project as **Moderate-Risk Project** as per the 2nd schedule of Environmental Management and Coordination Act (EMCA Cap 387) – amendment via legal notice no. 31 – April 2019.

Additionally, the project also falls under **moderate risk (category B)** of the AFD Environmental and Social Framework. The project does not lead to displacement of Project Affected Persons

(PAPs) or significant environmental effects. This report has been prepared for submission pursuant to Regulation 7 (4) of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019.

c) Key Kenyan Legislation and Regulations

Law/Regulation	Purpose / Key Provisions	Project Relevance
Constitution of Kenya (2010)	Guarantees right to a clean and healthy environment; requires public participation and access to information.	Project must uphold environmental rights and engage stakeholders.
EMCA (1999) & EIA Regulations (2003)	Establishes NEMA; sets procedures for EIA, auditing, and licensing.	Project must secure NEMA approval before implementation.
Noise & Vibration Control Regulations (2009)	Sets thresholds (60 dB day, 35 dB night); requires permits where exceeded.	Noise/vibration assessments and mitigation mandatory.
Water Quality Regulations (2024)	Effluent discharge licensing; prohibits pollution without license.	Effluent discharge license required.
Waste Management Regulations (2024)	Requires segregation, recycling, licensed handlers; prohibits illegal dumping.	Adoption of cleaner production and licensed disposal needed.
Wetlands/Riverbanks Regulations (2023)	Requires water resource permits for works near rivers/wetlands.	Permit required for activities near Nairobi & Kirichwa Kubwa rivers.
Air Quality Regulations (2024/2025 amendment)	Sets mandatory emission limits; requires emission licenses.	Control of dust/emissions during works.
Climate Change Act (2016)	Requires climate risk assessments in EIAs.	Project must integrate mitigation/adaptation measures.
Water Act (2016) + Regulations (2025)	Regulates water use, harvesting, and discharge; requires permits.	Rainwater harvesting, water permits, and compliance with WRA standards.

Forest Act (2016)	Promotes sustainable forest use and conservation.	Ensure minimal disturbance to riparian/forested areas.
Wildlife Act (2013)	Protects wildlife and prohibits harmful activities.	Must mitigate impacts to wildlife habitats.
Physical Planning Act (2019)	Requires Change of User permit; Nairobi River is a Special Planning Area.	Project must comply with land use planning restrictions.
National Construction Authority Act (2011)	Requires registration and construction certificate.	Project must obtain NCA compliance.
National Building Code (2024)	Requires multiple statutory approvals before works.	Must secure development permission, EIA license, and compliance certificate.
Traffic Act (Cap. 403)	Limits drivers' working hours to 8/day.	Logistics and driver shifts must comply.
Public Health Act (Cap. 242)	Sets sanitation, water, and sewage requirements.	Project must ensure health compliance.
Employment Act (2007)	Protects workers' rights, wages, and against discrimination.	All employment must comply.
Sexual Offences Act (2006)	Protects against sexual harassment and violence.	Safe working environment required.
Persons with Disabilities Act (2003)	Ensures equal employment rights and accessibility.	Project must include universal design.
Work Injury Benefits Act (2007)	Provides compensation for work-related injuries.	Workers must be insured.
Occupational Safety & Health Act (2007)	Requires registration, permits, and safe workplaces.	Project must establish OHS systems and facilities.
KEBS Standards Act (1997)	Ensures material quality compliance.	Construction materials must meet standards.
National Museums & Heritage Act (Cap 216)	Protects cultural/archaeological heritage.	Due diligence if artefacts found.
Penal Code (Cap 63)	Criminalizes pollution of water/air.	Strict adherence to approvals required.

d) International Standards & Guidelines

Standard	Key Provisions	Project Implications
AFD Environmental & Social Risk Management Policy (2017)	Requires categorization, consultations, commitment plans, grievance mechanisms.	Must comply as project is AFD-funded.
AFD Complaints Mechanism (2022)	Independent grievance handling through dispute resolution or compliance audits.	Grievance system must be in place.
World Bank ESF (2018)	ESIA proportionate to risk; mitigation hierarchy; ESS1, stakeholder engagement.	Requires continuous compliance with ESS1.
IFC Performance Standards (2012/2021)	Eight standards, with PS1 covering risk management and stakeholder engagement.	Align with international sustainability benchmarks.
Equator Principles (2020)	Risk framework for financiers; requires ESIA and safeguards.	Aligns project with responsible financing.
UN Guiding Principles on Business & Human Rights (2011)	Due diligence on human rights, grievance and remediation.	Must integrate human rights into project operations.

(i) Institutional Framework

Institution	Mandate	Relevance to Project
NEMA	Supervises and coordinates environmental matters.	Reviews and licenses the ESIA.
Water Resources Authority (WRA)	Regulates water use and discharge.	Issues water use permits.
Directorate of Occupational Safety and Health Services (DOSHS)	Ensures workplace safety and health.	Issues workplace permits.
National Construction Authority (NCA)	Regulates construction sector.	Issues construction certificate.
Nairobi County Government	Local planning and development control.	Provides permits and oversees planning compliance.

KEBS	Sets and enforces quality standards.	Certifies construction materials.
Kenya Forest Service / Wildlife Service / National Museums	Resource conservation and heritage protection.	Provide approvals where relevant.

(ii) University of Nairobi Policies

Policy	Key Focus
Safety Plan (2014)	Ensures safe campus environments and risk management.
Disability Policy (2020) & Strategy (2023–2028)	Mainstreaming accessibility and inclusivity.
Gender Policy (2008)	Promotes equity and inclusion.
GBV Workplace Policy (2022)	Prevents and responds to harassment and violence.
Anti-Corruption Policy (2010)	Promotes transparency and integrity in project processes.

Stakeholder Consultations

Stakeholder consultations and public participation were conducted during the ESIA study with the following objectives:

- Disseminate and inform the public and stakeholders about the project with special reference to its key components and description.
- Create awareness among the public on the need for the ESIA for the proposed project.
- Gather comments, suggestions, and concerns of the interested and affected parties.
- Incorporate the information collected in the ESIA.
- Build community consensus and acceptance of the proposed project.

A total of 398 people were surveyed, complemented by 15 key informant interviews and two focus group discussions with 20 participants (business representatives and students with disabilities). Stakeholders included students, staff, nearby institutions, local businesses, and vulnerable groups such as women, children, and persons with disabilities.

The survey was conducted using a stratified random sampling approach across students (50%), community/business stakeholders (25%), administrative staff (17%), and academic staff (8%). Data were collected digitally using the Kobo Collect platform, ensuring efficient entry, GPS tagging, and statistical confidence (95% with ±5% margin of error). This provided a representative cross-section of the university and its surrounding community.

Most respondents strongly supported the project: 92% said it aligns with university goals and 93% with Vision 2030. Anticipated benefits included improved classrooms and laboratories, better research capacity, higher enrolment, and new job opportunities.

Key concerns raised included environmental risks—noise (32%), dust (26%), water pollution (23%), and waste (22%)—and social risks such as disrupted learning, safety hazards, traffic congestion, and restricted access. Vulnerable groups emphasized inclusive hiring, gender-based violence safeguards, fencing and signage for child safety, and full accessibility for Persons With Disability (PWDs). Businesses welcomed economic opportunities but stressed the need for dust suppression, noise management, and clear traffic control.

Environmental and social impacts

a) Positive Impacts

Positive impacts identified by stakeholders and the ESIA include the following:

- **Employment & Skills Uplift:** Creation of jobs for skilled and unskilled labour during construction and long-term academic/technical/facilities roles during operation; on-the-job training, internships, and apprenticeships for students.
- **Local & National Economic Stimulus:** Spend on construction materials, transport, accommodation and services; VAT/PAYE; stronger demand for local MSMEs (cafés, printing, hostels, supplies).
- **Technology & Practice Transfer:** Exposure to Building Information Modeling (BIM) coordination, prefabrication, QA/QC, safe Lock Out-Tag Out (LOTO) procedures, and specialized lab systems; strengthened capacity of UoN Estates/Safety teams.
- **Infrastructure Upgrades:** Better internal access paths, Sustainable Urban Drainage Systems (SUDS) drainage (silt traps, permeable paving), lighting, signage, and rationalized utilities—benefiting wider campus users.
- **Optimal Land Use & Riparian Protection:** Compact, infill development within serviced campus; permanent works kept outside the riparian reserve; reinstatement/greening of temporary areas.
- **Enhanced Teaching, Research & Reputation:** Modern labs/lecture theatres improve learning outcomes, research capacity, and university standing; decongestion of existing facilities.

- **Resource Efficiency & Climate Co-Benefits:** Daylighting, efficient Heating, Ventilation, and Air Conditioning (HVAC)/controls, rainwater harvesting/greywater, solar PV readiness, lowering operating costs and emissions.

- **Social Inclusion:** Universal design (ramps, lifts, wayfinding), gender-responsive facilities, GBV safeguards, and accessible engagement/grievance routes

b) Negative impacts and proposed mitigation measures

Although there are a number of justifications of why the project should be developed in the area, there are various negative impacts raised that affect the environment and social well-being and therefore the proposed mitigation measures will reduce the adverse impacts. This will assist the contractor and proponent to check impact verses the proposed mitigation measures in the various levels/phases of the proposed project.

Impacts and proposed mitigation measures

Associated Impact	Proposed Management Actions
Pre-construction phase	
Poor siting or non-adherence to design/setbacks (incl. riparian)	• Validate layouts with statutory agencies (NEMA, Nairobi County, WRA). • Respect 30 m riparian reserve; fix red-line and fence off buffers before handover. • Obtain all approvals (EIA license, planning, NCA, DOSHS workplace registration). • Embed ESHS clauses in bidding docs; ESMP obligations in contracts. • Design review/verification by Project Management Team (PMT) incl. Environmental & Social Expert.
Stakeholder risks from inadequate engagement	• Implement SEP: early notices, accessible information, targeted sessions for PWDs/women/youth, functioning Grievance Redress Mechanisms (GRM); document commitments.
Construction phase	
Vegetation clearing, soil erosion & sedimentation	• Minimize clearing; phase earthworks; silt fences/traps; contour-aligned drains. • Replant natives; control invasives; reinstate disturbed areas promptly.

	• Keep cement/concrete work in contained zones away from drains.
Air quality (dust & exhaust)	• Perimeter dust nets; wet suppression; cover stockpiles/loads; speed limits/no idling. • Maintain equipment; provide masks for workers; schedule dusty works in calm periods.
Noise & vibration	• Daytime working; low-noise plant & maintenance; acoustic enclosures where feasible. • PPE (hearing protection); monitor at boundary; notify neighbors of peak activities.
Water pollution (oils, wash-water, sanitary waste)	• Bunded refueling on impervious pads with oil traps; spill kits & trained crews. • Concrete/paint wash-water to lined bays or conservancy tanks - no discharge. • Portable sanitation serviced by licensed handlers; effluent hauled to approved facilities.
Solid & hazardous waste	• Site-level waste plan; source segregation; licensed handlers; track manifests. • Maximize reuse/recycling; minimize packaging; safe storage of oils/chemicals.
Biodiversity disturbance (riparian/trees)	• No permanent works in riparian; retain mature indigenous trees; protect roots. • Targeted removal of high-risk invasives; compensate with native planting.
Traffic congestion & safety	• Contractor Traffic Management Plan; delivery windows; marshals and signage. • Designate contractor gate/lay-bys; incident/violation log; driver induction.
OHS risks (falls/struck-by, fire)	• DOSHS registration; H&S committee; method statements & JSA; toolbox talks. • Full PPE; cordon off hazards; emergency response plan; incident reporting.

Visual intrusion & nuisance	• Screen hoarding; good housekeeping; progressive clearance and landscaping.
Resource demand (water & energy)	• Fit low-flow fixtures; leak checks; efficient plant/lighting; meter temporary supplies.
Operation phase	
Sanitary wastewater (odour/health)	• Robust, accessible sewer design (rodding eyes, vents); housekeeping and disinfection; preventive maintenance with NCWSC.
Increased water demand	• Dual-flush/sensor taps; rainwater harvesting & storage; leak detection/AMR metering; drought-tolerant landscaping.
Increased energy demand	• High-efficiency HVAC/LED; BMS optimization; PV/heat pumps where feasible; occupant energy awareness.
Laboratory/process effluents	• Separate lab drains; pre-treatment (neutralization, grease traps, interceptors), sampling manholes; SOPs & training; consent compliance.
Surface drainage & flooding	• Sized self-cleansing drains; gratings; SuDS (permeable paving, detention); capture/reuse roof runoff.
Solid waste (operational)	• Source separation; labelled bins; licensed collection; recycling/composting; user education.
Community health & safety around campus edges	• Maintain lighting, CCTV where applicable; safe pedestrian routes; continuous GRM and notices for any intrusive maintenance.
Decommissioning phase	
Loss of livelihoods (temporary)	• Advance notice; fair separation benefits per law; link workers to retraining/placement programmes.
Noise, dust & vibration from demolition	• Daytime works; equipment maintenance; watering & dust screens; anti-idling; respiratory PPE.
Demolition waste volumes	• Selective dismantling; salvage & recycling; licensed transporters/sites; NEMA-approved decommissioning plan.
Water/soil contamination (oils, wash-down)	• Bunded plant; spill prevention/response; contain/haul wash-water; prohibit discharge to drains/river.

Traffic & road safety	• Approved haul routes; speed control; repair any damage; incident logs.
Soil erosion on cleared areas	• Stage works; gentle compaction; rapid re-vegetation with natives; stabilise exposed soils.
OHS and public safety	• Demarcation/hoarding; safe access routes; PPE; emergency plans; induction and supervision.

Project cost

The total estimated cost, excluding VAT, amounts to KShs. 3,195,158,000.00 *(Kenya Shillings three billion, one hundred ninety-five million, one hundred fifty-eight thousand.)*

Conclusion and Recommendation

The following are some of the recommendations made to minimize or mitigate for the adverse environmental and social impacts from the proposed project:

(i) There is need for rigorous implementation of the Environmental Management and Monitoring Plan which will facilitate the mitigation and/or prevention of potentially adverse environmental impacts.

(ii) The proposed ESMMP should be followed fully by the contractor with the supervision from the proponent. A report on the findings from the monitoring of the ESM&MP right from implementation all through to decommissioning phase submitted quarterly.

(iii) The mitigation measures proposed should be followed by the proponent as it is highlighted in this ESIA report.

(iv) The design, construction and operation should be carried out in accordance with the specific report for the proposed project.

(v) All contractor's employees and any other person visiting the site should be provided with appropriate PPE and trained on their proper use.

(vi) On completion of the construction works, the proponent to commission an Independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by Environment Impact Assessment and Audit Regulations of 2003. The audit will identify non-conformities which the Contractor together with proponent will address through the defect's liability period of the Project. This audit will also form basis of annual Project self-audits by proponent

1. INTRODUCTION

1.1 Project Background

The proposed Engineering Science Complex (ESC) with a gross development area of 28,302 m^2 will sit on approximately 6 acres at the University of Nairobi Chiromo Campus. The master planning and design of the complex is envisaged to host Centres of Excellence (CoEs) (spaces for teaching, research, innovation, and collaboration) to be jointly managed by the Faculties of Engineering and Science & Technology.

The site and context analysis of the proposed ESC building is informed by the original UoN Master Plan's central ideas and the existing built form elements within and surrounding the proposed site. In the era of significant socio-economic, technological, and climatic changes, the siting of physical facilities for higher education is of greater importance than ever. The most transformative education complexes are the ones whose physical space is central to the experience, where people gather to teach, learn, and discover, to converse face-to-face, to listen, and interact.

1.2 Rationale for the Project

The University of Nairobi (UoN) has over the years experienced constraints in the infrastructure to accommodate the growing demand for new courses as well as break the "silo" operation nature between science and engineering. The University has proposed the development of the Engineering & Science Complex (ESC), which is aimed at building a platform for cutting-edge engineering and science training, research, and consultancies. This has been triggered by the growing need and demand for specific skills in the face of emerging and recurrent challenges in global health, climate change, and changing lifestyles. Consequently, there has been a need to refocus and retool related issues that could meet industry demands, changing technology, and a knowledge-driven economy.

Industry demands require graduate pools that are equipped with hands-on practical skills, robust research, ICT integration, and efficient knowledge management systems. In line with achieving the University of Nairobi's goal of offering world-class academic excellence, the proposed ESC seeks to bridge four (4) key gaps between: 1) Science and Engineering; 2) Industry and Academia; 3) New and Old curriculum delivery; 4) Faculty and Students. The proposed ESC Complex seeks to create robust educational programs in critical areas needed by the petroleum, energy, mining industry, and science & technology. The participants in the project will collaborate to create technical and vocational training, professional development, and graduate degrees that can be delivered through physical and online learning in Kenya and partner Universities abroad. The proposed complex is envisaged to provide, among others:

- Teaching facilities for engineering and science-related courses to undergraduate and graduate students,
- Modern laboratories with modern equipment to support the state-of-the-art research in engineering and sciences,
- Incubation and innovation centres for promoting entrepreneurial spirit, enhancing the University-Company links and commercializing the intellectual outputs, and,
- Continuous professional development for engineers and technical staff working in flagship projects such as LAPSETT, SGR, and Lake Turkana Wind Power Project and Geothermal projects.
- A platform for collaborations with industry and companies, government, and international Universities; leasing out the Labs to multinational corporations for Research & Development (R&D).
- Research and consultancy services in engineering and related courses.
- Faculty training and development.
- Exchange programmes and internships for students; and
- Government and donor-funded scholarships for full-time engineering/science courses.

1.3 The Rationale for the ESIA

The Environmental and Social Impact Assessment (ESIA) is a critical step in ensuring that the proposed development aligns with environmental and social sustainability principles. The ESIA aims to:

- Identify potential environmental and social impacts of the project.
- Propose mitigation measures to minimize adverse effects.
- Ensure compliance with Kenyan laws and international standards, including the Environmental Management and Coordination Act (EMCA), Cap 387, Section 58, which mandates that all projects likely to have significant environmental impacts undergo an ESIA before implementation (Government of Kenya, 1999).
- Comply with the amended Regulation 7(4) of the Environmental (Impact Assessment and Audit) Regulations, 2003, vide Legal Notice 32 of 2019, which emphasizes stakeholder engagement and detailed analysis of cumulative impacts (Government of Kenya, 2019).
- Foster project acceptance and participation through stakeholder engagement.

1.4 Objectives of the ESIA

The objectives of this ESIA are to:

(i) Assess the potential environmental and social impacts of the proposed educational infrastructure project.

(ii) Identify and evaluate feasible mitigation measures.

(iii) Develop an Environmental and Social Management Plan (ESMP) for project implementation.

(iv) Ensure compliance with regulatory requirements and standards.

(v) Enhance stakeholder understanding and participation in the project.

(vi) Align the project with the provisions of the Education Act, which emphasizes the establishment of quality educational facilities that meet national standards for safety, accessibility, and environmental sustainability (Republic of Kenya, 2012).

(vii) Incorporate other relevant regulations, such as the Occupational Health and Safety Act, 2007, and the Public Health Act, Cap 242, to ensure the welfare of workers and community health (Government of Kenya, 2007; Government of Kenya, 2010).

1.5 Study Approach and Methodology

The ESIA process employs a systematic approach to ensure comprehensive assessment and documentation of the project's environmental and social impacts. The following methodologies are employed:

1.5.1 Environmental Scoping and Screening

Scoping and screening were conducted to identify potential environmental and social impacts and define the scope of the assessment. This process involved consultations with key stakeholders, review of regulatory frameworks, and preliminary site visits to determine priority issues.

1.5.2 Desk Study

A detailed desk study was undertaken to gather relevant secondary data from policy documents, environmental guidelines, and previous studies. Key sources included the National Education Sector Strategic Plan, local development plans, and environmental guidelines by the National Environment Management Authority (NEMA) (NEMA, 2019).

1.5.3 Physical Inspection of the Site and Surrounding

On-site visits were conducted to assess the physical and biological environment of the project area. Observations focused on existing land use, vegetation, topography, and nearby facilities to identify potential impacts and opportunities for integration with local ecosystems. The proposed site was

evaluated for its suitability for development based on its proximity to existing infrastructure and environmental sensitivity.

1.5.4 Public Participation

Public participation is a cornerstone of the ESIA process, ensuring inclusivity and transparency. Engagement activities included:

- Stakeholder meetings with local leaders, educators, and community members.
- Focus group discussions to capture diverse perspectives.
- Surveys to gather quantitative data on community needs and concerns.
- Collaboration with the local administration to ensure inclusivity and representation of all affected parties (Government of Kenya, 2019).

1.5.5 Data Synthesis

Data from various sources were synthesized and analysed to establish the baseline environmental and social conditions. Impact analysis used recognized assessment tools to evaluate the significance of identified impacts and propose mitigation measures.

1.5.6 Reporting

The findings of the ESIA process are compiled into a comprehensive report, which includes:

- Project description and justification.
- Baseline environmental and social conditions.
- Identified impacts and proposed mitigation measures.
- An Environmental and Social Management Plan (ESMP).
- Documentation of stakeholder engagement and feedback.

The final report will be submitted to NEMA for review and approval, ensuring compliance with regulatory requirements and enabling the project to proceed sustainably.

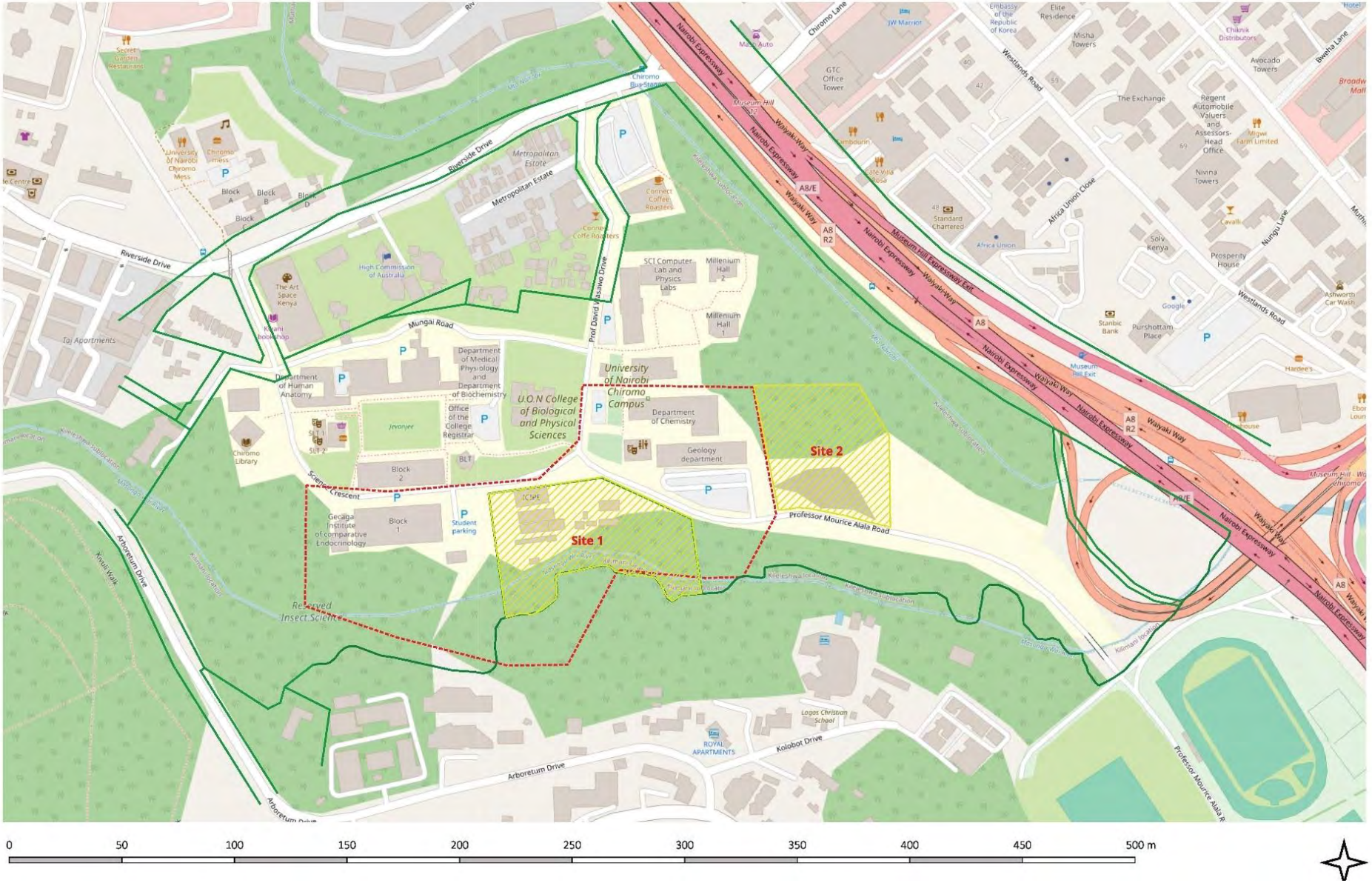


Figure 1-1: Project location within Chiromo Campus

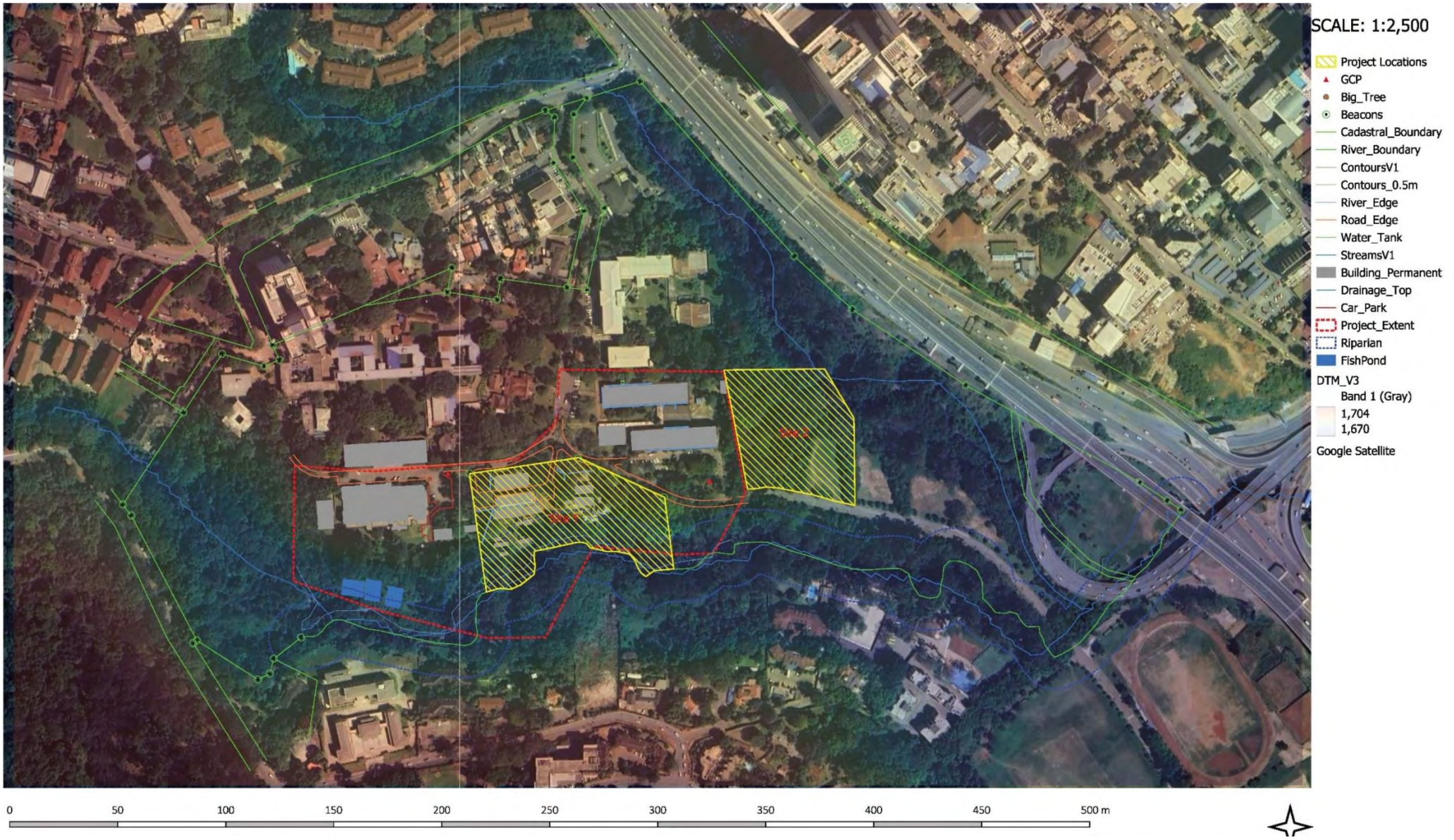


Figure 1-2: Topographical map of the Study area

2 PROJECT DESCRIPTION

2.1 Introduction

The University of Nairobi, through support from the French Development Agency (AFD), is undertaking the development of a state-of-the-art Engineering and Science Complex (ESC) at its Chiromo Campus. The proposed project is a flagship infrastructure investment aimed at enhancing the University's capacity in science, technology, engineering, and innovation, while aligning with Kenya's national development agenda and international sustainability commitments.

Situated within Chiromo Campus, the project will consolidate and expand existing teaching and laboratory infrastructure, create new collaborative spaces for research and innovation, and provide facilities that support partnerships with industry, government, and international institutions. The development is expected to serve as a catalyst for improved academic outcomes, expanded research opportunities, job creation, and strengthened linkages between the University and its surrounding community.

2.2 Project Description

The proposed ESC has been designed to host eight (8) Centers of excellence"- (CoEs) and 1 sub-CoE, which will take the form of a team and a shared facility that provides leadership, best practices, research, support, and/or training for a focus area. 4 initial CoEs have been defined in priority and supported by AFD in the ESC Project: Computer Sci/AI/Data, Innovation, Green & Blue Engineering, and Advanced Manufacturing (Industry 4.0, Robotics, automation. The University of Nairobi (UoN) will develop the other envisaged 4 CoEs from its source budget. In the long run, CoEs are aimed at building cutting-edge training and research platform capacities that will increase access to affordable, world-class training and research facilities to support science, technology, and engineering at the UoN.

2.3 Project Location and Context

2.3.1 Nature of the Project Area

The Engineering and Science Complex project will be situated within the Chiromo Campus of the University of Nairobi, which currently hosts the Faculty of Science and the Examination Centre. The location is easily accessible from both the Faculty of Engineering and the Faculty of Architecture and Built Environment. Therefore, this proposed landmark development will be strategically located to support multidisciplinary research, innovation, and teaching in engineering,

life sciences, environmental studies, and emerging technologies. Approximate GPS coordinates of the main entrance are:

- Latitude: -1.2664° S
- Longitude: -36.8086° E
- (UTM Zone 37M, Easting: ~251230m, Northing: ~9859920m)

Chiromo Campus (Figure 1-1) is uniquely bordered by two major rivers that define its natural boundary:

- Nairobi River – flows along the northern boundary of the campus.
- Kirichwa Kubwa River – a tributary that joins Nairobi River at the western end of the campus.

These rivers converge near the eastern periphery of the Chiromo grounds, creating a distinctive natural green buffer and ecological zone. This setting presents both ecological value and design constraints. This riparian setting introduces important considerations for sustainable infrastructure development, flood risk management, and ecological conservation, which will be integral to the planning and implementation of the Engineering and Science Complex.

2.3.2 Position and Layout Plan

The property under which Chiromo University sits, and which formed the Area of Interest is registered as LR No. 209/346/40/R and LR No. 209/346 /40/51.

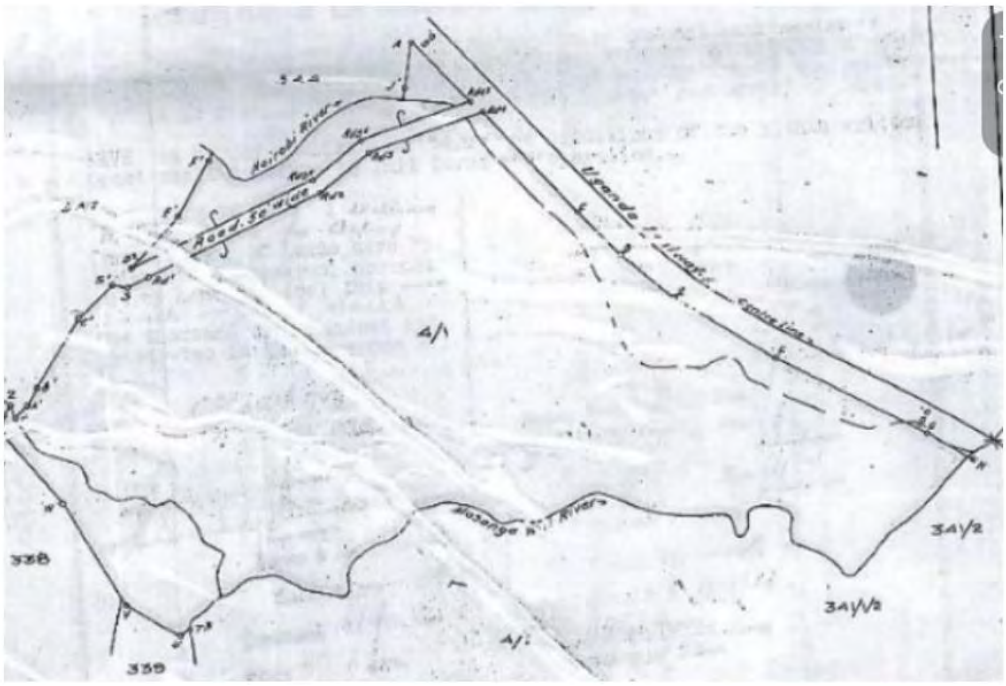


Figure 2-1: Dead plan



Figure 2-2: Topo Area of Interest

2.3.3 Proposed Alternative Sites

Site 1, adjacent to the School of Biological Sciences and the Confucius Institute, lies in a more enclosed, greener pocket directly bordering the Kirichwa Kubwa (Msongwai River).

Site 2, located next to the Department of Mathematics and close to the Nairobi River and a major highway, sits within a partially vegetated area bordered by dense road infrastructure.

2.4 Land ownership

The proposed Engineering Science Complex (ESC) site at Chiromo Campus is owned by the University of Nairobi. The property on which Chiromo Campus is situated, and which constitutes the Area of Interest, is registered as LR No. 209/346/40/R and LR No. 209/346/40/51.

2.5 Waste/Sewerage Management

The site will be connected to the existing Nairobi City Water and Sewerage Company sewer system for conveyance to the treatment plant. Before connection, the proponent MUST seek approval from Nairobi City Water and Sewerage Company.

2.6 Description of the Project's Construction Activities

2.6.1 Site Preparations

The proposed project site will be prepared for construction. This will involve site clearing, Soil Stripping, excavation works and transportation of construction materials. This will be undertaken in a phased approach to mitigate soil erosion and the impacts of excessive dust generation. Due to the nature and size of the proposed project, there will be use of heavy earthmoving machinery such as excavators, lifting tackle and bulldozers. However, where the use of machinery will not be necessary, use human labour through employment of the residents especially the youth will be encouraged.

2.6.2 Excavation and Foundation Works

Excavation works will be carried out to prepare the site for construction of foundations for the various structures particularly the main building and the parking area.

2.6.3 Storage of Materials.

Building materials such as rough stones, ballast, sand and steel will be carefully stored on site. However, to avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in quotas. Materials such as cement, paints and glass among others will be stored in temporary storage structures built for this purpose.

2.6.4 Masonry, Concrete Work and Related Activities

The construction of the slabs, columns, beams, pavements, foundations, drainage systems among other components of the project involve some concrete works, masonry work and related activities. These activities are known to be labor intensive and are supplemented by machinery such as concrete mixers, cranes where need arises.

2.6.5 Structural Steel Works

The development will be reinforced with structural steel for stability. Structural steel works involve steel cutting, welding and erection particularly during setting out and reinforced concrete works.

2.6.6 Electrical Works

Electrical work during construction will include electrical ducts, earthing, electrical wiring, installation of building lighting, street lighting etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

2.7 Description of Project's Operational Activities

2.7.1 The Facility Users

The proposed project will be used by the University of Nairobi community which include staff, researchers and students. Additionally, it is anticipated that researcher from other institutions may have pre-authorised access to the building.

2.7.2 Electrical System

The proposed development will be connected to the Kenya Power Company electricity main line of which will be used in all phases of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

2.7.3 Water Reticulation System

Water from the Nairobi City Water and Sewerage Company (NCWSC) will be used during the operation phases of the project.

2.7.4 Solid Waste Management

Solid waste management will consist of collection by segregation of waste by type from the various sources and these will be collected at designated points. The waste will later be collected for disposal by a NEMA licensed refuse collector.

2.7.5 General Repairs and Maintenance

The proposed development and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of the main building, finishes and pavements, repair and maintenance of electrical gadgets, painting and replacement of worn-out materials among others.

2.7.6 Ventilation

The building has been designed to make use of natural ventilation and artificial ventilation.

2.8 Description of the Project's Decommissioning Activities

2.8.1 Demolition Works

Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas, perimeter fence etc. will be demolished. This will produce a lot of solid waste, which will be re-used for other construction works or if not re-usable, disposed of appropriately by a licensed waste disposal company.

2.8.2 Dismantling of Equipment and Fixtures

All equipment including electrical installations, furniture, finishing fixtures partitions, pipework and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of this equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of this equipment to schools, churches and charitable institutions.

2.8.3 Site Restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

2.9 Construction Plan

The project is planned for implementation over a period of approximately 1-3 years from commencement, subject to mobilization timelines, design reviews, statutory approvals, and availability of financing. The construction plan will follow a phased approach to minimize disruption to ongoing academic activities at Chiromo Campus.

Key considerations include:

- **Mobilization:** Deployment of skilled and unskilled labor, machinery, and equipment.
- **Compliance:** Acquisition of all relevant statutory permits and adherence to NEMA, OSHA, and Nairobi County regulations.
- **Stakeholder Coordination:** Continuous engagement with students, staff, and neighboring institutions to manage disruptions.
- **Health, Safety, and Environment (HSE):** Strict enforcement of OHS standards, dust and noise suppression, traffic management, and waste management.

The phased delivery of the complex will allow for progressive completion of teaching and laboratory spaces, ensuring early academic use while final works are completed.

3 BASELINE INFORMATION

3.1 Physiographic and Natural Conditions

3.1.1 Topography

Site 1 has two distinct slopes: 1) Upper part that slope moderately 2) Lower part that slopes steeply. Site 2 slopes more uniformly. The characteristics of the two drainage areas is presented in the table that follows:

Table 3-1: Characteristic of the Surface Topography at Site 1 and Site 2

Site	Upper Level (m)	Lower Level (m)	Slope
Site 1 - Upper	1692	1985	9%
Site 1 - Lower	1685	1676	29%
Site 2	1690	1678	7%

3.2 Geotechnical Conditions

3.2.1 Scope and methods.

Two complementary investigations inform the site's subsurface and seismic conditions:

(i) a factual geotechnical investigation (30 boreholes to ~20 m, SPTs, plate load/CBR, sampling and lab tests) and

(ii) a seismic MASW survey along six profiles (288 m total) to derive shear-wave velocity (Vs) profiles and site class.

3.2.2 Geological and subsurface profile.

The site is underlain by Nairobi phonolitic trachyte and tuff; the upper ~2 - 4 m comprises weathered silts/clayey silts of medium–high plasticity that are weak and unsuitable for significant loads without treatment, while competent trachyte is generally encountered from about 4 - 6 m depth and persists to at least 30 m in the investigation window. Local variability includes lenses of tuff and decomposed/weathered rock interrupting the trachyte in places. Groundwater occurs at variable depths and is expected to fluctuate seasonally under the influence of the Nairobi River.

3.2.3 Seismic characterization.

MASW results give Vs30 = 771 - 1,063 m/s, classifying the site as Site Class B (rock) under UBC/IBC/NEHRP - indicating low amplification potential and confirming good seismic competence of the founding strata.

3.2.4 Geotechnical suitability and principal risks.

Overall, the site is suitable for heavy/high-rise development provided the weak near-surface soils are removed, replaced, or stabilized and foundations are bearing on competent trachyte (typically ≥~5 m). ESIA-relevant risks include

(i) differential settlement if shallow weak horizons are left untreated.

(ii) excavation stability and dewatering where groundwater is intercepted; and

(iii) sediment mobilization/erosion and potential river-linked fluctuations during earthworks, requiring robust drainage and pollution prevention.

3.2.5 Design and construction implications.

(i) **Foundations:** Design to bear on trachyte; pad/strip footings for moderate loads, raft where settlement control is critical, and piles socketed into trachyte for heavily loaded cores, at the structural engineer's discretion.

(ii) **Ground improvement:** Excavate and backfill weak soils in the 0–5 m horizon with engineered fill or apply stabilization to achieve a stable platform.

(iii) **Water management:** Provide temporary dewatering during excavation as needed and permanent surface-water control/SuDS with erosion and silt control to protect campus drains and the Nairobi River.

(iv) **Seismic design:** Apply the Kenya Building Code (2020) and Eurocode 8 provisions consistent with Site Class B parameters.

3.3 Ecological Conditions

The Chiromo site retains ecologically valuable riparian and forest patches amid urban pressure; while the recorded fauna during this campaign were common and Least Concern, the habitat's connectivity, regulatory services, and educational value make it a constrained receptor that requires strict buffer protection, hydrological controls, invasive management, and ongoing monitoring to ensure the project achieves no net loss of biodiversity and protects Nairobi River's ecological function.

3.3.1 Scope & approach.

The ecology study established a baseline for habitats, flora, fauna and ecosystem services within and around the proposed site between the Kirichwa and Msongawai tributaries, using targeted field surveys (vegetation quadrats, avifauna point counts/mist-netting, camera traps and track surveys for mammals, herpetofauna visual encounter and pitfall trapping, macroinvertebrate kick-netting, and electrofishing), supported by literature and guidance.

3.3.2 Landscape setting & habitat types

The site forms part of a middle-order Nairobi River system inside a remnant riverine forest mosaic (riparian belts, semi-closed forest patches, bamboo-dominated strips, grassland and disturbed edges). Urbanization has fragmented habitats and altered hydrology; upstream catchment pressures and midstream urban activities increase sediment and pollutant loading, heightening

sensitivity in Chiromo. Riparian reserves legally range 6 - 30 m from the riverbank and function as the project's key ecological receptor/interface.

3.3.3 Vegetation & invasive species

Vegetation comprises a mix of indigenous riverine species (e.g., **Ficus sycomorus, Croton megalocarpus, Trichilia emetica, Markhamia lutea**) interspersed with exotics (**Eucalyptus, Grevillea, Cupressus**, ornamental **Filicium**), plus an extensive **bamboo (Bambusa vulgaris)** belt along parts of the river; several quadrats show canopy fragmentation, bank destabilization, invasive/ornamental encroachment, and limited indigenous regeneration in disturbed reaches.

3.3.4 Fauna highlights.

(i) **Herpetofauna:** Five species recorded during this campaign (dominated by **Trachylepis kilimensis**) all **IUCN Least Concern**; the species accumulation curve did not plateau, indicating further seasonal effort would likely add species.

(ii) **Mammals:** Records include **vervet monkey (Chlorocebus pygerythrus)** and small mammals (e.g., **Crocidura**), consistent with edge habitats and riparian strips.

(iii) Avifauna: **A diverse assemblage typical of urban river valleys - e.g.,** Hadada ibis, African pied and montane wagtails, hamerkop, black-headed heron, African fish eagle, yellow-billed kite, Hartlaub's turaco, sunbirds, weavers, manikins, flycatchers**, reflecting structural heterogeneity of canopy/edge/open water.**

(iv) **Fish & aquatic biota: Mosquitofish (Poecilia reticulata, LC)** recorded; macroinvertebrate assemblages dominated by pollution-tolerant **Chironomidae** and culicids in impacted reaches, with more sensitive taxa (e.g., **Baetidae, Cheumatopsyche**) indicating better-quality microhabitats upstream/locally consistent with known longitudinal pollution gradients in the basin

3.3.5 Water quality signals & riparian condition

Evidence from algal/diatom communities, macroinvertebrates and field observations points to **organic enrichment, suspended solids and episodic algal blooms** in sections of the tributaries; riparian zones show **herbaceous overgrowth, exotic stands, and human pressures** (encroachment, dumping, bank erosion), though structurally intact patches and bamboo belts still support birds, primates and herpetofauna.

3.3.6 Ecosystem services

The riverine forest provides **regulating services** (microclimate moderation, stormwater buffering, carbon storage, water quality support), **habitat connectivity** for urban biodiversity, and **cultural/educational services** for campus teaching and research, values that amplify the significance of maintaining a healthy riparian buffer.

3.3.7 Sensitivity & constraints for the project.

- **High-sensitivity receptors: Riparian corridor and Nairobi River water quality**; bank stability; remnant indigenous trees; breeding/cover sites for herpetofauna; roosting/foraging for birds and primates.
- **Key pressures:** Vegetation clearance, soil disturbance, runoff and sediment mobilization, accidental spills, invasive species spread, and loss of microhabitat complexity if buffers are narrowed.

3.3.8 Implications for design & construction

1. **No permanent works within the riparian reserve**; physically demarcate and fence buffers before site handover; retain large indigenous trees.
2. **Integrate Sustainable Urban Drainage Systems (SuDS)** (permeable paving, bioswales, detention) and **construction-phase sediment controls** to protect streams; avoid direct discharges.
3. **Selective vegetation management**: remove high-risk invasives (prioritized), retain/augment natives, and plan post-construction **indigenous riparian planting** to restore canopy and understorey.
4. **Lighting design** to reduce spill into riparian zones; maintain wildlife movement along green corridors.
5. **Pollution prevention**: spill kits, chemical storage containment, and lab effluent **pre-treatment** in operation to meet consent limits and protect receiving waters.
6. **Biodiversity monitoring** through construction and early operation: seasonal **herpetofauna** checks, **avian** point counts, and **macroinvertebrate** indices upstream/at-site/downstream to verify no-net-degradation.

3.4 Water Quality Assessment

The proposed Engineering and Science Complex for the University of Nairobi is located within the Chiromo Campus, between Nairobi River and its Kirichwa Kubwa (Msongowai) tributary. Development activities such as excavation and increased auto use can impact water quality by contributing sediment, nutrients, and other pollutants to limit water supplies, increasing the temperature of the water and the rate and volume of runoff.

Water quality indicators are essential in evaluating the health and sustainability of aquatic ecosystems potentially impacted by the proposed building construction and operations. Additionally, they are needed for assessing the potential of degrading the river water quality beyond the requirements for sources of drinking water. Assessment of the Baseline River Water quality

was conducted to facilitate early identification and mitigation of the adverse environmental impacts.

3.4.1 Water Sampling and Laboratory Analyses

Water samples were collected to evaluate baseline water quality and potential project-related impacts. Sampling points were chosen upstream and downstream of the proposed construction site along Kirichwa Kubwa (Msongowai) for Site 1 and Nairobi River for Site 2.

Laboratory analyses were conducted at the Public Health Laboratory of the University of Nairobi. The tests covered the following:

- Physico-chemical parameters: pH, color, turbidity, electrical conductivity, dissolved suspended solids;
- Biochemical characteristics: BOD5, COD
- Microbiological indicators: Total coliform bacteria, E. coli

3.4.2 Baseline Water Quality

The baseline water quality for Kirichwa Kubwa (Msongowai) River and Nairobi River for upstream and downstream of the alternative Construction Sites 1 and 2 are presented in the following table. The water qualities were compared with the Kenya Bureau Standards (KEBS) Standards for Drinking Water and the NEMA Water Quality Regulations for Effluent Discharge into Aquatic Environment.

Table 3-2: Baseline (2025) Water Quality for Kirichwa Kubwa and Nairobi Rivers at Chiromo

Parameter	Standards[1, 2, 3]	Kirichwa Kubwa River		Nairobi River	
		U/S[4]	D/S	U/S	D/S
Physico-chemical parameters					
pH	6.5 – 8.5 [1]	7.49	7.56	7.28	6.95
Apparent Color °H	15 [2]	35	35	25	25
Turbidity, F.T.U	NR [3]	52	68	20.7	26
Conductivity M/S/Cm (mg/L)	NR	615	671	420	444
Nitrates (mg/L)	10 [1]	0.1	0.1	0.5	0.4
Suspended Solids (mg/L)	30 [1, 2]	200	220	100	90
Dissolved Solids (mg/L)	1,200 [1, 2]	500	600	350	340
Biochemical Characteristics					
BOD_5 (mg/L)	30 [2]	90	120	30	18
COD (mg/L)	50 [2]	352	416	76	112
Bacteriological Examination					
CFU of Total Coliform/100 mL	30 [1]	130 x 10^6	140 x10^6	116 X10^4	100 x 10^4
CFU of E. Coli /100 mL	Nil [1]	12 x 10^6	15 x 10^6	10 X10^4	5 x 10^4

[1] Kenya Standards KS 05-459: Part 1: 1996, [2] The Environmental Management & Coordination Water Quality Regulations (2004)- Third Schedule: Standards for Effluent Discharge into Aquatic Environment, [3] NR - Not Regulated, [4] U/S, D/S - Upstream and Downstream of Chiromo, respectively.

The results indicate that except for pH, nitrates, and dissolved solids the baseline water quality parameters exceeded the standards for both sources of drinking water and discharge into the aquatic environment. Generally, the river water was highly polluted with excessively high organic load and fecal contamination with Kirichwa Kubwa River (Site 1) being more polluted than the Nairobi River (Site 2). However, the insignificant dissolved solids in all the samples suggested that the pollution load is largely of domestic origin that excludes industrial discharges.

It is pertinent to note that while the baseline water quality has been assessed, an ongoing Nairobi River Restoration Project may significantly alter the situation before the start of the construction the stage. Therefore, it will be necessary to re-evaluate the baseline water quality before commencement of the project.

3.4.3 Available Water and Wastewater Infrastructure

3.4.3.1 Water Supply

The Chiromo Camus of the University of Nairobi where the proposed development is located is well water lines from the Nairobi City and Sewerage Company (NCWSC). The layout of the water supply pipelines is presented in the Appendix. Additionally, there are no. boreholes within the Campus that are integrated in the water supply.

3.4.3.2 Sewerage

The Chiromo Campus is served by sewers that run along both the Nairobi and the Kirichwa Kubwa River. The layout and Details of the sewers is shown in the Appendix

3.5 Hydrology and Drainage Assessment

The proposed University of Nairobi Engineering and Science Complex alternate sites Site 1 and Site 2 are bounded by the Kirichwa Kubwa (Msongowai) and Nairobi River, respectively. Development along water bodies must take into consideration flood risks, constrains of riparian regulations and altered surface drainage. These considerations for the proposed alternative projects sites are elaborated in the following sub-sections.

3.5.1 Flood Risks

The risk of flooding is determined by the terrain and flow regimes. It may also be exacerbated by changes in surface hydrology from construction of impervious surfaces (buildings, parking and roads) that increase the flow of water to the rivers. For the current, projects, the two sites under consideration are on relatively steep valleys, which minimizes the risks of flooding.

3.5.2 Riparian Constraints

The extent of development along water bodies is constrained by riparian requirements that are based on flow regimes, flood risks, and drainage needs. The government policy on major rivers, especially Nairobi River is strictly 30 meters. Consequently, both construction sites will be constrained to 30 m from the river centerline and the available construction area will be the site area to the river less 30 m wide riparian.

3.5.3 Surface Drainage

The surface drainage for the two alternate construction Sites 1 and 2 is divided into two as follows:

i. Area above the main Access Roads:

The surface run-off is cut-off by lined road drains that collect it and divert channels on the lower side of the road. The water then flows through vegetated drains to the respective rivers. These natural drains have firmed up with time and do not show signs of degradation.

ii. Area within the Sites

Surface drainage within comprises sheet flow from the adjoining paved roads, stormwater from existing buildings and own catchment flow. The stormwater flows through vegetation that covers the two sites.

Site 1 has two distinct slopes: 1) Upper part that slope moderately 2) Lower part that slopes steeply. Site 2 slopes more uniformly. The characteristics of the two drainage areas is presented in the table that follows:

Table 3-3: Characteristic of the Surface Drainage Area at Site 1 and Site 2

	Drainage Length (m)	Upper Level (m)	Lower Level (m)	Slope
Site 1 - Upper	80	1692	1985	9%
Site 1 - Lower	31	1685	1676	29%
Site 2	168	1690	1678	7%

3.6 Climate

The project area lies within Nairobi County, which experiences a sub-humid equatorial climate moderated by altitude (~1,700 m above sea level). The local climate is characterized by bimodal rainfall, with the long rains occurring from March to May and the short rains from October to December. January–February and June–September typically present drier periods. Temperature averages range from 12°C to 27°C, with minimal seasonal variation but strong diurnal changes.

3.6.1 Rainfall Regime

Rainfall data from the Kabete Meteorological Station (2011–2023), which most accurately represents climatic conditions at Chiromo Campus, show the following:

- Annual Rainfall: Ranged between 794 mm (2017) and 1,589 mm (2015).
- Mean Annual Rainfall: ~1,253 mm over the 13-year period.
- Rainfall Variability: Interannual variability is significant, with a standard deviation of ~249 mm, reflecting sensitivity to the El Niño–Southern Oscillation (ENSO) and regional climate drivers.
- Seasonality: Peaks are consistently observed in April–May (long rains) and October–November (short rains), confirming the bimodal pattern typical of Nairobi's highland climate.
- Extreme Events: Heavy rainfall episodes have been recorded, such as April 2012 (353 mm) and May 2015 (262 mm), increasing flood risk along the adjacent Chiromo and Msongawai Rivers. Conversely, extended dry spells (e.g., January 2012 with 0 mm) highlight the periodic occurrence of drought stress.

3.6.2 Climate Risks and Trends

Flooding: The project site's proximity to Chiromo River makes it vulnerable to localized flooding during high-intensity rainfall, requiring robust stormwater management and climate-proofing measures.

Drought: Increasing frequency of rainfall failure during dry seasons may stress landscaping and water supply for the complex, necessitating rainwater harvesting and reuse systems.

Heat Island Effect: With urbanization, central Nairobi is experiencing gradual microclimatic warming, reinforcing the importance of green building design, shaded courtyards, and landscaping.

Climate Change Context: Projections for Nairobi under Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6, 2021–2023) scenarios indicate a likely increase in rainfall variability, shorter but more intense rainy seasons, and higher frequency of extreme storms, consistent with AFD's requirement to integrate climate-resilient design considerations

3.7 Air Quality

3.7.1 Scope and methods

A targeted baseline assessed $PM_{2.5}$ and Black Carbon (BC) at two Chiromo Campus micro-environments, Site 1 (near an active construction area) and Site 2 (adjacent to Uhuru Highway, tree-sheltered), using personal samplers (day: 9 am–7 pm; night: 7 pm–7 am) on 28 Aug 2025; filters were analysed for $PM_{2.5}$concentration and BC.

3.7.2 Results & compliance

All observed **$PM_{2.5}$** levels were **well below** the **WHO 24-hour guideline of 15 µg/m³** and Kenya's **35 µg/m³** standard:

- **Site 1 (construction-proximate):** $PM_{2.5}$ **5.3 µg/m³ (day)**; **6.4 µg/m³ (night)**; BC **14.3 ng (day)**; **13.5 ng (night)** a **dust-dominated** profile with relatively low BC contribution.
- **Site 2 (highway-adjacent, treed):** $PM_{2.5}$ **3.0 µg/m³ (day)**; **7.4 µg/m³ (night)**; BC **14.2 ng (day)**; **12.7 ng (night)** signals **traffic combustion** influence; **night-time inversion** increased concentrations.

Chiromo Campus air quality is good at baseline, with micro-scale variation reflecting source proximity: construction dust at Site 1 (more PM, less BC) versus vehicular exhaust at Site 2 (higher BC fraction), and canopy effects that moderate daytime exposure near the highway.

3.7.3 Implications for the project

With appropriate controls, construction and operation can **maintain compliance**; however, removing mature tree cover would **erode the natural PM/BC buffering**, degrade microclimate,

and could **raise local exposures**, especially under night inversions. Preserving and enhancing vegetative buffers is therefore an **impact-critical** design choice.

3.7.4 Key mitigation and monitoring

(i) **Construction:** wet suppression, covered haulage, wheel-wash, speed control, boundary PM spot-checks, and complaint logging at sensitive edges.

(ii) **Operation:** preserve/enhance **tree belts** along traffic edges; site intakes away from roads; low-NO_x standby generators with proper stacks; lab fume hood commissioning and maintenance.

(iii) **Monitoring:** boundary **$PM_{2.5}$** spot-checks during peak works; periodic **BC/$PM_{2.5}$** campaigns at the two sites to confirm no deterioration from baseline, with **night-time checks** during dry seasons

3.8 Socio-Economic Environment

3.8.1 Location and Land Use

Chiromo Campus is located within Westlands Sub-County of Nairobi City County, in proximity to the Central Business District (CBD), Westlands commercial hub, and residential estates such as Kileleshwa, Riverside, and Parklands. The area is characterized by mixed land uses, including:

- Institutional: University of Nairobi Chiromo and Main Campus, Confucius Institute, and nearby tertiary institutions.
- Residential: Student hostels (both on-campus and private facilities such as Qwetu and Mamlaka), rental flats, and staff housing.
- Commercial: Hotels (Radisson Blu, local guest houses), food vendors, cafes, and small businesses serving the student population.
- Health Facilities: Kenyatta National Hospital and University of Nairobi Health Services provide medical support within reach.

3.8.2 Economic Activities

The local economy around Chiromo is heavily influenced by the University, with key activities including:

- Student-driven businesses such as cafes, hostels, photocopy/printing services, and bookshops.
- Informal vending of food and beverages around campus gates.
- Hospitality and accommodation services, with hotels and hostels targeting visiting scholars, conferences, and students.

- Transport services, including boda boda riders and matatus serving the University community.

3.8.3 Social Services and Infrastructure

Chiromo Campus is a historic academic hub, hosting faculties of Science, Engineering, and Biosystems. It has strong symbolic and cultural value to students, alumni, and the wider Kenyan education system. The campus grounds also host mature indigenous trees and green spaces, contributing to biodiversity and aesthetic value.

- Education: University of Nairobi is the main institutional anchor, attracting students nationally and regionally.
- Housing: There is a mix of on-campus hostels (Mamlaka, Hall 4, Hall 13, etc.) and private off-campus accommodation (Qwetu, Klabu, etc.). Pressure on student housing is high, leading to growth in private hostels.
- Utilities: The area is served by Nairobi City Water and Sewerage Company, with power from Kenya Power. Waste collection is a mix of County services and private providers.
- Accessibility: The site is well connected through University Way, Riverside Drive, and Waiyaki Way, though traffic congestion during peak hours is common.

3.9 Population

According to the 2019 Kenya Population and Housing Census, Nairobi City County had a population of 4,397,073, with an average density of 6,247 people/km²

- The county comprises 11 sub-counties, 17 constituencies, and 85 wards
- The average household size stands at 2.9 persons, with a total of 1,506,888 households
- Nairobi's population grew from 3.14 million in 2009 to 4.40 million in 2019.
- With an annual growth rate of ~2.09%, the population is projected to reach approximately 5 million by 2025

Chiromo Campus lies within Kileleshwa ward, falling under Dagoretti North Constituency and part of the broader Westlands/Lang'ata sub-county cluster.

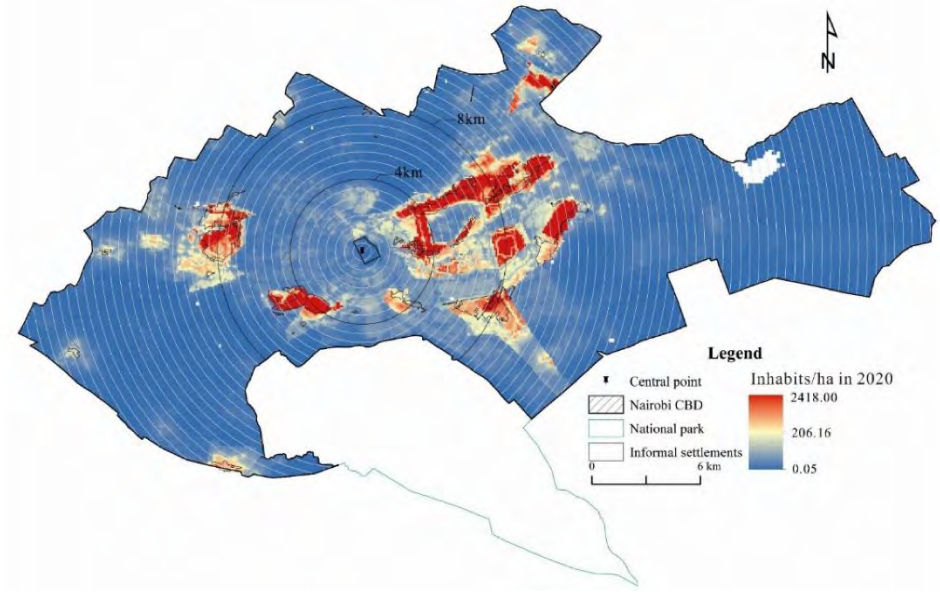
3.9.1 Dagoretti Sub-County (2009 vs 2019):

The population of Dagoretti Sub-County grew from 294,222 to 434,208 people While the population density highlights within Nairobi County showed that Kibra and Mathare are among the most densely populated areas.

Kileleshwa, which includes Chiromo within its broader ward boundaries, had a population of 22,216 in 2019, with a density of approximately 4,229 people/km².This indicates that while the area remains predominantly residential, there has been increasing densification, with emerging mid-rise and high-rise developments.

Here's a high-resolution map showing Nairobi's population density distribution, with Chiromo Campus located in the more densely populated inner zones of the city, particularly within Dagoretti North/Lang'ata sub-county, near Westlands and the CBD.

Figure 3-1: Nairobi's population density distribution



3.9.2 University of Nairobi Population

The University of Nairobi is Kenya's largest higher-education institution, with 49,047 students in the 2023 academic year: 35,897 undergraduates and 11,003 postgraduates. The presence of tens of thousands of students within the city, and a large proportion likely based at Chiromo and nearby campuses, significantly influences local housing demand, transportation, and service provision.

3.9.3 Implication for the Project

- The rapid urban population growth, alongside evolving residential densities, underscores the need for responsive infrastructure, including wastewater systems, traffic management, and green/open spaces.
- A sizeable student population at the University of Nairobi brings seasonal peaks in housing demand, motility, and consumption patterns, a dynamic that must be factored into baseline assessments and environmental impact projections.

- Given the moderate to high density and mixed-use nature of Kileleshwa and Chiromo, the campus must incorporate strategies to manage resource demand, service delivery, and community integration.
- Planning must anticipate continued densification, linked both to broader urban growth and university expansion, aligning with sustainable development targets.

3.10 Questionnaire Findings

A total of 398 respondents (students, staff, and nearby community members) participated in the ESIA survey for the proposed Engineering and Science Complex at Chiromo.

- **Demographics:** Majority were youth aged 18–25 years (51%), with 58% male and 42% female. Most respondents were students (50%), followed by nearby institutions (22%) and university staff (25%). Education levels were generally high, with 67% holding bachelor's degrees.
- **Awareness and Perceptions:** About half (49%) were aware of the project, mainly through word of mouth. A strong majority believed the project aligns with University strategic goals (92%) and supports national development plans (93%).
- **Anticipated Impacts:** Respondents expect improved learning facilities (49%), better lab/classroom access (45%), and increased student enrollment (79%). Many also foresee positive impacts on teaching, research, and the University's reputation.
- **Risks Identified:** The most cited environmental concerns were deforestation, air pollution (dust/emissions), water pollution, and noise. Social risks included disruption of academic activities, restricted access to facilities, and safety hazards.
- **Vulnerable Groups:** Women were noted to benefit from employment and business opportunities, though safeguards such as gender-sensitive recruitment and anti-harassment policies were recommended. For children, risks included air pollution, accidents, and noise, with fencing and safety signage proposed as key measures. For PWDs, accessibility challenges were emphasized.
- **Mitigation Priorities:** Suggested measures included dust and noise control, waste management, relocation of classes during construction, fencing and safety signage, and continuous stakeholder engagement.

4 LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Preamble

This chapter sets out a summary of the laws, regulations and institutional setup relevant to environmental and social management in Kenya and pertinent to this project. It highlights the fundamental national and sub-national laws and regulations and also highlights international guidelines relevant to the proposed project, including the Environmental and Social Risk Management Policy (ESMP) for AFD-funded Operations. The chapter also elaborates on the institutional framework relevant for environmental and social management to ensure that the ESMP will be effectively implemented.

4.2 Relevant Kenyan Legislation and Regulations

4.2.1 Constitution of Kenya, 2010

The legal basis for EIAs in Kenya is anchored in both the Constitution. Article 42 of the Constitution guarantees every person the right to a clean and healthy environment, while Article 69(1) obligates the State to establish systems for EIAs, audit, and monitoring as part of its duty to protect the environment for present and future generations. Additionally, Articles 35 and 69(1)(d) underscore the importance of public participation and access to information in environmental decision-making, making stakeholder engagement a constitutional requirement in the EIA process. ***The project's management is expected to protect the environment in all phases of the project's cycle by fully complying with the constitutional provisions on the right to a clean and healthy environment.***

4.2.2 Environmental Management and Coordination Act, 1999

The Environmental Management and Coordination Act, 1999 (EMCA) is the principal legislation regulating EIAs in Kenya and establishes the National Environment Management Authority (NEMA) as the lead agency for coordinating and supervising environmental matters.[1] Section 9 mandates NEMA to review all EIA reports and determine whether to issue licenses for proposed projects, as well as to register and license EIA experts. Part VI of EMCA, sets out the detailed procedures and requirements for EIAs.

EMCA's Second Schedule further classifies projects into Low, Medium, and High-Risk categories depending on their likely impacts. Construction projects are specifically categorized as either Medium Risk, where the development does not exceed one hundred units, or High Risk where the development exceeds one hundred units.[2] ***The project must undergo the prescribed EIA***

[1] Environmental Management and Co-ordination Act (Cap. 387), Laws of Kenya, Section 7
[2] *Ibid,* Second Schedule

process and obtain NEMA's approval prior to implementation, as it is legally classified as a either a Medium or High-Risk development depending on the number of units to be constructed.

4.2.2.1 Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003, set out the detailed procedures and requirements for EIAs. The Regulations prohibit the implementation of any project likely to have significant environmental impacts unless an EIA has been conducted and approved, making EIAs a mandatory legal prerequisite for environmentally sensitive projects.[3] Regulation 6 details the requirements for public participation, ensuring that affected communities and stakeholders are consulted and their views integrated into the assessment process.

Additionally, Regulations 17 and 18 provide for monitoring, auditing, and reporting obligations, requiring proponents to implement mitigation measures and submit compliance reports to NEMA. ***The project management needs to ensure that an EIA is conducted and approved prior to commencement, identifying and mitigating potential environmental impacts. This compliance supports sustainable development and safeguards environmental and social interests throughout the project lifecycle.***

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

The Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009 define construction as including the erection, alteration, repair, dismantling, demolition, structural maintenance, painting, mowing, land-clearing, earth-moving, landscaping, grading, excavating, laying of pipes and conduits whether above or below ground level, road, railway and highway building, concreting, installation and alteration of equipment, and the structural installation of construction components and materials in any form or for any purpose that includes any work in connection with the construction.[4]

Persons wishing to operate or repair any construction equipment that is expected to exceed the regulated noise thresholds (60 decibels during the day and 35 decibels at night in residential areas) must obtain a noise permit from NEMA.[5] Furthermore, persons intending to carry out construction are required during the EIA studies to identify any natural resources, land uses, or activities that may be affected by noise or excessive vibrations arising from construction,

[3] The Environmental (Impact Assessment and Audit) Regulations (Legal Notice 101 of 2003), Laws of Kenya, Regulation 4
[4] Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009, (Legal Notice 61 of 2009), Laws of Kenya, Regulation 2
[5] *Ibid*, Regulation 11 as read together with Schedule One and Two

demolition, mining, or quarrying activities.[6] They must also determine the measures necessary to minimize or eliminate such adverse impacts and ensure that these abatement measures are incorporated into the project's plans and specifications.[7]

The project involves construction activities that may generate noise and vibrations. ***The project's management must undertake noise and vibration assessments as part of the EIA, integrating mitigation and abatement measures into project designs, and, where noise levels are expected to exceed permissible thresholds, securing a noise permit from NEMA before commencing works.***

4.2.2.3 Environmental Management and Coordination (Water Quality) Regulations, 2024

Where construction activities involve the discharge of wastewater or other effluents, an Effluent Discharge License must be obtained in accordance with the Environmental Management and Coordination (Water Quality) Regulations, 2024.[8] These regulations set standards for the disposal of effluents and pollutants to ensure that water bodies are protected from harmful discharges. The application must be made in Form A set out in the Seventh Schedule of the Regulations and must be accompanied by an application for discharge of effluent into the environment of KES. 5,000 and an annual license application fee of KES. 20,000 where the population is greater than 100 persons and KES. 10,000 where the population is more than 50 people but less than 100 persons.[9]

Upon submission, the Authority is obligated to communicate its decision, together with reasons, to the applicant within thirty days.[10] Where an application is approved, the Authority issues the effluent discharge license within twenty-one days of approval.[11] The license is valid for one year from the date of issue, and the Authority is required to maintain a register of all effluent discharge licenses.[12] Importantly, an effluent discharge license issued under the Act is not transferable.[13] It is an offence to discharge effluent without such a license.[14] ***The project management must obtain an Effluent Discharge Licence from NEMA before discharging wastewater or effluents during construction. Compliance ensures legal operation and protection of surrounding water resources.***

[6] *Ibid*, Regulation15 (a)
[7] *Ibid*, Regulation 15 (b) and (c)
[8] The Environmental Management and Co-ordination (Water Quality) Regulations (Legal Notice 120 of 2006), Laws of Kenya, Regulation 16
[9] *Ibid*, Schedule 11
[10] *Ibid*, Regulation 16 (2)
[11] *Ibid*, Regulation 16 (3)
[12] *Ibid*, Regulation 17
[13] *Ibid*, Regulation 18
[14] *Ibid*, Regulation 27

4.2.2.4 Environmental Management and Coordination (Waste Management) Regulations, 2024

The Environmental Management and Coordination (Waste Management) Regulations, 2024 apply to all categories of waste and aim to ensure that generated waste is handled appropriately. The regulations define a waste generator as any person whose activities or activities under his or her direction produces waste or if that person is not known, the person who is in possession or control of that waste.[15] As construction sites generate quantities of waste, they are required to comply with the obligations set out under Part II of the regulations. A generator of waste is prohibited from disposing of any waste on public highways, streets, roads, recreational areas, or other public places except in designated waste receptacles. They are obligated to collect, segregate, and dispose of waste, or cause it to be disposed of, in accordance with the regulations, and must ensure that such waste is transferred only to persons licensed to transport and dispose of waste in designated facilities.

In addition, construction projects are required to minimize the volume and impact of waste generated by adopting cleaner production methods, including conserving raw materials and energy, eliminating toxic inputs, reducing toxic emissions, monitoring the product cycle to enable recovery, reuse, and recycling, and incorporating environmental considerations in the design and disposal of construction products. Waste generators must also segregate hazardous waste from non-hazardous waste and ensure that both streams are disposed of in facilities provided by the relevant local authority. ***The project management must ensure proper collection, segregation, and disposal of both hazardous and non-hazardous waste through licensed handlers, while also adopting cleaner production methods to minimize waste volumes and impacts in line with the regulatory requirements.***

4.2.2.5 Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Seashore Management) Regulations, 2023

Where development involves activities that are likely to impact rivers, lakes, wetlands, or other water bodies the developer must obtain a water resource use permit.[16] These activities include erecting or demolishing structures in or near water bodies, excavations, deposit of waste materials, diverting or obstructing natural watercourses, or draining wetlands. In such cases, a developer is required to secure the water resource use permit from the Water Resources Authority, in addition to the EIA licence from NEMA, where applicable. ***The project management must obtain a***

[15] The Environmental Management and Co-ordination (Waste Management) Regulations (Legal Notice 121 of 2006), Laws of Kenya, Regulation 2.
[16] The Environmental Management and Co-ordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations (Cap. 387), Laws of Kenya, Regulation 12

water resource use permit from the Water Resources Authority where its activities may affect rivers, wetlands, or other water bodies.

4.2.2.6 Environmental Management and Coordination (Air Quality) Regulations, 2024

Construction activities have the potential to impact on air quality and are listed as sources of fugitive emissions and dust.[17] In light of this, the regulations prohibit developers from acting in a way that directly or indirectly causes or may cause air pollution to exceed the levels set out in the First and Second Schedules. No person shall cause or allow the emission of visible air pollutants from a stationery source in excess of the limits set put in the Third Schedule. To control air pollution, an Emissions License must be acquired by developers that emit more than the specified amount.

The regulations have been amended by legal notice 66 of 2025 which specifically deletes provisions in the 2024 Regulations that had used permissive language such as "may prescribe" in relation to permissible emission levels, ambient air quality standards, and penalties. In their place, the amendment introduces mandatory requirements, ensuring that emission limits and compliance obligations are clearly defined and enforceable. ***The project management must comply with mandatory air quality standards by controlling dust and fugitive emissions during construction and, where applicable, obtaining an Emissions Licence from NEMA.***

4.2.3 Climate Change Act, 2016

The Climate Change Act, 2016 requires the integration of climate considerations into all forms of environmental planning and decision-making. Section 20 of the Act obliges public and private entities to undertake climate change risk and vulnerability assessments and to report on mitigation and adaptation measures relevant to their operations.[18] This obligation is reinforced through EMCA, which, as amended in 2015, explicitly incorporates climate change as a factor in EIA processes, requiring project proponents to demonstrate how proposed activities will address potential climate impacts. ***The project management must integrate climate risk and vulnerability assessments into its EIA, demonstrating mitigation and adaptation measures to ensure compliance with the Climate Change Act, 2016 and EMCA.***

4.2.4 Water Act of 2016

The Water Act, 2016 establishes the legal framework for the management, conservation, use, and control of water resources in Kenya, as well as the acquisition and regulation of rights to use water. It also regulates the provision of water supply and sewerage services, setting out provisions on the

[17] The Environmental Management and Co-ordination (Air Quality) Regulations (Legal Notice 180 of 2024), Laws of Kenya, Part Eight of the Fifth Schedule
[18] Climate Change Act (Cap. 387A), Laws of Kenya, Section 20

ownership of water, the institutional framework, national water resources management strategies, permit requirements, state schemes, and community projects. Part IV of the Act addresses water supply and sewerage and requires the national water services strategy to detail existing water services, the number and location of persons lacking basic water supply and sewerage, plans for extending services to underserved areas, timeframes for implementation, and investment programmes.[19]

Further, Part II, provides for a national monitoring and information system on water resources, empowering the Water Resources Authority (WRA) under subsection (3) to demand specified information, documents, samples, or materials on water resources from any person or institution.[20] In line with this, facility operators may be required to keep specific records and furnish such information to the Authority. ***The project management must secure necessary water use permits, maintain required records, and provide information to the Water Resources Authority, while ensuring adequate water supply and sewerage management in line with national strategies.***

4.2.4.1 The Water (Harvesting and Storage) Regulations, 2025

Under the Water (Harvesting and Storage) Regulations, 2025, any new institutional, commercial, industrial, or customer-service building constructed must incorporate roof-based rainwater harvesting systems such as guttering or ground catchments designed to capture rainwater.[21] The harvested water must be stored in tanks or storage facilities capable of containing at least seven days' average water demand of the building. Where it is impractical to comply with these requirements, a building may be supplied via piped water, but only if a county government or water service provider deems it appropriate and imposes conditions.

Harvested rainwater must pass through proper filtering for non-potable uses and undergo additional treatment if intended for drinking, in accordance with standards set by the Water Services Regulatory Board.[22] The Regulations also provide for land-based rainwater harvesting through groundwater recharge pits or structures, support through technical and capacity-building services from the Water Storage Authority, and measures for stormwater runoff management by county governments.[23] ***Project management must ensure compliance by integrating rainwater harvesting and storage systems into the construction design, securing sustainable water supply and regulatory approval.***

[19] Water Act (Cap. 372), Laws of Kenya, Section 59(4)
[20] *Ibid*, Section 18
[21] The Water (Harvesting and Storage) Regulations, 2025 (Legal Notice 57 of 2025), Laws of Kenya, Regulation 51 (1)
[22] *Ibid*, Regulation 51 (6)
[23] *Ibid*, Regulation 52

4.2.4.2 The Water (Resources) Regulations, 2025

The Water (Resources) Regulations, 2025, highlights that construction projects in Kenya that may involve abstraction, discharge, or alteration of surface or groundwater features must adhere to a structured permitting and compliance framework.[24] Project proponents are required to obtain a water use permit from the WRA, supported by technical documentation and subjected to public notification and scrutiny through regional Technical Evaluation Committees or Basin Area Advisory Committees as per their risk category.[25] Permit holders must install measuring devices such as an airline in boreholes, maintain records of water use or discharge for a minimum of 24 months and submit water quality samples when required.[26] If water is intended for human consumption, treatment must meet the standards set by WRA.[27] Additionally, the permit conditions typically include safeguards such as returning used water undiminished in quantity and quality, preventing pollution or siltation, and ensuring non-interference with existing lawful users. ***Project management must secure a water use permit from WRA and comply with monitoring, treatment, and safeguard obligations to ensure lawful and sustainable water use.***

4.2.5 Forest Conservation and Management Act, 2016

The Act provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socioeconomic development of the country. It recognizes the importance of forests for the benefits of soil and ground water regulation, agriculture and their role in absorbing greenhouse gases. The Act has four priority areas related to the management of forests, including reducing pressure to clear forests for agriculture and other uses; promoting the sustainable utilization of forests; improving governance in the forest sector; and the enhancement of carbon stocks and reforestation of degraded lands. ***The project proponent will be in continuous consultation with the Kenya Forest Service and will ensure that the construction project causes minimal disruption of the environment in any forested areas and that mitigation measures are fully implemented where required.***

4.2.6 Wildlife Conservation and Management Act, 2013

The Act provides that the holder of a permit or license shall use the land in accordance with the requirements for sustainable use of land. Section 30 of the Act prohibits any activity which is likely to have adverse effects on the environment, including the seepage of toxic waste into streams,

[24] The Water (Resources) Regulations, 2025 (Legal Notice No. 24 of 2025), Laws of Kenya, Regulation
[25] *Ibid*, Regulation 9 as read together with the First Schedule
[26] *Ibid*, Regulation 76 (3)
[27] *Ibid*, Regulation

rivers, lakes and wetlands. ***The project proponent will ensure to obtain necessary leases and licenses from the Kenya Wildlife Service and will mitigate any adverse impacts to wildlife.***

4.2.7 Physical Planning Act, 2019

In situations where the proposed land use differs from the existing designated use for instance from agricultural to residential, a Change of User Permit must be secured under the Physical and Land Use Planning Act, 2019.[28] This often requires further consent from relevant boards and is processed by the County Director of Physical and Land Use Planning. Furthermore, section 25 (b) of the Act states that a local physical development plan shall consist of such maps and description as may be necessary to indicate the manner in which the land in the area may be used. The project management must obtain a Change of User Permit under the Physical and Land Use Planning Act, 2019 where the proposed development diverges from the designated land use and aligns with local physical development plans to ensure lawful and compatible land use.

The County Government of Nairobi has declared the Nairobi River Corridor as a Special Planning Area (SPA) meaning that any developments falling within the 60-metre corridor (30-metre riparian reserve plus 30-metre development control zone) will be subject to new planning restrictions and heightened regulatory oversight for at least two years while a special integrated plan is prepared. For construction projects, the proposed declaration of Projects in this zone may face suspension of approvals, demolition of non-compliant structures, or stricter development controls, with exemptions granted only at the discretion of the County Government for permits issued more than six months before the declaration. ***Developers and property owners must therefore anticipate possible restrictions and modifications to existing and proposed projects within the designated area and prepare to engage in public participation and compliance processes under the Physical and Land Use Planning Act, 2019 and SPA Regulations, 2021.***

4.2.8 National Construction Authority Act, 2011

Construction-related approvals also include the requirement to obtain a Construction Certificate from the National Construction Authority (NCA). This is governed by the National Building Code, 2022 and the National Construction Authority Regulations, 2014. All construction works must be registered with the NCA, and no person is permitted to operate as a contractor or begin construction without first obtaining this compliance certificate. ***The project management will be required to obtain a Construction Certificate before commencing any construction works.***

[28] Physical and Land Use Planning Act (Cap. 303), Laws of Kenya, Section 42 as read together with Section 51

4.2.9 National Building Code, 2024

The National Building Code, 2024 states that a person intending to undertake any construction works is required to secure a range of statutory approvals before commencement. These include a development permission issued in accordance with the Physical and Land Use Planning Act, 2019, an EIA licence issued under EMCA and a compliance certificate issued pursuant to the relevant provisions of the Act.[29] In addition, the proponent must obtain any other applicable approvals as may be required under the law, ensuring that the proposed development complies with planning, environmental, and regulatory standards. ***The project management needs to obtain statutory approvals including a development permission under the Physical and Land Use Planning Act, 2019, an EIA licence under EMCA, and a compliance certificate under the Code before commencement of works.***

4.2.10 Traffic Act (Cap. 403)

This is an Act of Parliament to consolidate the laws relating to traffic on the roads. Section 66 A (1) of the Act protects the occupational safety and health of drivers by stating that, "No person shall drive a public service vehicle or a commercial vehicle for more than a total of eight hours in any period of twenty-four hours".[30] All drivers who drive vehicles to be used in the proposed project in all its phases shall operate in shifts of not more than 8 hours in any period of 24 hours. ***The project management must ensure that vehicle operations must be structured in shifts not exceeding eight hours within a 24-hour period to safeguard occupational safety and health.***

4.2.11 County Government Act, 2012

County governments may impose additional regulations and permits under county laws.[31] For example, in Nairobi, developers must obtain permits before cutting down trees, ensure buildings are painted annually, and install security lighting in front of buildings. These requirements are enforced through respective county assemblies and administrations. ***The project developer will therefore have to abide by all laws, rules, regulations, guidelines and requirements of the respective county government where the work is to happen. The project management will be required to comply with all applicable county government laws and regulations.***

4.2.12 Public Health Act, Cap 242 of 1986

To ensure public health standards are maintained during and after the construction phase, housing projects must comply with the Public Health Act, Cap 242 of 1986. This involves securing approvals related to water supply, mosquito control, sewage, and other sanitation-related factors.

[29] National Building Code, 2024 (Legal Notice No. 47), Section 5 (2) (a), (b), (c) and (d)
[30] Traffic Act (Cap. 403), Laws of Kenya, Section 66 A (1)
[31] County Governments Act (Cap. 265), Laws of Kenya

The Act prohibits nuisance by stating that, "No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."[32] These are typically enforced by the relevant County Government where the construction project is taking place. ***The project management will be required to comply with the provisions of the Public Health Act, Cap 242, including securing necessary approvals on water supply, sanitation, mosquito control, and sewage management.***

4.2.13 Employment Act, 2007

The Act applies to all employees employed by any employer under a contract of service and covers the following elements: protection of wages; rights and duties in employment; termination and dismissal; protection of children; insolvency of the employer; employment records; employment management; foreign contracts of service; and dispute settlement procedures (between employer and employees). The Act provides for prohibition against forced labor, discrimination in employment and sexual harassment. ***The project proponent will ensure that employees are of the right age, have entitlement to leave, are protected from any discrimination and sexual harassment and have all their employment related rights respected.***

4.2.14 Sexual Offences Act, 2006

The Act protects people and employees from any unwanted sexual attention or advances by staff members. This Act ensures the safety of women, children, and men from any sexual offences, including rape, defilement, and indecent acts. The Act also supports the provisions of the Employment Act which mandate that a worker should not be harassed sexually to receive preferential treatment at the workplace or detrimental treatment on present or future employment. ***The project proponent will ensure that there is ample working environment in all workplaces in the project and matters and incidents related to gender-based violence at the workplace are managed appropriately.***

4.2.15 Persons with Disabilities Act, 2003

The Act guarantees that: no person shall deny a person with a disability access to opportunities for suitable employment; a qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees; and an employee with a disability shall be entitled to exemption from tax on all income accruing from his employment. ***During construction period, the project proponent will offer employment opportunities to persons without any form of discrimination and where a person with disabilities is employed the***

[32] Public Health Act (Cap. 242), Laws of Kenya, Section 115

project proponent shall ensure they are subject to the same terms and conditions of employment and that appropriate measures such as the construction of ramps where necessary shall be undertaken to ensure that they are able to equally contribute to the work.

4.2.16 Work Injury Benefits Act (WIBA), 2007

This Act provides compensation for employees on work related injuries and diseases contacted in the course of employment and for connected purposes. The Act includes compulsory insurance for employees and defines an employee as any worker on contract of service with employer. ***The project management must ensure that all employees are covered under compulsory insurance and are compensated in the event of work-related injuries or diseases.***

4.2.17 Occupational Health and Safety Act, 2007

This Act provides for the safety, health and welfare of workers and all people lawfully present at workplaces where any person is at work, whether temporarily or permanently.[33] Workplace safety is to be ensured by obtaining a Workplace Permit issued by the Directorate of Occupational Safety and Health Services. The Act requires all workplaces to be registered and renewed annually, with adequate systems in place to monitor and report on occupational health and safety. The Act also mandates the provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed.[34] ***The project management will be required to register the workplace and obtain the necessary workplace permits, renewed annually. It must also establish and maintain systems to ensure the health, safety, and welfare of all workers and persons lawfully on site, including providing adequate training, supervision, and reporting mechanisms throughout the project's duration.***

4.2.17.1 The Occupational Safety and Health (First Aid in the Workplace) Regulations, 2024

The Occupational Safety and Health (First Aid in the Workplace) Regulations, made under the Occupational Safety and Health Act set out the minimum standards and requirements for the provision of first aid in all workplaces in Kenya.[35] The regulations require every employer to establish and maintain adequate first aid facilities, which include suitably stocked first aid boxes, trained first aiders, and where necessary, dedicated first aid rooms depending on the size and nature of the workplace. They prescribe the minimum contents of first aid boxes, the number of first aiders required based on the number of employees, and the obligation to ensure continuous training and certification of designated personnel. The regulations also mandate proper record

[33] Occupational Safety and Health Act, (Cap. 236A) Laws of Kenya, Section 6
[34] *Ibid*, Section 6 (c)
[35] The Occupational Safety and Health (First Aid in the Workplace) Regulations (Legal Notice 79 of 2024)

keeping of all first aid incidents and emphasize employer responsibility to provide immediate assistance to workers in case of accidents or sudden illness. ***The project must establish and maintain adequate first aid facilities, including trained personnel and proper record keeping, to safeguard workers' health and safety in compliance with the regulations.***

4.2.17.2 Occupational Safety and Health (Fees Charged for Occupational Safety and Health Services) Regulations, 2022

The Occupational Safety and Health (Fees Charged for Occupational Safety and Health Services) Regulations prescribe the fees payable for a wide range of occupational safety and health services provided under the Occupational Safety and Health Act.[36] These services include registration and renewal of workplaces, approval of building plans for new or existing workplaces, medical examinations of workers, approval and examination of plant, machinery, equipment, and protective gear, as well as inspection and certification of pressure vessels, lifts, cranes, and boilers. The regulations also cover fees for training, advisory services, and other compliance-related approvals required to ensure workplace safety and health standards are met. ***The project will be required to pay prescribed fees for workplace registration, approvals, inspections, and certifications of equipment and facilities, as well as for worker medical examinations and training, to ensure compliance with occupational safety and health standards.***

4.2.17.3 Factories (Building Operations and Works of Engineering Construction) Rules, 1984

Section 48 (1) prohibits any timber or material with projecting nails from being placed or being allowed to remain in any place at a site where they are a source of danger to the employed people. Section 55 (C) provides that properly maintained scaffolds or; where appropriate, ladders or other means of support which shall be sufficient and suitable for the purpose shall be provided, placed and kept in position for use where work cannot be safely done on or from the ground or from part of a building or other permanent structure. ***The proponent and contractor will ensure that the relevant provisions of these rules and provisions of OSHA 2007 are adhered to throughout the construction and operation phases.***

4.2.17.4 Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005

According to section 5 of the rules, where noise in a workplace exceeds the continuous equivalent of 85 A weighted decibels (dB (A)) the occupier must develop and implement an effective noise control and hearing conservation programme which must be in writing and should address: Noise measurement; Education & training; Engineering noise control; Hearing protection; Posting of

[36] Occupational Safety and Health (Fees Charged for Occupational Safety and Health Services) Regulations (Legal Notice 50 of 2022)

notices in noisy areas; and Annual programme review Additionally, section 13 provides that where the noise level is above 90 dB (A), the employer shall: Post a sign at the entrance to and in every room or conspicuous place, clearly and prominent marked "DANGER HEARING PROTECTION MUST BE WORN"; Supply hearing protection to all persons required to enter such an area; and Ensure that all workers and any other person entering this area wear hearing protectors. ***The proponent will implement the measures set out and mitigate against any negative impacts associated with noise emission.***

4.2.18 Standards Act, 1997

Compliance with national standards is essential. The Kenya Bureau of Standards (KEBS) issues certifications under the Standards Act, 1997.[37] Materials and processes used in the construction must conform to applicable Kenya Standards. ***The project must ensure that all construction materials and processes comply with applicable standards, with certification obtained from the Kenya Bureau of Standards (KEBS) to guarantee adherence to national quality and safety requirements.***

4.2.19 National Museums and Heritage Act, Cap 216

The Act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interest. It prohibits any person from carrying out activities on or in relation to any object declared to be preserved or protected. The Act equally spells out the procedures and requirements to declare and inspect newly discovered sites that may have archaeological, paleontological, ethnographical, historical and traditional significance for purposes of protection. ***The proponent will ensure due diligence is practiced where historical property is encountered during construction of the proposed project and other related activities.***

4.2.20 Penal Code, Cap 63

The Penal Code under Section 191 makes it an offence for any person or institution that voluntarily corrupts, or foils water for public springs or reservoirs rendering it less fit for its ordinary use. Additionally, section 192 prohibits making the atmosphere in any place noxious to health of persons/institutions in dwellings or business premises in the neighborhood or those passing along a public way. ***The project proponent will ensure strict adherence to the requirements of the EIA and all approvals obtained throughout the project cycle in order to mitigate any possible negative impact associated with dust, noise, and effluent discharge.***

[37] Standards Act (Cap. 496), Laws of Kenya.

4.3 County Laws

4.3.1 Nairobi City County Air Quality Act, 2022

The Nairobi City County Air Quality Act applies to any premises or processes that discharges and emits or is capable of discharging and/or emitting air pollutants into the open air. The owners or occupiers of premises must take measures to avoid emitting beyond the limit values for air pollution.[38] Evidence of compliance shall be in the form of a licence issued by the county department for the time being responsible for matters relating to the environment in Nairobi City County.[39] ***The project must obtain an air quality licence from the Nairobi City County environment department and implement measures to ensure emissions remain within prescribed limits.***

4.3.2 Nairobi City County Solid Waste Management Act, 2015

The Nairobi City Council Solid Waste Management Act highlights that solid waste management shall be a shared responsibility amongst all actors including the county government, owners and occupiers of premised and contracted service providers.[40] The Act mandates that persons shall not be licensed to carry on businesses or activities that generate solid waste unless the person demonstrates that they have established measures to minimize solid waste generation by adopting cleaner production principles including: improvement of production process through the conservation of raw materials and energy; incorporating environmental concerns in the design process and disposal of a product; monitoring the product cycle from beginning to end in order to enable the recovery and reuse of the product where possible and to facilitate reclamation and recycling.[41] ***The project must adopt cleaner production principles and demonstrate measures for minimizing, reusing, and recycling solid waste to obtain the necessary licences for activities generating solid waste within Nairobi City County.***

4.3.3 Nairobi City County Climate Change Act, 2024

The Nairobi City Council Climate Change Act, 2024 highlights the need to promote sustainable biodiversity conservation and address important drivers of biodiversity loss.[42] The Act also calls for the mainstreaming of climate change inro county development projects.[43] ***The project proponents must align the construction activities with the Act's provisions by mainstreaming climate change considerations into project design and ensuring that biodiversity conservation measures are incorporated throughout implementation.***

[38] Nairobi City County Air Quality, No. 4 of 2022, Section 5 (2)
[39] *Ibid*, Section 5 (4) as read together with Section 2
[40] Nairobi City County Solid Waste Management Act, No. 5 of 2015, Section 4
[41] *Ibid*, Section 14
[42] Nairobi City Council Climate Change Act No. 4 of 2024, Section 3 (k)
[43] *Ibid*, Section 26 (c) (ii)

4.3.4 Nairobi City County Public Participation Act, 2015

The Act provides that a public participation notice shall be published at least twenty-one (21) days before the meeting in the County Gazette or the media in terms of this Act or shall be displayed at the sub-county, ward or village offices, provided that notice of a shorter period may be given in an emergency that calls for public participation or consultation.[44] The notice shall indicate the time, date and venue of the meeting and shall be in the official languages but shall have regard to language preferences and usage of the area. ***The project proponent will ensure to undertake stakeholder engagements as provided by the provisions of this Act.***

4.4 Applicable International Standards and Guidelines

International standards and guidelines a central role in shaping EIA processes by providing principles, procedural standards, and substantive safeguards that ensure environmental and social considerations are systematically integrated into the entire phase of a project's development and subsequent implementation.

4.4.1 Agence Française de Développement (AFD) Environmental and Social Risk Management Policy, 2017

The Environmental and Social Risk Management Policy, adopted by the AFD Board in July 2017, serves as the institution's principal safeguard policy and provides the overarching framework for managing environmental and social risks across its funded operations.[45] The policy outlines AFD's vision, objectives, and guiding principles in ensuring that projects contribute to sustainable development while avoiding, minimizing, or mitigating adverse impacts. It establishes key mechanisms such as project categorization based on potential risks, mandatory stakeholder consultations, and the preparation of environmental and social commitment plans to ensure accountability and transparency.

In addition, it provides for grievance handling procedures, robust monitoring frameworks, and compliance with international reference standards, thereby embedding environmental and social considerations throughout the project lifecycle. ***The project must comply with AFD's Environmental and Social Risk Management Policy by undertaking risk categorization, conducting meaningful stakeholder consultations, and preparing environmental and social commitment plans to ensure accountability and transparency. It will also be required to establish grievance handling mechanisms, adhere to international reference standards, and implement robust monitoring frameworks.***

[44] Nairobi City Council Public Participation Act, 2015 Section 6 and 7
[45] Agence Française de Développement, *Environmental and Social Risk Management Policy* (July 2017) accessed 21 August 2025 and available at: AFD - Agence Française de Développement

4.4.2 AFD Environmental and Social Complaints Mechanism Rules of Procedure, 2022

AFD's Environmental and Social Complaints Mechanism, guided by its Rules of Procedure, provides an independent and transparent process for addressing grievances related to environmental and social impacts of AFD-funded projects.[46] Any individual, group, or community affected by such projects can submit a complaint to the Mechanism, which operates under the oversight of AFD's Ethics Advisor and involves independent experts in each step.[47] The Mechanism handles complaints via two routes: dispute resolution, which facilitates dialogue between complainants and project stakeholders to resolve issues amicably, and compliance audit, which assesses whether AFD has adhered to its Environmental and Social Risk Management Policy. The Rules of Procedure detail eligibility criteria, processing steps, access to information, timelines, and procedural safeguards, including ensuring no compensation expectations are created during resolution.

4.4.3 World Bank Environmental and Social Framework (ESF), 2018

The World Bank's ESF, which came into effect in 2018, provides the overarching standards and guidelines for ESIAs in projects it finances.[48] Central to the ESF is Environmental and Social Standard 1 (ESS1) on Assessment and Management of Environmental and Social Risks and Impacts, which requires borrowers to carry out an ESIA proportionate to the nature, scale, and potential risks of a project. ESS1 establishes the mitigation hierarchy avoid, minimize, mitigate, and compensate for impacts,and requires the preparation of Environmental and Social Commitment Plans alongside robust stakeholder engagement throughout the project cycle.

To complement ESS1, the World Bank also issues operational guidance such as the Environmental and Social Directive for Investment Project Financing, the Environmental, Health, and Safety Guidelines, and the Bank Procedure 10.00 on Investment Project Financing, all of which provide technical and procedural requirements for implementing ESIA. Together, these instruments ensure that World Bank–financed projects integrate environmental and social considerations in a systematic, transparent, and accountable manner. ***The project needs to comply with the ESF and its associated instruments which entails requiring an ESIA proportionate to the project's risks, adherence to the mitigation hierarchy, and continuous stakeholder engagement to ensure environmentally and socially sustainable outcomes.***

[46] Agence Française de Développement, *Environmental and Social Complaints Mechanism: Rules of Procedure* (2022) accessed on 29 August 2025 and available at: afd-rules-procedure-environmental-social-complaints-mechanism-2022.pdf
[47] Ibid, (AFD, 2022)
[48] World Bank, *Environmental and Social Framework* (2018) accessed 21 August 2025 and available at: Environmental and Social Framework (ESF)

4.4.4 International Finance Corporation Performance Standards on Environmental and Social Sustainability, 2012 (IFC Standards)

The IFC Standards first issued in 2012 and updated in 2021, are a globally recognised framework for identifying, assessing, and managing environmental and social risks in private sector operations.[49] They are widely applied by development finance institutions, commercial banks, and investors to ensure that projects are implemented in line with international best practice on sustainability.

Among the eight standards, Performance Standard 1 is particularly significant as it establishes the requirements for assessing and managing environmental and social risks and impacts throughout the project lifecycle.[50] It also emphasises the importance of meaningful stakeholder engagement, information disclosure, and the development of effective environmental and social management systems, thereby ensuring that projects contribute to sustainable development while minimising adverse impacts.[51] ***Where the project is financed by development finance institutions or investors applying the IFC Performance Standards, compliance is required, particularly with Performance Standard 1, which mandates robust risk assessment, stakeholder engagement, and environmental and social management to align the project with international best practice on sustainability.***

4.4.5 Equator Principles, 2020

The Equator Principles adopted in 2020 are a financial industry risk management framework adopted by banks and other financial institutions to determine, assess, and manage environmental and social risks in projects.[52] They apply primarily to project finance, project-related corporate loans, and bridge loans, and establish minimum standards for due diligence and monitoring to ensure that projects are developed in a manner that is socially responsible and environmentally sustainable. The framework requires borrowers to conduct ESIAs, engage meaningfully with stakeholders, and address issues such as human rights, climate change, and biodiversity. ***The project must comply with the framework's requirements on ESIA, stakeholder engagement, and sustainability safeguards, ensuring alignment with international standards for responsible and environmentally sound project finance.***

[49] International Finance Corporation, *Performance Standards on Environmental and Social Sustainability* (adopted 1 January 2012, updated 2019 and 2021)
[50] *Ibid*, (International Finance Corporation, 2012)
[51] *Ibid*, (International Finance Corporation, 2012)
[52] Equator Principles Association, *The Equator Principles (EP4)* (July 2020) accessed 20th August 2025, available at: The Equator Principles - Equator Principles

4.4.6 United Nations Guiding Principles on Business and Human Rights, 2011 (Guiding Principles)

Endorsed by the United Nations Human Rights Council in 2011, the Guiding Principles set out guidelines for states and companies to prevent, address and remedy any human rights abuses committed in business related operations. Businesses must seek to prevent or mitigate any adverse impacts related to their operations, products, or services, even if these impacts have been carried out by suppliers or business partners.[53] To meet this responsibility, business enterprises must institute a policy commitment to meet the responsibility to respect human rights; undertake human rights due diligence to identify, prevent, mitigate and account for their human rights impacts; and have processes in place to enable remediation for any adverse human rights impacts caused or contributed to by the business.[54] ***The project will need to integrate the UN Guiding Principles by embedding human rights due diligence into its operations, ensuring that risks of adverse impacts are identified, mitigated, and addressed across its activities and supply chains, and establishing accessible grievance and remediation mechanisms for affected stakeholders.***

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[53] UN Human Rights Council, *'Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework'* (21 March 2011) UN Doc A/HRC/17/31

[54] *Ibid*, (UN Human Rights Council, 2011)

4.5 Institutional Roles and Responsibilities

Environmental management in Kenya is multi-sectoral, and different government Ministries, Departments and Agencies have roles and responsibilities under law. The legal mandates and functions of the diverse institutions must be considered during the proposed project life cycle. The relevant institutions are set out in Table 4-1

Table 4-1: Relevant Institutions

	Institution	Legislative Mandate	Relevance
1.	Ministry of Environment, Climate Change and Forestry	develops policies, programmes and regulatory frameworks aimed at improving, maintaining, protecting, conserving, and managing the Country's natural resources (water, forestry, wildlife and environment).	The proposed project is expected to align with the policies and programs of this Ministry notably the requirements of EMCA Cap 387, and its implementing regulatory Authority-NEMA,
2.	National Environmental Management Authority	exercises general supervision and co-ordination over all matters relating to the environment and implements all policies relating to the environment.	The Authority will review this ESIA report for the proposed project and issue an ESIA license if all issues relevant to the proposed project have been identified and mitigation measures to manage them have been proposed.
3.	National Environmental Tribunal	resolves conflicts between NEMA and any of their clients regarding the environment.	The Tribunal may be relied on if the project's implementation parties are aggrieved by NEMA's decision or license conditions.

	Institution	Legislative Mandate	Relevance
4.	Directorate of Occupational Safety and Health Services	ensures the safety, protection, health and welfare of all workers in all workplaces.	The Directorate will be key in issuing permits that ensure that the project proponents sites meet occupational health and safety standards, protecting workers and reducing workplace risks.
5.	Kenya Bureau of Standards	develops, implements, and enforces quality and safety standards for goods, services, and systems in Kenya.	The Bureau is essential as it will ensure that project materials, equipment, and processes meet established quality and safety standards.
6.	Water Resources Authority	regulates water resources issues such as water allocation, source protection and conservation, water quality management and pollution control and international waters.	The Authority will issue the necessary water abstraction permits required by the project.
7.	National Director for Physical and Land Use Planning	oversees the preparation and approval of physical and land use development plans in Kenya.	The Director will ensure that the project aligns with national and county spatial and land use plans for orderly development.
8.	National Construction Authority	regulates and oversees the construction industry by registering contractors, enforcing compliance with building standards, and ensuring safety and quality in project implementation.	The Authority will ensure that the project's contractors are duly registered and that the construction process meets regulatory safety, quality, and technical standards.

	Institution	Legislative Mandate	Relevance
9.	Nairobi County Government	The proposed project is within the jurisdiction of Nairobi County Government. The County government is expected to issue relevant approvals as well as collaborate on physical planning matters.	The County Government shall issue the required county government development permits and other necessary approvals to the project proponent.
10.	Kenya Forest Service	conserves, manages, and sustainably utilizes state forests and some community forests (unregistered community land) in Kenya	The Service will provide approvals and oversight if the project affects gazetted forests or requires forest resources, ensuring sustainable forest use.
11.	Kenya Wildlife Service	conserves and manages Kenya's wildlife resources in both protected areas and dispersal zones.	The Service will provide approvals and oversight where the project has potential impacts on wildlife habitats, migration corridors, or protected areas.
12.	National Museums of Kenya	serves as the national repository for Kenya's scientific, cultural, technological, and human heritage, while facilitating research, conserving cultural and natural assets, and promoting their sustainable use for social and economic development.	The National Museums of Kenya will provide guidance and necessary approvals where the project affects cultural heritage, archaeological or historical sites.

4.6 University of Nairobi Policies/Standards

4.6.1 University of Nairobi Safety Plan, 2014

The University of Nairobi's Safety Plan, 2014 in recognition of the growing complexity of campus environments and evolving standards of safety, health, and environmental protection, seeks to provide a safe and healthy environment for all members of the university community.[55] The Plan highlights that the university faces several risks on a daily basis stemming from the workplace, fire, natural calamities such as lightning risks, earthquakes and outbreaks of diseases and sets out recommendations for addressing each and every of these risks. The overall responsibility for implementing the safety plan lies with the University's Vice Chancellor. ***The project proponent shall ensure that all project activities are carried out in compliance with the provisions of the Safety Plan by identifying potential risks, instituting preventive measures, and putting in place adequate response mechanisms while ensuring that the welfare of students, staff, and other stakeholders is safeguarded.***

4.6.2 University of Nairobi Disability Policy, 2020

The Disability Policy, 2020 aims to promote fairer and inclusive societies as enshrined in the Constitution of Kenya (2010), the Persons with Disabilities Act (2010), the Convention on the Rights of Persons with Disabilities (2003) and other relevant Acts, policies and human rights instruments.[56] The Policy highlights the institutional commitment and measures for mainstreaming disability issues in all University processes and operations. It also calls for the provision of equal employment opportunities for all persons as well as ensuring that all facilities of the University are accessible to Persons with Disabilities through the construction of ramps, signage, washrooms, furniture and fitting and surroundings. ***The project proponent shall ensure that the design, implementation, and management of the project incorporate disability-friendly features and comply with the standards set out in the Policy. This includes integrating universal design principles to guarantee that project facilities and infrastructure are accessible to persons with disabilities, providing clear signage, appropriate fittings, and barrier-free environments.***

4.6.3 University of Nairobi Disability Mainstreaming Strategy 2023-2028

The Disability Mainstreaming Strategy recognizes that Persons with Disabilities are entitled to equal opportunities, the guarantee of human rights, liberty, and equality as all other members of

[55] University of Nairobi, University of Nairobi Safety Plan, 2014, (U.o.N, 2014) accessed on 29 August 2025 and available at: Safety Plan 03-March-2014.pdf
[56] University of Nairobi, University of Nairobi Disability Policy, 2020, (U.o.N, 2020) accessed on 29 August 2025 and available at: UON DISABILITY POLICY OCTOBER 9 EDITED VERSION.pdf

the University community.[57] The strategy establishes a Central Disability Mainstreaming Committee, domiciled under the Office of the Dean of Students, and tasked with ensuring that disability issues are integrated into all University policies, programs, services, and activities. The Committee provides oversight, guidance, and monitoring to ensure that the University adheres to national and international standards on disability rights, while also promoting awareness, inclusivity, and the removal of barriers that hinder the full participation of Persons with Disabilities in ongoing activities within the institution.

4.6.4 University of Nairobi Gender policy, 2008

The University's Gender Policy seeks to foster a fair and just academic environment where men and women enjoy equal opportunities, rights, and access to resources, enabling all persons to realize their full potential in a community grounded in mutual respect.[58] To achieve this, the University commits to ensuring gender-responsive management and administration across all its functions, integrating equity in all university activities, and reaching out to marginalized groups including women, girls, and boys from poor, rural, and ASAL backgrounds to expand access to opportunities. The Policy also provides for the establishment of appropriate administrative structures to oversee its implementation and emphasizes collaboration with the Government of Kenya and development partners to mobilize the resources necessary for effective realization of its objectives. ***The project proponent should ensure that all project activities are designed and implemented in a gender-responsive manner, providing equal access and opportunities for both men and women.***

4.6.5 University of Nairobi Workplace Policy on Gender Based Violence, 2022

The Workplace Policy on Gender-Based Violence at the University of Nairobi commits to creating a safe, respectful, and inclusive environment that is free from all forms of GBV, including sexual harassment, intimidation, and exploitation. It outlines preventive measures such as awareness creation, training, and capacity building; establishes clear reporting and response mechanisms; and guarantees confidentiality and protection from victimization for survivors.[59] The Policy also provides for disciplinary action against perpetrators in accordance with university regulations and national laws, while promoting a culture of accountability and respect across the institution. ***The project proponent must integrate gender-based violence safeguards to ensure the safety, dignity, and equitable participation of all stakeholders.***

[57] University of Nairobi, Disability Mainstreaming Strategy, 2023 -2028, (U.o.N, 2023) accessed on 29 August 2025 and available at: DISABILITY MAINSTREAMING STRATEGY 2023-2028.pdf
[58] University of Nairobi, Gender Policy, 2008, (U.o.N, 2008), accessed on 29 August 2025 and available at: UONGenderPolicyJune2008.pdf
[59] University of Nairobi, Workplace Policy on Gender-Based Violence, 2022 (U.o.N, 2022) accessed on 29 August 2025 and available at: University of Nairobi Workplace Policy on Gender-Based Violence_ June 2022-pdf.pdf

4.6.6 University of Nairobi Anti-Corruption Policy, 2010

The Anti-Corruption Policy of the University of Nairobi reinforces the institution's commitment to integrity, transparency, and accountability in all its operations.[60] It prohibits all forms of corruption, including bribery, fraud, abuse of office, conflict of interest, and any practices that undermine ethical conduct or the responsible use of University resources. The Policy sets out preventive measures such as internal controls, regular audits, ethical training, and whistle-blower protections, while also providing mechanisms for reporting, investigation, and enforcement of disciplinary and legal action against offenders. By embedding integrity as a core value, the Policy seeks to foster a culture of honesty and fairness across academic, administrative, and financial processes. ***The project proponent must ensure that the implementation of all activities adheres to the Anti-Corruption Policy by promoting transparency, preventing misuse of resources, and fostering accountability at every stage including procurement.***

4.7 Conclusion

In conclusion, the construction project will inevitably touch on multiple sectors and therefore requires a coordinated approach with the relevant national, county, and institutional authorities to ensure smooth implementation. The project proponent must therefore secure all statutory approvals, including environmental, safety, land use, and construction permits, while also aligning with applicable policies on cross-cutting issues such as gender equality, disability inclusion, occupational safety, anti-corruption, and community engagement. Compliance with international principles, national legislation, county regulations, and relevant university policies will be essential not only for legal adherence but also for fostering transparency, equity, and sustainability. ***By embedding these obligations into the project cycle and maintaining close collaboration with regulators and stakeholders, the project will be positioned to achieve its objectives in a manner that is lawful, inclusive, and socially responsible.***

[60] University of Nairobi, University of Nairobi Anti-Corruption Policy, 2010, accessed on 29 August 2025 and available at: UoN_Anti_Corruption_Policy_Final.pdf

5 ANALYSIS OF PROPOSED SUB-PROJECT ALTERNATIVES

This Environmental and Social Impact Assessment Report of Proposed construction of the proposed Engineering and Science Complex at the University of Nairobi has identified positive and negative impacts and proposed mitigating measures. However, the study is not complete without the identification and analysis of alternatives that could be considered as viable options for the project site, design and implementation.

5.1 The Proposed Project Construction Alternative

The EIA report was prepared for submission to NEMA; facts, findings and recommendations/ proposals of which are based on the proposed site, materials and proposed technologies. This helps in evaluating and examining the foreseeable effects of the project on the environment and therefore assisting in addressing how the proposed development must ensure that all environmental measures are complied with during the preparation, construction and operational phase. The alternative consists of the proponent's/applicant's final proposal with the inclusion of the legal guidelines, regulations and procedures as stipulated in the EMCA, Cap 387 which aims at reducing environmental impacts to the maximum extent practicable. Appropriate Environmental Management Plan have been prepared as per the proposed project.

5.2 Alternative Site Option

Site 1 – Kirichwa Kubwa (Msongowai) valley side (Green Boundary): Internally terraced ground with two distinct bands: a moderately sloping upper bench and a steep lower section trending toward Kirichwa Kubwa River (approx. 9% and 29% slopes respectively). The site sits in a steep valley (intrinsically low direct flood exposure), but is constrained by the statutory 30 m riparian reserve measured from the river centerline.



Figure 5-1: Site 1 – Kirichwa Kubwa (Msongowai) valley side

Site 2 – Nairobi River / Expressway side (blue boundary): More uniform ground (~7% overall slope) on the valley side of Nairobi River, immediately backdropped by the Nairobi Expressway/Wayaki Way corridor; also subject to the 30 m riparian constraint. As with Site 1, the valley form reduces fluvial flood susceptibility but demands careful surface-water management.



Figure 5-2: Site 2 – Nairobi River / Expressway

Both locations are within the serviced campus grid, i.e., NCWSC water and campus sewers that run along both rivers.

Key environmental and social considerations

1) Riparian policy & flood context

A fixed 30 m riparian reserve applies to both rivers, reducing buildable footprints on either site.

The steep valley setting at both sites mitigates riverine flooding but any new impervious area will require robust Sustainable Drainage Systems and controlled outfalls. Local rainfall is bimodal with documented heavy events that can spike runoff, design must anticipate intense storms.

Implication: Either site is feasible hydrologically if the riparian buffer is respected and Sustainable Drainage Systems are integrated; Site 1's lower terrace is better reserved as a landscaped attenuation/biodiversity zone given its 29% slope.

2) Water quality sensitivity

Baseline monitoring shows high pollution in both rivers, with Kirichwa Kubwa (Site 1) generally more polluted than Nairobi River (Site 2) on organic load and fecal indicators.

Implication: Construction controls are critical at Site 1 to avoid exacerbating already degraded water quality; this can be turned into a net-gain opportunity via riparian rehabilitation.

3) Air quality & noise context

Measured $PM_{2.5}$ was compliant at both sites; Site 1 reflected a dust-dominant signature near works, while Site 2 showed stronger traffic combustion (BC) influence from the highway, with night-time increases.

Implication: Site 1 benefits from greater separation from the highway (lower traffic-noise/BC exposure for lecture spaces) and can manage dust during works; Site 2 carries a persistent operational exposure to traffic noise/soot without substantial vegetative buffers.

4) Topography & constructability

Site 1: split platform (9%/29%); earthworks need careful grading, retaining, and slope stabilization, with the lower steep band left undeveloped.

Site 2: simpler massing (~7% slope) i.e., terrain is uniform (gentle or consistent slope), so buildings don't need to be broken into stepped levels, split platforms, or fragmented blocks, but tighter interface with the expressway corridor.

Geotechnical base: competent trachyte typically from ~4–6 m depth; site suitable for heavy development with ground improvement for weak near-surface soils, applies campus-wide.

5) Campus integration & socio-economic setting

The campus sits within a mixed institutional-residential-commercial milieu (UoN colleges, hostels, nearby hotels/businesses).

Implication: Site 1 lies more interior to academic precincts (libraries, labs, lecture theatres), supporting walkable linkages and minimizing interface with off-campus traffic; Site 2 gives higher urban visibility but brings highway-edge disadvantage.

Preferred option and rationale

The Preferred Site 1 (Kirichwa Kubwa valley) is better in environmental compliance terms as it allows for"

1. **Academic integration & walkability.** Site 1 is embedded in the core teaching/research belt, shortening student flows between labs, lecture theatres, and the library, and reducing reliance on highway-edge access. This aligns with the project's intent to consolidate and expand teaching/innovation spaces within Chiromo.

2. **Health & learning environment:** Separation from the expressway avoids chronic traffic-noise/BC exposure indicated at Site 2; dust at Site 1 can be controlled through standard measures.
3. **Nature-based design opportunity**. The steep lower band and degraded Kirichwa Kubwa corridor can be repurposed as a riparian park with Sustainable Drainage Systems (bioswales, detention, permeable paving), delivering measurable water-quality and biodiversity uplift while keeping permanent works out of the reserve.
4. **Hydro-geotechnical feasibility**. With foundations bearing on competent trachyte and careful drainage/erosion control, heavy/high-rise development is feasible.
5. **Stakeholder expectations.** The alternatives analysis focus requested by AFD is satisfied while demonstrating how Site 1 can convert a sensitive edge into a net-gain corridor rather than placing the complex against the expressway.

5.3 The 'No Action' Alternative

The "No Action" alternative considers a scenario in which the University of Nairobi does not proceed with the proposed Engineering & Science Complex. In this case, the University would continue operating within its current infrastructure, which is already overstretched and outdated. While avoiding the immediate environmental footprint of construction, this option undermines the University's strategic role in advancing science, technology, and innovation in Kenya and the region.

5.3.1 Environmental Perspective

a) **Avoided Impacts:** The University avoids construction-related impacts such as vegetation clearance at Chiromo Campus, dust emissions, construction noise, traffic congestion, and waste generation.

b) **Missed Opportunities:** The chance to implement modern, green building technologies, such as solar PV generation, heat pumps, rainwater harvesting, and low-carbon materials, would be lost. The University would remain dependent on existing inefficient buildings that consume more energy and water, contributing to higher operational costs and a larger carbon footprint.

5.3.2 Social and Academic Perspective

a) **Learning and Research Constraints**: Current lecture theatres and laboratories remain overcrowded, limiting the University's ability to expand STEM programs and undertake cutting-edge research. This undermines Kenya's ambition to produce skilled engineers and scientists under Vision 2030 and the Competency-Based Curriculum (CBC) transition.

b) **Equity and Competitiveness:** Students at the University of Nairobi would continue to learn in facilities that lag behind international standards, reducing competitiveness in global academic rankings and disadvantaging Kenyan graduates in the job market.

c) **Job Creation Loss:** Opportunities for short-term construction employment and long-term technical, academic, and facility management jobs that the project would generate are foregone.

5.3.3 Economic Perspective

a) **Deferred Strategic Investment**: The University loses an opportunity to modernize its infrastructure and attract research grants, regional partnerships, and international collaborations that typically gravitate towards institutions with advanced facilities.

b) **Escalating Costs:** The existing aging infrastructure will continue to deteriorate, leading to increasing maintenance costs without delivering the efficiencies and savings offered by modern, green facilities.

While technically feasible, the "No Action" alternative is not viable for the University of Nairobi. It fails to support Kenya's Vision 2030 aspirations, the University's modernization agenda, and the global call for sustainable, climate-resilient higher education facilities.

5.4 Alternative Design, Materials, and Technology

The proposed University of Nairobi Engineering & Science Complex provides an opportunity to embed green building principles that reduce environmental impacts, improve resilience, and enhance occupant well-being. This section evaluates design, material, and technology alternatives using the criteria of:

a) Energy and water efficiency – minimising resource use during operation.

b) Carbon footprint reduction – lowering greenhouse gas emissions during construction and use.

c) Operational resilience and maintainability – ensuring systems are reliable and easy to service.

d) Regulatory compliance – alignment with Kenya's Building Code, EMCA/NEMA standards, and DOSHS requirements.

e) Best practice alignment – drawing from international benchmarks such as EDGE, LEED, and BREEAM.

5.5 Design Alternatives (Passive + Active Strategies)

Design strategies combine passive features (utilizing natural resources such as sunlight and wind) with active systems (mechanical or electrical equipment) to create efficient and comfortable buildings.

Table 5-1: Design Alternatives

Strategy	Green Alternative	Expected Benefits
Passive solar & envelope	Orient the rooms to capture natural daylight while minimising direct heat gain; install high-performance glazing (windows that reduce heat transfer) and external shading devices.	Maximises natural lighting, reduces electricity use, and lowers cooling demand by 20–40%.
Natural ventilation & mixed-mode HVAC	Utilize cross-ventilation (breezes through windows) and stack ventilation (warm air rising through vents) in classrooms, labs, and offices, while reserving mechanical air conditioning for critical spaces, such as labs.	Lower energy use for cooling and improved indoor air quality.
Green roofs & podium landscaping	Vegetated roofs and bioswales (shallow vegetated channels for stormwater).	Reduces heat island effect, improves rainwater management, and provides outdoor learning/relaxation areas
Flexible modular floorplates	Modular internal partitions and raised floors to allow easy reconfiguration.	Allows reconfiguration of spaces without demolition waste; adaptable for future needs.
Accessibility & circulation	Separate pedestrian routes from service/delivery routes.	Safer and more efficient movement across campus.

5.5.1 Material Alternatives (Low-Carbon, Durable, Healthy)

Material choices influence both the environmental footprint of construction and the long-term performance of the building.

Table 5-2: Material Alternatives

Material Category	Green Alternative	Benefits
Concrete	Replace ≥25% cement with pozzolans (volcanic ash from Naivasha/Longonot, calcined clay, fly ash); use recycled aggregate	Reduces the carbon footprint of cement production; pozzolans are abundant in Kenya.
Timber	- FSC (Forest Stewardship Council)-certified timber (imported where needed) - Bamboo timber (fast-growing, locally grown) - Reclaimed/engineered wood (from demolition or sawmill waste)	Ensures sustainable sourcing; bamboo offers a renewable, local option; reclaimed timber reduces deforestation.
Metals	Use recycled-content steel & aluminium from Kenyan mills (e.g., Devki Steel)	-Cuts down on emissions from virgin metal production. -Lower embodied CO_2; steel recycling is well-established in Kenya
Finishes	Use low-/no-VOC (Volatile Organic Compounds) paints, adhesives, and sealants (available from brands like Crown Paints Kenya).	Improves indoor air quality; safer for occupants
Plastics & Composites	Recycled plastic lumber (locally produced from PET/HDPE waste)	Durable substitute for timber in landscaping, benches, and decking; diverts waste from landfills.
Prefabrication	Employ pre-made façade panels, bathroom pods, and MEP (Mechanical, Electrical, Plumbing) modules.	Less waste on-site, faster installation, and higher quality control.
Durability	Ceramic/stone façades, laterite, granite (locally available)	Lower maintenance costs and reduced need for replacement.

5.5.2 Technology Alternatives (Energy, Water, HVAC, Controls)

Technology systems provide active support for efficiency and sustainability.

Table 5-3: Technology Alternatives

Technology Area	Green Alternative	Benefits
Space heating & hot water	Air-source or ground-source heat pumps (devices that transfer heat efficiently instead of burning fuel).	40–60% energy savings and reduced carbon emissions.
Renewable energy	Install solar PV (photovoltaic panels) on rooftops and carport canopies with battery storage.	Cuts reliance on grid electricity and increases resilience.
HVAC & air quality	Use demand-controlled ventilation (airflow adjusted by CO_2 sensors) and heat recovery units.	Lower ventilation energy costs and improved indoor air quality.
Building Management System (BMS)	Centralised digital system with smart sub-meters to monitor and optimise building performance.	Real-time efficiency management and fault detection.
Lighting & electrical	LED fixtures with occupancy sensors and daylight controls.	30–50% energy savings for lighting.
Water efficiency	Dual-flush toilets, sensor taps, rainwater harvesting, and greywater reuse.	Reduces potable (drinking-quality) water demand by 30–60%.
Waste & circularity	On-site segregation, composting of organic waste, and recycling of metals, plastics, and concrete.	≥75% of construction waste diverted from landfill.

5.6 The Comparison of Alternatives

Under the proposed development alternative, the project would create more lecture and research facilities meeting the demand for research facilities at the University of Nairobi. It will create job opportunities during the construction and operations phases. With the construction of the proposed project, it is expected that new forms of economic activities will crop up. Economic activities bordering on material sourcing will improve the sales of commodities services such as: welding materials; timberworks; cement; sand; petrol; motor vehicle related spares and services; and increased number of people seeking services of from recreational facilities. This will be an

opportunity for the suppliers of construction materials and other utility suppliers to create market and sell their goods in the project area. In turn, this will boost their profit margin which is an advantage to their businesses. The spill-over effect because of tax remittance will contribute towards economic development of the nation.

Under the 'No Action' Alternative, there would be no development at all. There would be no benefits from the site, and neither would there be the significant environmental Impacts.

Provided the Environmental Impact mitigation measures are implemented as well as adoption of sound construction management practices, negative impacts will be avoided /minimized. However, commitments related to development alternative would ensure that potential impacts are minimized to levels of insignificance as envisaged in the ESMP.

5.7 Solid Waste Management Alternatives

Solid wastes will be generated from the proposed project. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness program in the management and the staff. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation program to be put in place. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, the proponent, the proponent, will need to ensure regular waste removal and disposal in an environmentally friendly manner. In this regard, a NEMA registered solid waste handler would have to be engaged. This is the most practical and feasible option for solid waste management considering the delineated options.

5.8 Mitigation for the Proposed Action

Mitigation measures for the proposed action are included hereinafter in this report.

6 PUBLIC PARTICIPATION AND STAKEHOLDER CONSULTATION

6.1 Purpose and Objective

This Stakeholder Engagement Plan (SEP) guided the identification, mapping, and analysis of the ESIA study stakeholders. This ensured the project stakeholders were identified, and adequate consultation was undertaken with the affected parties. The objective was to ensure the relevant stakeholders' views and concerns are well considered and incorporated during the project design and implementation. The engagement helped to develop a sense of ownership among the stakeholders and cultivate a healthy relationship throughout the project period and beyond.

6.2 Principles guiding ESC project Stakeholder Engagement

Stakeholder engagement for the ESC project was conducted in line with the provisions of public participation as envisaged in the Kenyan constitution 2010. The process was exhaustive and culturally appropriate, ensuring that relevant stakeholders in the vicinity were given a chance to voice their suggestions, comments, and grievances. Their input was crucial not only for the successful completion of the project but, most importantly, to cultivate a sense of ownership among them and build a healthy relationship between them, the development partners and the University of Nairobi.

This stakeholder engagement was done without any intimidation, manipulation or coercion. All stakeholder engagement proceedings were documented, and where possible, photographs and audio recordings, in addition to minutes taken with the consent of the stakeholders.

6.3 Need for Stakeholder Engagement

This stakeholder engagement process recognized that engaging UON/ ESC project stakeholders would bring a variety of perspectives and contribute to the quality of decisions made by the developer, UON and the consultant during the project planning and implementation. Continuous consultation with stakeholders would create a sense of ownership, therefore earning a buy in, building trust resulting to healthy operational environment for the ESC project. It also helped identify Issues that may arise, resolve them at the earliest possible stage before they escalate into bigger issues.

It is through public engagements that mitigating strategies were developed. Regular engagement would be confirmation of goodwill and transparency so as to minimize scepticism and misunderstanding especially among the young student population that is constantly critical of the happenings around them.

Public participation was in essence feedback collecting provision which would enable adjustments, improvements and alternatives where necessary. It ensures project alignment with authority and regulation, accountability and social license to proceed and operate.

This stakeholder engagement was conducted in full recognition that along the way complaints and grievances may arise due to possible project impacts. A grievance mechanism will therefore be development where stakeholders will be encouraged to voice their complaints. An effective stakeholder engagement is built on the timeliness in which these grievances are addressed and responded to; and this will be incorporated throughout the ESC project.

6.4 Objectives of SEP

The overall objective of the SEP was to establish how the various relevant stakeholders would interact throughout the design phase (including ESIA Study) of the project. The key objectives of the SEP are summarized as follows:

(i) Provide guidance for stakeholder engagement that meets the standards of International Best Practice
(ii) Identify key stakeholders that are affected, and/or able to influence the Project and its activities.
(iii) Identify the most effective methods, timing, and structures through which to share project information, and to ensure regular, accessible, transparent, and appropriate consultation.
(iv) Develop a stakeholders' engagement process that provides stakeholders with an opportunity to influence project planning and design.
(v) Establish a formal grievance/resolution mechanism.
(vi) Define roles and responsibilities for the implementation of the SEP.
(vii) Define reporting and monitoring measures to ensure the effectiveness of the SEP and periodical reviews of the SEP based on findings.

6.5 Stakeholder Mapping

Stakeholder mapping was critical as it helped the project management team to identify the various stakeholders' needs and understand which of the identified needs needed to be closely managed, and which stakeholders need to be kept informed and monitored during the various project phases.

The identified stakeholders were mapped into two categories: primary and secondary stakeholders. Primary stakeholders being those who have direct influence over the project while secondary stakeholders being those who had an interest in the proposed project.

Table 6-1: Stakeholder Mapping

Primary Stakeholders

Development Partners and Donors

- Agence Française de Development (AFD) – the project funder, with representatives directly involved in the ESIA process. (Environmental Representatives)

University of Nairobi management

- VC
- Corporate affairs
- University Council
- DVC A&F
- DVC Administration
- DVC research
- UON security department

Regulatory and Governmental Agencies

- National Environmental Management Authority (NEMA)
- Ministry of Water, Environment and Natural Resources
- Ministry of Environment and Forestry
- •Directorate of Occupational Safety and Health Services (DOHSS)
- Water Resource Authority (WRA)
- Kenya Wildlife Service (KWS)
- Kenya Forest Service (KFS)
- County Government of Nairobi
- Nairobi City Water and Sewerage Company (NCWSC)
- Nairobi River Commission

Staff Unions

- UASU
- KUSU

Faculties Academic staff and administrative staff

- Examination Centre Chiromo
- Faculty of Engineering (FoEng)
- Faculty of Science and Technology (FST)
- Faculty of Built environment and design
- Faculty of Health Sciences
- Faculty of Arts and Social Sciences

Non-Academic staff

- Faculty of Engineering (FoEng)
- Faculty of Science and Technology (FST)
- Faculty of Built environment and design
- Faculty of Health Sciences
- Faculty of Arts and Social Sciences

Students and student unions

- Faculty of Engineering (FoEng)
- Faculty of Science and Technology (FST)
- Faculty of Built environment and design
- Faculty of Health Sciences
- Faculty of arts and social sciences
- Student bodies
- UON Student Association (UNSA)
- Environmental student association

Adjacent institution

- Confucius Institute-UON
- Olive Cresent International School
- African Studies Foundation-Riverside

Vulnerable groups

- PWD
- Women, youth and children

Interest groups

- Friends of the arboretum
- Friends of Nairobi River

Secondary Stakeholders

Businesses owners /and management • Arborville Apartments • Clean Shelf Supermarket • Riverfront Business • Qwetu Hostel Chiromo/Qejani Hostel Chiromo/ • Arziki Restaurant Chiromo • Botrack Ltd-Land developer across proposed site. • Metropolitan Estate • Kolobot Gardens Ltd • Heri Heights hotel. • Private home owners.	**Local administration** • DCC in charge of Westlands sub county • Chief in charge of kileleshwa **Media** • University of Nairobi Channel TV (UNCTV

6.6 Stakeholder Participation and Stakeholder Consultations.

The stakeholder groups who were likely to be affected and/ interested in the implementation of the Engineering Complex Building were identified and a proposed communication methods and medium of engagement for each group outlined in **Table 6-2**.:

Table 6-2: Stakeholder Analysis

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
	Corporate affairs	*-Cooperate Affairs Office*		Key Informant Interview (KII)	Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Security Concerns -Environmental concerns Accessibility for PWD'S (Lifts, Accessibility pathways) --Space for PWD'S
	UON security department	-UoN Security Department: UoN towers Floor 12 Directors Office	08/09/2025	Key Informant Interview (KII)	- Role & Current Security: The office secures students, staff, assets, and relies on effective physical and procedural measures. Construction Risks: Main risks are vandalism, theft, and managing worker traffic, mitigated through access control and coordination. Operational Phase: Recommends CCTV, guards on each floor, restricted access control, and a Disaster Response Management Plan. Risk Mitigation: Emphasizes training, awareness, drills, and use of technology such as CCTV, alarms, and biometric systems. Coordination: Operates a three-tier system (internal, private, government) and coordinates with police given CBD location risks.

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
					Critical Investment: Priority investment is in electronic security (CCTV) and physical barriers (fencing). Under regulatory and government agencies:
Regulatory and Governmental Agencies	National Environmental Management Authority (NEMA)	NEMA offices	14/8/2025	-Key Informant Interview (KII)	- Project Scoping and Screening - Riparian reserve - Effluent discharge into Chiromo or Msongowai rivers. - Buffer requirements for institutional developments next to watercourses - Parameters of emphasis in water quality sampling and analysis? - Scope of environmental audits required for institutional effluent discharge.
	Directorate of Occupational Safety and Health Services (DOSHS):	Venue Safety House 3rd Floor	02/09/2025	Key Informant Interview (KII)	Role & Oversight: DOSHS enforces OSHA (2007) and WIBA through statutory plan approvals, workplace inspections, accident investigations, and requiring safety officers/committees on large sites. Construction Risks: They identified risks such as falls from height, dust and noise exposure, poor hygiene, structural failures (scaffold/excavation collapse), ergonomic strain, machinery accidents, and electrocution. Mitigation Measures: Recommended measures include hazard assessments, strict PPE use (helmets, harnesses, boots, gloves), health surveillance, safety signage, barricading, equipment maintenance, and deployment of fire marshals and trained first aiders. Operational Phase: For the completed facility, DOSHS emphasized annual workplace registration, 12-monthly OHS audits, proper lab chemical management (SDS), continuous risk

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
					assessments, safety training for staff/students, and compliance with fire, ventilation, and emergency standards.
	Faculty of Science and Technology (FST)	- Dean's Office	06/8/2025	-Key Informant Interview (KII)	-Operations and roles of the faculty. - Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Examination Centre Chiromo Campus UON	-Examination Centre Chiromo Campus	06/08/2025	- Key Informant Interview (KII)	-Background and roles of Examination Centre. Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental and social concerns -Expectations from the university and contractor.
	Chemistry Department	-Chemistry Department Chairman Office	08/08/2025	-Key Informant Interview (KII)	-Background and roles of Examination Centre. Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental and social concerns

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
					-Expectations from the university and contractor
Students and bodies Students	UON student Association (UNSA)-PWD Representative.	Main Campus-Gandhi Wing	22/08/2025	Key Informant Interview (KII)	Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns -Accessibility for PWD'S (Lifts, Accessibility pathways) --Space for PWD'S
Community Stakeholders *Businesses owners /and management*	Metropolitan Estate	Metropolitan Estate Premises (Managers Office)	06/08/2025	Key Informant Interview (KII)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Ariziki Restaurant	Ariziki Restaurant Premises.	06/08/2025	Key Informant Interview (KII)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
	Clean shelf Supermarket - Qwetu (Riverside Drive)	Clean Shelf Supermarket Premises	06/08/2025	Key Informant Interview (KII)	Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	University of Nairobi Enterprise Services (UNES) Limited.	University of Nairobi Enterprise Services (UNES) Limited. - Head quarters	11/08/2025	Key Informant Interview (KII)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Homeowner (Eulam Hussein). - Next to Chiromo gate near Examination Centre	Homeowner (Eulam Hussein) Homestead	11/08/2025	Key Informant Interview (KII)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Ariziki Restaurant	Clean Shelf Premises	06/08/2025	Focus Group Discussion (FDG)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations.

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
					-Environmental concerns
	Kolobot Gardens Ltd	-Kolobot Gardens Ltd Accounting Office	19/08/2025	Key Informant Interview (KII)	-Operations and Business background --Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	-Olive Cresent International School	-Olive Cresent International School Administration Office	19/08/2025	Key Informant Interview (KII)	-School Operations and background --Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Riverfront Business	- River front Business Manager office	29/08/2025	Key Informant Interview (KII)	-Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns
	Botrack Ltd Land developer-Opposite	-On site	19/08/2025	Key Informant Interview (KII)	Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures

Stakeholders		Venue	Date	Engagement Strategy	Topics of Engagement
	proposed site Statehouse Road Next to Kirichwa River				-Awareness and initial reactions; support for project -Project planning -Recommendations. -Environmental concerns -Expectations from contractor and the University.
Vulnerable groups	Organization for students with disabilities	Main campus	22/08/2025	Focus Group Discussion (FDG)	Project brief, scope and components -Funding -Objectives of engagement in line with law. -Impacts; Positive, negative and mitigation measures -Awareness and initial reactions; support for project -Communication engagement -Recommendations. -Environmental concerns -Accessibility for PWD'S (Lifts, Accessibility pathways) --Space for PWD'S

6.7 Consultation Methods

The Consultant employed the following methods when engaging the different categories of stakeholders.

6.7.1 Key Informant Interviews

The key stakeholders were consulted one-on one where the Consultant interviewed them on their opinions of the proposed project and obtain feedback to enhance the successful implementation of the Engineering Building Complex. The interviews were guided by a key informant guide that sought to identify the potential impacts and proposed mitigation measures for the adverse ones. Relevant participants were identified depending on their authority or influence they had in their stakeholder category. They were key leaders, top management or heads of groups.

This report presents the findings from Key Informant Interviews (KIIs) conducted as part of the stakeholder engagement process for the proposed project. The consultations were undertaken with a diverse range of stakeholders, including institutional representatives, local businesses, students, and vulnerable groups such as persons with disabilities (PWDs). The objective was to document stakeholders' perceptions of the project, identify potential environmental and social concerns, and gather suggestions for mitigation measures that would ensure project acceptability, inclusivity, and sustainability.

The KIIs provided in-depth perspectives from institutional leaders, private homeowners and business representatives directly or indirectly affected by the project. These included hospitality establishments, security and safety offices, and student associations, among others.

Business community.

- The Ariziki restaurant
- Metropolitan Estate -Chirimo Neighborhood
- Kolobot Gardens ltd
- Cleanshelf Supermarkert-Qwetu.
- River front
- Botrack Limited.
- Homeowner – Eulam Hussein

Institutions

- Olive Cresent International School.

University of Nairobi Departments/Organizations

- Faculty of Science and Technology
- Examination Centre – University of Nairobi
- Chemistry Department – University of Nairobi
- Security Personnel – Chiromo Campus
- Cooperate Affairs -UON
- UNES HQ-University of Nairobi
- PWD Representative- University of Nairobi (Main Campus)
- *UON* security department.

Attached are some photos taken during this exercise.

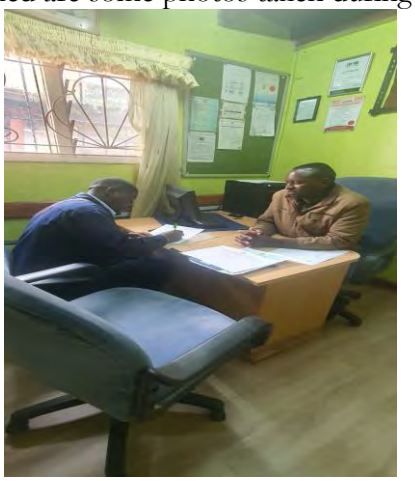


Plate 6-1: Key Informant Interview- Metropolitan Estate



Plate 6-2: Key Informant Interview - Clean shelf Supermarket-Qwetu

6.7.2 Focus Group Discussions

FGDs were used to facilitate discussion on Project's specific issues that merit collective examination with various groups of stakeholders. They were a quick way to gather views and concerns form a fairly large number of stakeholders in a conversational manner.

- Group sessions were held at Ariziki restaurant and for students with disability
- Each group discussion was guided by a trained facilitator using structured topics from the EIA discussion guide.

The FGDs were constituted in line with the technical requirements such as:

- Groups of at least 10 participants per session,
- Duration: 60–90 minutes
- Discussions were semi-structured, allowing for both guided and open conversation
- Notes and key points were documented by a rapporteur

Table 6-3: Focus Group Discussions

Target Group	Venue	Gender		
		Male	Female	Total
Arziki restaurant personnel	Arziki restaurant	6	4	10
Students with Disability	Ghandi Wing	7	3	10

This report presents the findings Focus Group Discussions (FGDs) conducted as part of the stakeholder engagement process for the proposed project. The consultations undertaken included local businesses and vulnerable groups such as persons with disabilities (PWDs). The objective was to document stakeholders' perceptions of the project, identify potential environmental and social concerns, and gather suggestions for mitigation measures that would ensure project acceptability, inclusivity, and sustainability.

The FGDs captured group dynamics and collective voices, particularly from business community (hospitality), student representatives and PWD groups, providing a platform for the discussion of shared experiences, priorities, and concerns. FGDs offered a comprehensive understanding of the anticipated opportunities and challenges associated with the project.

Attached are some photos taken during the exercise:



Plate 6-3: FDG Meeting at Ariziki Restaurant.



Plate 6-4: FDG Meeting at Ariziki Restaurant.

6.7.3 Administration of the Survey Questionnaires

As part of the Environmental and Social Impact Assessment (ESIA) for the proposed University of Nairobi Engineering and Science Complex, a structured questionnaire survey was administered to 398 respondents, including students, academic staff, administrative staff, nearby institutions,

and community members. The respondents' locations show a strong clustering around the University of Nairobi Chiromo Campus and nearby institutions.



Figure 6-1: Heatmap of survey respondent locations

The findings provide insights into demographic characteristics, awareness of the project, perceived impacts, and recommendations for mitigation. Data collection was conducted using an Electronic Data Capture System, specifically the Kobo Collect platform, which allowed for efficient mobile data entry and GPS tagging, even in offline conditions. Each survey took approximately 30 minutes to complete.

a) Sampling Approach

All individuals within the defined respondent categories were considered eligible for sampling. The sampling strategy accounted for the distribution of study areas to ensure fair representation of each group.

(i) Representativeness of the Sample

The University of Nairobi has a large and diverse population, with approximately 49,000–80,000 students, in addition to several thousand academic and non-academic staff. Within this context, a survey of 398 respondents represents a sufficiently robust sample size for statistical analysis.

Using **Cochran's formula** for sample size determination for large populations:

$$\eta o = \frac{Z^2.\mathrm{P}.(1-\mathrm{P})}{e^2}$$

Where:

- Z=1.96 (for 95% confidence level),
- p=0.5 (assumed proportion for maximum variability),
- e=0.05 (desired margin of error).

This calculation yields a minimum sample size of 384 respondents. The survey achieved 398 valid responses, exceeding this threshold and ensuring a 95% confidence level with a ±5% margin of error.

(ii) Sampling Distribution

The responses covered a broad cross-section of the university community and environs:

- Students: 50%
- Nearby institutions/ Community/business stakeholders: 25%
- Administrative staff: 17%
- Academic staff: 8%

This distribution ensures perspectives from both direct project beneficiaries (students and staff) and indirectly affected stakeholders (businesses, hostels, and service providers).

(iii) Sampling Framework

A Stratified Random Sampling technique was employed to ensure diversity and representativeness within each respondent category. Stratification by group (student, academic staff, administrative staff, and local community) to ensure that engagement addresses group-specific issues.

b) Demographic Profile

The survey revealed that respondents were predominantly male (58%) compared to female (42%). showing a fairly balanced representation critical for inclusive socio-economic assessment. In terms of age, the majority were young people between 18 and 25 years (51%), followed by those aged 26 to 35 years (24%), 36 to 45 years (15%), and a smaller proportion above 55 years (2%). Education levels were generally high, with most respondents holding a bachelor's degree (67%), while 12% had diplomas, 8% had attained master's degrees, and 2% held PhDs. With respect to roles, about half of the respondents (50%) were students, 22% represented nearby institutions, 17% were administrative staff, and 8% were academic staff.

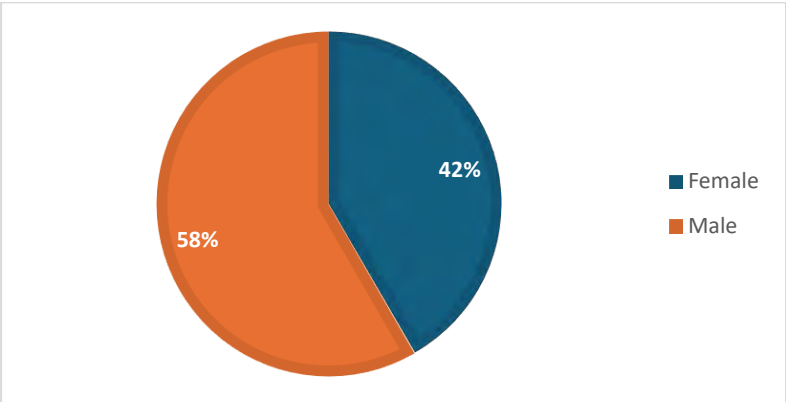


Figure 6-2: Gender distribution of survey respondents

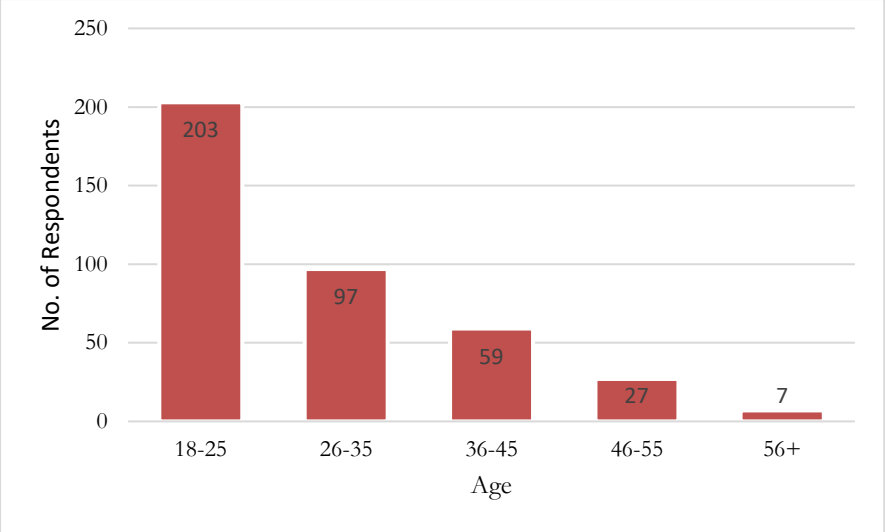


Figure 6-3: Age distribution of survey respondents

c) Awareness and Perceptions of the Project

Almost half of the respondents (49%) indicated that they were aware of the proposed project, with most learning about it through word of mouth (40%) and a smaller proportion through university communications (6%). A strong majority, however, expressed confidence in the project's relevance, with 92% affirming that it aligns with the University's strategic goals and 93% agreeing that it supports Kenya's Vision 2030 as well as the Sustainable Development Goals. In terms of anticipated benefits, respondents pointed to improved learning facilities (49%), enhanced access to classrooms and laboratories (45%), job creation (23%), and the attraction of more collaborators and academic staff (23%).

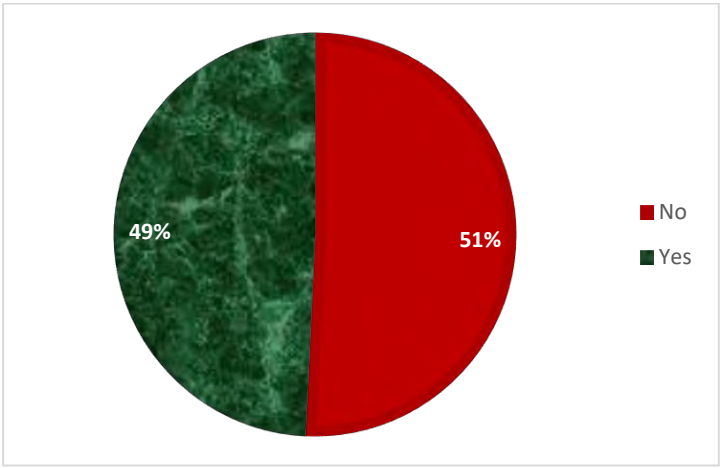


Figure 6-4: Familiarity with the proposed Engineering and Science Complex project.

d) Anticipated Academic and Institutional Impacts

Most respondents (79%) expected that teaching activities would be positively impacted by the proposed development, while 82% anticipated that it would significantly improve research capacity. In addition, 79% foresaw an increase in student enrollment because of the modernized infrastructure. A large majority, 92%, further believed that the new complex would enhance the University's reputation both nationally and internationally.

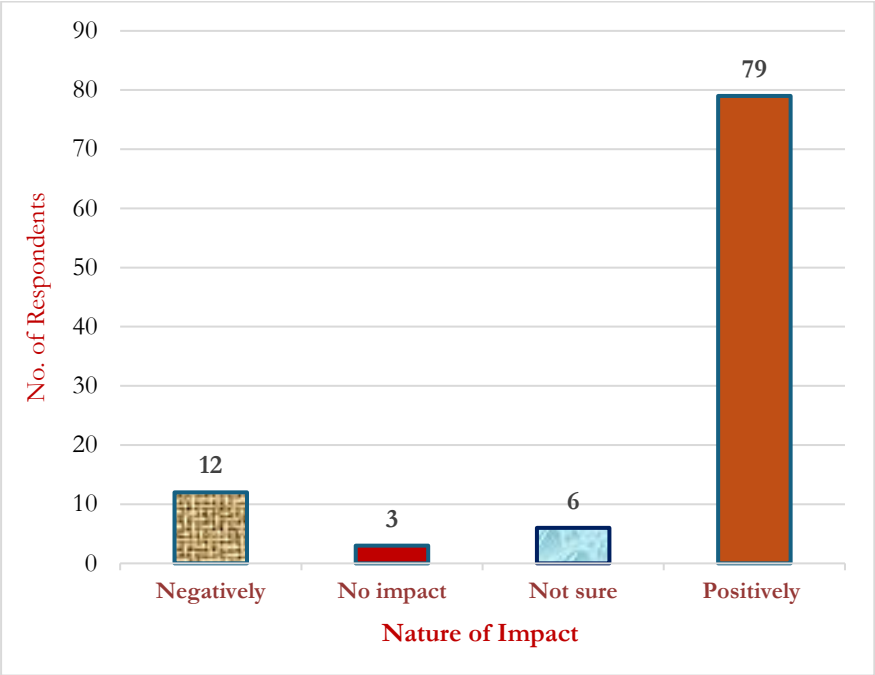


Figure 6-5: Perceived impact of construction on teaching activities

e) Environmental and Social Risks Identified

The key environmental risks identified by respondents included deforestation (32%), deterioration of air quality from dust and emissions (26%), water pollution (23%), waste management challenges (22%), and noise pollution (20%). Social risks were also noted, with concerns over disruption of academic activities (29%), increased safety risks for students and staff (27%), restricted access to facilities (26%), and noise disturbance (26%). In terms of occupational health and safety, the top concerns raised were noise exposure (31%), falling debris (28%), and risks related to dust and air quality (28%).

f) Vulnerable Groups – Women, Children, and PWDs

Respondents anticipated that women would benefit significantly from the project, particularly through employment opportunities (70%), business ventures such as food supply and cleaning services (67%), and skill development (43%). To ensure meaningful inclusion, they recommended

measures such as gender-sensitive recruitment practices (62%), the adoption of anti-harassment policies (54%), and the provision of gender-sensitive facilities (50%).

For children, the main risks identified were air pollution (62%), exposure to unsafe strangers such as construction workers (59%), accidents involving equipment and open trenches (57%), and noise disruption (55%). To safeguard their well-being, respondents emphasized the need for secure fencing around the construction site (81%), clear safety signage (66%), and scheduling noisy or high-risk works outside school hours (47%).

Regarding persons with disabilities (PWDs), 18% of respondents reported their presence in and around the project area. The primary barriers foreseen included accessibility challenges (75%), sensory overload from noise and dust (47%), and a lack of awareness among construction personnel about PWD needs (52%).

g) Community and Institutional Stakeholders

Local businesses and institutions around Chiromo, such as student hostels, hotels, food vendors, health services, and churches, highlighted opportunities for increased business but raised concerns over dust, traffic congestion, and safety risks.

h) Sample Issues /Concerns raised and Responses

Table 6-4: Some of The Sample Questions From The Key Stakeholders

No.	Issue/Concern/Question	Response (s)
1.	When will the construction of the Complex commence	The exact date has not yet been confirmed, but once determined it will be shared
2.	Which access road will be used for delivery of materials	Three possible routes were identified: through the playground, via the Chiromo morgue reception, and near the morgue towards the Examination Centre. The final route is yet to be determined
3.	How many years will the construction of the complex take	As of now the exact timeline is not known
4.	Which hours will the construction work be ongoing	From 7am to 6pm. But any work outside those hours will require prior approval from authorities
5.	How many floors will the complex be	As of now 4-5 flours

No.	Issue/Concern/Question	Response (s)
6.	Will the complex be open to all students who wish to undertake research	The complex is intended to enhance research opportunities and would be accessible to all eligible students in line with university research guidelines.
7.	Has the design incorporated access for Persons with Disabilities (PWDs).	The final design is not yet out but we believe the UoN is compliant with concerns of PWDs. In addition, we shall convey these concerns to be considered in final project design
8.	Will the trees on the proposed site be cut down	It was explained that tress would be cut down and the number would be highly minimized. The contractor will be required to come up with a tree planting programme to replace the cut ones. The replacement will be at contractors' cost
9.	The project site has monkeys and birds. Will they be protected	The ecosystem in the area would be highly considered during construction and operation to minimize the disruptions.
10.	Will the Complex only be open to students of engineering and science	We will escalate this concern to the university management to provide guidelines on student access
11.	Which is the exact site for the complex	It was explained that the site was next to the biology laboratory near Kirichwa river.
12.	Will the project include construction of a bridge between the complex and Confucius institute	As of now it is not part of the project design/scope
13.	The project site is too close to Kirichwa river.	NEMA guidelines would be strictly followed and required distance would be left between the river and the complex
14.	Concerns were raised regarding construction workers coming from outside and possibility of insecurity around the campus.	Security of the area will be a key concern. The site will be secured. Only authorized people will be allowed into the site. There will be security screening of all those who come in. A security company will be hired to provide all round the

No.	Issue/Concern/Question	Response (s)
		clock security services. There will be adequate lighting at night as well.
15.	Stakeholders inquired if the complex would only be research facility.	It was stated the facility was expected to have others facility such as labs, lecture halls, conference halls, offices, cafeteria etc.
16.	There is likely to be traffic congestion at university gates during construction	A particular gate will be designated for all construction related activities. Traffic and safety marshals will be available to manage traffic.
17.	Stakeholders wanted to know whether facilities in the complex such as toilets would be accessible to visitors especially during graduations when most parents prefer to sit around Chiromo during the celebrations.	It was stated that this proposal would be communicated to the client for consideration.

i) Summary of issues, Remarks Raised by different Stakeholders

(i) Cross-Cutting Environmental and Social Concerns

Figure 6-6 highlights the main environmental and social concerns raised by stakeholders during consultations. **Deforestation** was the most frequently mentioned, reflecting strong sensitivity to land use change and vegetation loss. **Air quality** issues—especially dust and emissions—were nearly as prominent, signalling potential health risks and nuisance impacts. **Water-related concerns**, including pollution, runoff, and drainage, accounted for a substantial share of the feedback, underscoring risks to both ecosystems and human use. **Waste management and noise** pollution also featured prominently, pointing to wider worries about operational impacts on daily life. Although **biodiversity loss** was raised less often, it remains a critical consideration for long-term sustainability.

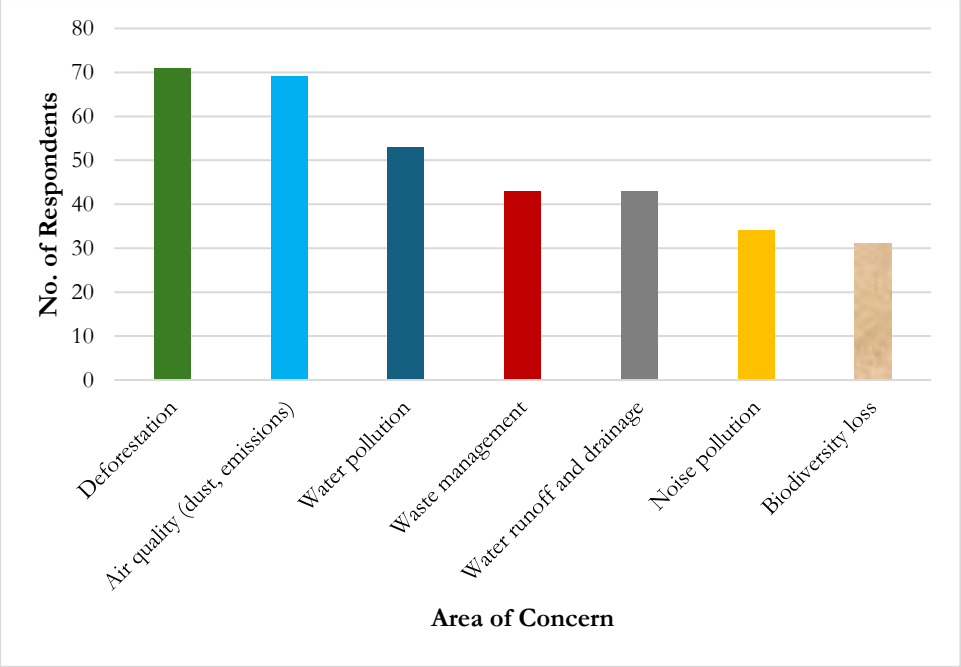


Figure 6-6: Main Environmental and Social Concerns Raised by Stakeholders

- **Noise Pollution.**

From the KIIs and FGDs, stakeholders identified noise pollution during the construction phase as the most pressing environmental concern. Excessive noise was viewed as a likely source of disruption to institutions, businesses, and residential areas within the project's vicinity. Of particular concern was the impact on learning activities in nearby schools, the delivery of hospitality services, and the general peace and well-being of the community.

- **Dust Emissions and Air Quality.**

Another critical issue raised was the risk of dust emissions and the general deterioration of air quality during construction. Participants noted that the generation of dust could significantly affect both indoor and outdoor environments, potentially causing discomfort and health concerns for students, staff, and clients in neighbouring facilities. The importance of implementing dust suppression mechanisms, such as regular sprinkling of water and covering of loose materials, was strongly emphasized to safeguard health and ensure the smooth continuity of academic and business operations.

a) Waste Management.

Waste management emerged as a cross-cutting concern across both construction and operational phases. Stakeholders stressed that during construction, safe collection, transportation, and disposal of debris is essential to prevent environmental degradation. Looking ahead to the operational

phase, they highlighted the need for a robust solid waste management plan that not only addresses daily waste handling but also integrates recycling and reduction strategies to minimize environmental risks.

b) Conservation of Natural Resources.

The conservation of natural resources, particularly the adjacent river and surrounding green spaces, was also emphasized. Stakeholders viewed these resources as vital to the local ecosystem, recreational use, and the overall well-being of the community. Concerns were raised about possible contamination, overuse, or encroachment linked to the project, with calls for strong protective measures to ensure the sustainability of these natural assets.

j) Social Issues

a) Displacement and Access Concerns

From the KIIs and FGDs, stakeholders raised concerns about potential displacement and restricted access during the construction phase. While no major physical displacement of households is expected, temporary disruptions such as blocked pathways, reduced access to learning institutions, businesses, and residential areas were emphasized. Stakeholders noted that such inconveniences could affect students' punctuality, service delivery for nearby businesses, and overall mobility within the project area.

b) Occupational Health and Safety

Occupational safety risks were strongly emphasized, particularly for construction workers and the surrounding community. Participants highlighted the likelihood of accidents, injuries, and exposure to hazards such as dust, noise, and falling debris if adequate safety measures are not enforced. The need for compliance with established occupational health and safety standards, regular inspections, and the use of personal protective equipment (PPE) was underscored by respondents.

c) Community Health and Safety

In addition to worker safety, community health and safety emerged as a priority. Stakeholders pointed out risks of accidents involving students and pedestrians due to the movement of heavy machinery and increased traffic during construction. Concerns about air and noise pollution affecting learning, mental well-being, and productivity were also raised, with respondents emphasizing the need for awareness campaigns and adequate safety signage.

d) Employment and Livelihood Opportunities

While some concerns were expressed, many stakeholders also identified positive social opportunities associated with the project. Employment creation during construction and operation phases was noted as a potential benefit, especially for youth within the local community. However, stakeholders cautioned that recruitment processes should be transparent and inclusive to avoid conflict or perceptions of unfairness.

e) Security and Social Cohesion

Stakeholders also highlighted potential security risks associated with an influx of workers and increased movement within the area. There were concerns about possible social tensions, petty crime, and strain on existing social facilities. Participants recommended collaboration with local administration and security offices to enhance surveillance and foster positive engagement between project workers and the host community.

k) Suggested Mitigation Measures

(i) Environmental Mitigation Measures

To address noise and dust pollution during the construction phase, contractors should adopt best construction practices, including the use of noise-dampening equipment, restriction of construction activities to daylight hours, and regular watering of dusty surfaces. Where possible, physical barriers such as dust screens should be installed around sensitive receptors, particularly schools and businesses in proximity to the site.

For waste management, a comprehensive waste management plan should be developed and enforced. This plan should provide for segregation of waste, designated disposal sites, and partnerships with licensed waste handlers to ensure proper disposal of construction debris. Long-term operational waste should be managed through sustainable approaches such as recycling and waste minimization campaigns targeting residents and users of the facility.

The conservation of natural resources should be prioritized. Measures should include protecting nearby water bodies from contamination through proper drainage management, maintaining existing green spaces, and incorporating landscaping plans that enhance biodiversity. Environmental awareness sessions should be conducted for workers and local communities to reinforce stewardship of natural resources.

(ii) Social Mitigation Measures

To minimize displacement and access concerns, contractors should ensure that alternative pathways and temporary access routes are clearly demarcated and maintained throughout the construction period. Scheduling of works should take into account peak hours for schools and businesses to reduce disruption.

Regarding occupational health and safety, contractors must strictly comply with occupational safety regulations by providing personal protective equipment (PPE), installing safety signage, and conducting regular safety training for workers. Routine inspections and emergency preparedness plans should be enforced to safeguard both workers and the surrounding communities.

Community health and safety concerns should be addressed through strict traffic management plans, including speed limits for heavy machinery, designated delivery times, and road safety awareness campaigns targeting students and pedestrians. Buffer zones or barriers should be placed between construction areas and learning institutions to minimize risks.

To maximize employment benefits, the project should prioritize local hiring and ensure transparent, inclusive recruitment processes. Stakeholders should be engaged regularly to prevent misunderstandings and enhance community ownership of the project.

Finally, to mitigate potential security and cohesion challenges, contractors should collaborate with local security agencies and community leaders to develop protocols for monitoring and addressing emerging risks. Worker-community engagement initiatives, such as orientation sessions and grievance redress mechanisms, should be established to build trust and ensure smooth relations.

6.8 Summary of Stakeholder Concerns and Responses

The consultations revealed general support for the proposed project, acknowledging its potential to improve learning facilities, enhance research opportunities, and foster interdisciplinary collaboration.

However, several environmental, social, and operational concerns were raised by various stakeholders, which are summarized in **Table 4.1** below alongside proposed mitigation and management actions.

Table 6-5: Summary of Issues Raised and proposed Action Plan

NO	Stakeholder / Group	Issue / Concern Raised	Description / Details	Proposed Mitigation / Action Plan	Responsible Party
1	General Stakeholders	Commencement of construction	Requested clarity on project start and duration.	Communicate timelines in advance via official channels and campus notices.	Client (UoN) / Contractor
2	General Stakeholders	Road use and traffic	Concern about congestion and unsafe truck movement.	Use designated route via Gate B (Qwetu–Arboretum), enforce delivery schedules, and use traffic marshals.	Contractor.
3	General Stakeholders	Construction working hours	Fear of noise and disturbance after hours.	Restrict works to 8:00 a.m.–5:00 p.m.; avoid noisy works during exams.	Contractor
4	General Stakeholders	Building height and design	Sought clarity on 4–5 storey structure and design.	Share approved plans and communicate changes through meetings and updates.	Client / Architect
5	General Stakeholders	Student and researcher access	Concern about facility use restriction.	Develop transparent scheduling policy to ensure equal access.	UoN Management
6	Persons with Disabilities (PWDs)	Physical accessibility	Concerns about inadequate access for PWDs to laboratories, lecture halls, and toilets.	Incorporate universal design standards (ramps, lifts, tactile paving, signage, accessible toilets).	Architect / Contractor
7	Persons with Disabilities (PWDs)	Safety during construction	Concern over barriers, dust, and blocked access routes.	Provide temporary accessible routes, signage, and marshals to assist movement.	Contractor / Safety Officer
8	Persons with Disabilities (PWDs)	Laboratory usability	Need for accessible workstations, adjustable benches, and lighting.	Adopt inclusive lab design with adjustable furniture, wide corridors, and adequate lighting.	Architect / Design Team
9	Persons with Disabilities (PWDs)	Drainage and flooding	Flooded underpass limits access between hostels and campus.	Improve drainage design and elevate pedestrian pathways where necessary.	Contractor
10	Persons with Disabilities (PWDs)	Inclusion in employment	Desire for equal job opportunities during construction and operation.	Implement inclusive employment policy and ensure accessible work areas.	Client / Contractor

11	Security Department	Increased human activity and safety	Risk of theft, accidents, and unregulated access during construction.	Enhance surveillance, enforce worker ID badges, and fence construction site.	Contractor / UoN Security
12	Security Department	Coordination with security	Need for timely communication before major works or deliveries.	Establish direct liaison between contractor and campus security for coordination.	Contractor / Security Office
13	Neighboring Businesses.	Dust and noise disturbance	Concern about business disruption during construction.	Install dust nets, regularly sprinkle water, and schedule works to minimize noise.	Contractor.
14	Neighboring Businesses	Traffic and accessibility	Concern about material delivery routes near business areas.	Restrict heavy vehicles to designated routes and times.	Contractor.
15	Neighboring Businesses	Influx of workers.	Fear of insecurity and behavioral misconduct.	Register all workers, provide ID badges, and sensitize on campus codes of conduct.	Contractor / UoN Security
16	Neighboring Businesses	Opportunities for local engagement	Interest in providing catering or supplies to workers.	Prioritize campus-based suppliers and vendors where possible.	Client / Contractor
17	All Stakeholders	Noise, waste, and dust management	Need for proper environmental control measures.	Implement an Environmental and Waste Management Plan, including waste segregation, recycling, and dust suppression.	Contractor / Environmental Officer
18	All Stakeholders	Communication and grievance redress	Request for clear, accessible feedback mechanism.	Establish a Grievance Redress Mechanism (GRM) with designated focal person and communication channels.	Client / Contractor
19	All Stakeholders	Project benefits	Desire for job creation, innovation, and capacity building.	Prioritize local hiring, student internships, and collaboration with departments.	Client / Contractor

6.8.1 Summary and Way Forward

The stakeholder consultation process demonstrated broad support for the proposed project, particularly due to its anticipated academic and social benefits. The concerns raised primarily relate to **construction impacts (noise, dust, traffic)**, **PWD accessibility**, and **site security**. These issues will be addressed through the **Environmental and Social Management Plan (ESMP)** and ongoing stakeholder engagement throughout the project lifecycle.

A formal **Grievance Redress Mechanism (GRM)** will be maintained by the client to ensure that any future concerns from affected parties are received, logged, and resolved promptly.

Continuous engagement will be sustained through notices, meetings, and digital communication platforms (email, WhatsApp groups, and public boards), ensuring transparency and inclusivity during both construction and operational phases.

6.9 Conclusion

The Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) conducted across the project area provided critical insights into both the opportunities and challenges associated with project implementation. Communities and stakeholders expressed optimism about the anticipated socio-economic benefits, particularly improved infrastructure, enhanced access, and potential employment opportunities. However, they also raised genuine concerns regarding environmental degradation, disruption of livelihoods, occupational and community safety, and broader social cohesion.

The assessment highlighted key environmental risks such as dust, noise, and improper waste management, which, if left unaddressed, could negatively affect both the natural environment and public health. Social concerns, ranging from displacement risks, safety hazards, and disruption to access routes, to potential tensions between workers and host communities, also emerged as critical areas requiring proactive management.

The proposed mitigation measures underscore the importance of embedding sustainability, inclusivity, and safety into all phases of the project. By enforcing stringent environmental safeguards, adhering to occupational health and safety standards, and ensuring meaningful community engagement, the project can minimize adverse impacts while maximizing its positive contributions.

Going forward, it is imperative that project implementers maintain an open, transparent, and continuous dialogue with affected communities and stakeholders. Regular monitoring, a

responsive grievance redress mechanism, and collaboration with both government agencies and local leaders will ensure that challenges are promptly addressed. Ultimately, the successful realization of the project's objectives will depend on a balanced approach that safeguards the environment, promotes social well-being, and fosters community ownership.

7 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

7.1 Preamble

The environmental baseline information and project characteristics provide the foundation for identifying and evaluating impacts. These impacts can be categorized as positive or negative, direct or indirect, short-term or long-term, temporary or permanent, depending on their extent and duration in the environment. The assessment of impacts is conducted throughout all project phases, including construction, operation, and decommissioning. This chapter, therefore, presents an evaluation of the potential environmental and social impacts associated with the development of the proposed Engineering and Science Complex at the University of Nairobi, Chiromo Campus.

7.2 Positive impacts during the construction phase

7.2.1 Creation of Employment Opportunities

The construction phase of the project will create job opportunities, particularly for casual workers. Many individuals, including casual laborers, masons, carpenters, joiners, electricians, and plumbers, will be employed on-site throughout the project's duration, from start to finish. In addition to casual laborers, formal employees including engineers, surveyors and planners will also secure employment during the construction period. The skilled labor will make up approximately 10% of the total work force during construction.

Construction activities for the project will also offer employment especially for women which includes direct construction work and indirect, such as food vendors who will have more buyers for their food and thus improved income for the locals. This will also have a similar effect to traders operating around the project area.

7.2.2 Gains in the Local and National Economy

With the construction of the proposed project, it is expected that new forms of economic activities will crop up. Economic activities bordering on material sourcing will improve the sales of commodities services such as:

(i) Welding materials
(ii) Timberworks
(iii) Cement.
(iv) Sand.
(v) Fuel for construction equipment and vehicles.
(vi) Motor vehicle related spares and services.
(vii) Increased number of people seeking services of from recreational facilities

This will be an opportunity for the suppliers of construction materials and other utility suppliers to create market and sell their goods in the project area. In turn, this will boost their profit margin which is an advantage to their businesses. The spill-over effect because of tax remittance will contribute towards economic development of the nation.

The contractor will pay Value Added Tax (V.A.T) on purchasing materials for the project. Construction workers will also pay income tax from their earnings while working on the project. A large sum of the project money shall be released into the local economy due to the construction activities. This money will be in form of payments for skilled and unskilled labor; Purchases of construction materials; and payments for local provisions including fuel, foods and accommodation.

7.2.3 Technology Transfer

The construction of the Engineering and Science Complex will introduce modern building methods and management systems to the project area. Techniques such as Building Information Modelling (BIM) coordination, prefabrication of components, quality assurance/quality control procedures, safe electrical lock-out/tag-out (LOTO), and the installation of specialized laboratory services will be demonstrated on site. Through daily collaboration with the main contractor and specialist subcontractors, local artisans, technicians, and junior professionals will acquire new practical skills and standards that they can apply on future projects.

In addition, the contractor is encouraged to conduct on-the-job training, toolbox talks, and mentorship for apprentices and interns drawn from the local community and the University. This will enhance the capacity of local firms and improve the competence of University Estates and Safety staff who will later operate the facility. The result is a lasting transfer of knowledge and improved workmanship within the local construction sector.

7.2.4 Infrastructure improvement

During the construction period, the project will deliver both temporary and permanent improvements to campus and adjacent infrastructure. These include upgraded internal access roads and footpaths, enhanced storm water drainage (e.g., lined drains, silt traps and permeable paving where applicable), improved street and security lighting around the site, clearer wayfinding and signage, and safer gatehouse arrangements for vehicles and pedestrians. Utility tie-ins for water, sewer, electricity and ICT will be rationalized and, where feasible, upsized or rehabilitated to address existing bottlenecks.

These works will improve circulation, safety and reliability of services for students, staff and visitors beyond the project footprint. Neighboring users will also benefit from better-managed

runoff and reduced localized flooding. The improvements will remain in place after construction, thereby raising the overall standard of infrastructure on the campus.

7.2.5 Optimal use of land

The project promotes optimal land use by situating the new facility within the existing university campus and adopting a compact, multi-storey design. This infill approach accommodates teaching, research and support functions on a limited footprint, thereby minimizing the need for additional land take and preserving open spaces and landscaping. It also maintains the riparian buffer along the Nairobi River by avoiding permanent structures within the setback and restricting construction lay-down areas to designated zones.

By concentrating development where services already exist, the project reduces pressure to expand onto greenfield areas and curbs future sprawl. After construction, temporary areas will be reinstated with appropriate planting and permeable finishes, ensuring that functional space is maximized while environmental quality is protected. This efficient use of land supports long-term campus planning objectives and sustains ecosystem services associated with green and riparian areas.

7.3 Negative Impacts during Construction Phase

7.3.1 Noise Pollution and Vibrations

The primary sources of noise during construction will be the construction machinery, communication among workers and incoming vehicles delivering construction materials. The construction activities for the proposed project however are not expected to be excessively noisy due to its small scale. While people residing in the neighborhood and the site workers may be affected by occasional noise from these activities, it can be managed within acceptable limits.

The significance of noise impacts depends on whether the project would introduce new sources of noise that would increase noise levels above the existing ambient levels. Noise impacts would be considered significant if the project results in the following:

(i) Exceeding the noise standards established in the local general plan or noise ordinance, or standards set in the EMCA (Noise Regulations 2009), thus exposing individuals to excessive noise levels or generating such levels.
(ii) Exposing individuals to excessive ground-borne vibrations or noise levels.
(iii) Causing a substantial permanent increase (more than five decibels, dBA) in ambient noise levels near the project, compared to levels without the project.
(iv) Causing a substantial temporary or periodic increase in ambient noise levels in the project vicinity compared to levels without the project.

According to the Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005 Rule No.4, no worker shall be exposed to noise levels in excess of:

(i) The continuous equivalent of 90dB(A) in 8 hours within any 24 hours' duration.
(ii) 140dB (A) peak sound level at any given time.
(iii) Noise transmitted from workplace shall not exceed 55dB(A) during the day and 45dB(A) during the night.
(iv) Anybody working in an area involving exposure to noise, needs Audiometric examination and internal examination (pre-employment and annual) to determine deafness, cases with deterioration of hearing loss of 20dBA or more in two successive examinations within two weeks.

The current criteria for noise, Threshold Limit Value (TLV) which is allowed is 85 dB (A) as the first action level, 90 dB (A) second action level and 140 dB (A) being the third action level hourly.

Noise can also be a nuisance to the local community if construction works begin too early in the day and continues into the night. Uncontrolled noise becomes a great nuisance Noise levels from construction activities exceeding 60 dB (A) at the construction camp site have a negative impact to the environment.

The potential noise impacts of the construction activities will be managed to ensure compliance with applicable noise standards and to prevent significant disturbances to the surrounding environment by adopting the following mitigation measures:

(i) Scheduling: Construction activities that generate significant noise can be scheduled during the day when the impact on nearby establishments is expected to be lower.
(ii) Equipment Selection: Choosing construction equipment and machinery that are specifically designed to minimize noise emissions can significantly reduce noise levels. Opting for quieter alternatives and using equipment with noise-reducing technologies can be effective in mitigating noise impacts.
(iii) Equipment Maintenance: Regular maintenance and inspection of construction equipment can prevent excessive noise caused by mechanical issues, ensuring that the machinery operates at optimal noise levels.
(iv) Limit pickup trucks and other small equipment to a minimum idling time observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible.

(v) Acoustic Enclosures: Enclosing noisy equipment or machinery within soundproof enclosures can effectively contain and reduce noise emissions. These enclosures are designed to absorb and block noise, preventing it from spreading to the surroundings.

(vi) Provision of Personal Protective Equipment and clothing (PPE/C) including earmuffs for ear protection to the workers on site

(vii) Communication and Education: Maintaining open communication with nearby residents and workers about the construction activities, expected noise levels, and the duration of noisy operations can help manage expectations and minimize disruption. Educating workers about the importance of minimizing noise and following proper noise control measures can also contribute to noise reduction.

Adhering to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) guidelines is crucial. Ensuring that noise levels generated by construction activities remain within acceptable limits set by local authorities (Control) Regulations, 2009 regarding noise limits at the workplace. Adhering to local noise regulations and guidelines is crucial. Ensuring that noise levels generated by construction activities remain within acceptable limits set by local authorities.

7.3.2 Solid Waste Generation

Considerable volumes of solid waste will be generated during site preparation and construction works, which would include some vegetation and typical construction waste such as wasted concrete, steel, wooden scaffolding and forms, pulp and polythene bags, waste earth materials, etc. This waste will negatively impact the aesthetic value of the site and surrounding environments if not properly managed and disposed of at an approved dumpsite. Solid waste, if allowed to accumulate on the ground, could cause localized pooling and flooding. Pooling of water, in turn, would create conditions conducive to the breeding of nuisance and health-threatening vectors such as mosquitoes. Improper management of construction waste constitutes a short-term negative impact.

The other type of waste is excavated over-burden soil that must be removed for foundation works. This amount of soil must be deposited at a site where it will neither be of visual intrusion nor adversely alter the landscape of the site. The proposed project is also expected to generate wastes such as waste concrete and other solid waste such as fugitive soil, debris, cement bags, plastic containers, vehicles spare parts, waste oil, old tyres, obsolete equipment, metal end cuts especially at still section, iron sheet at the camp site, stripped off vegetation, glass materials, and packaging materials which will need to be disposed as per the guidelines in the waste regulations. Solid waste

has the potential of causing aesthetic degradation and nuisance to employees and visitors to the site.

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is minimal.

It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once used or recovered construction materials will lead to financial savings and a reduction of the amount of construction debris disposed of as waste.

Additional recommendations for the minimization of solid waste during the construction of the project include:

(i) Provision of solid waste collection facilities (waste bins)
(ii) Contracting licensed solid waste handlers to ensure proper disposal and recycling of construction waste.
(iii) Sensitization of construction workers on proper disposal of solid wastes
(iv) The contractor will maintain all site vehicles and equipment at a serviceable state.
(v) Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels.
(vi) Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.

7.3.3 Water pollution

All sorts of motorized equipment, from generators to trucks, requiring fuel, lubrication and maintenance will be used at the construction site. Many will also be fitted with lead batteries. Spillage of hazardous materials on the ground surface has a potential of contaminating the soil and underground water. The Liquid wastes generated may include unmanaged wastewater from cleaning of equipment and spills from oils and other liquids used during construction.

To address these concerns, the project proponent will develop a plan outlining measures to prevent and respond to accidental spills quickly and safely. It will include procedures for the proper handling of hazardous materials during construction, aimed at reducing the likelihood of spills. Additionally, an emergency response program will be established to ensure prompt and safe clean-up of any accidental spills that may occur.

The plan will also identify designated areas where activities such as refueling, vehicle maintenance, and storage of hazardous materials, if applicable, will be permitted. These areas will be carefully

chosen to minimize the risk of environmental contamination and ensure the proper containment and management of hazardous substances.

Mitigation

(i) Oils and greases emanating from repair and maintenance activities will be collected in containers.

(ii) Waste from the sanitation facilities should be collected and transported by a licensed waste transporter.

(iii) All polluted water treated before discharging to the environment.

(iv) Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from construction site.

(v) Wash areas shall be placed and constructed in such a manner to ensure that the surrounding areas are not polluted.

(vi) Storage areas or secondary containment should be constructed of waterproof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them.

(vii) Ensure compliance with the Water Act 2016 and the Water Quality Regulations.

7.3.4 Loss of Biodiversity

During the excavation for foundation laying, some existing vegetation, particularly shrubs, may be disturbed. However, the overall impact on the ecosystem is expected to be minimal since the project has been planned to conform to the character of the surrounding area.

After the completion of construction, the project proponent intends to undertake landscaping efforts to enhance the aesthetic appeal of the site and introduce elements of nature. This means that parts of the project site will be landscaped to create a more pleasing environment, which may include planting new trees, flowers, and other vegetation.

The landscaping plans aim to mitigate the temporary disturbance caused by construction and contribute to the overall enhancement of the natural surroundings. By incorporating greenery and natural elements into the project site, it can provide a more visually appealing and harmonious integration with the surrounding environment.

Mitigation

(i) Implementing best construction practices: It involves minimizing the impact construction on biodiversity. This includes minimizing land clearing, soil erosion,

(ii) Adopting biodiversity friendly design principles: It involves preserving the existing natural features, such as mature trees, and avoid unnecessary disturbance to sensitive areas. Any area around the project site that will not be used for construction purposes will be restored and landscaped to the original state with addition of aesthetic beauty.

(iii) Replanting at a minimum ratio of 3:1 or higher depending on the tree ecological value, following IFC Environmental and Social Performance Standard 6 and Kenya Forest Service guidelines on tree planting, compensatory afforestation, and species selection.

(iv) Replanting and monitoring post-construction targeting ≥80% survival after 2-3 years, by implementing a landscaping plan during the construction phase by the Contractor and the University maintenance department taking up the task post-construction. Specific replanting locations will be targeted such as onsite landscaping zones, designated greenbelts within the area or offsite compensatory afforestation area where the space is constrained.

(v) Where avoidance is not feasible, a translocation plan will be implemented. A census will be undertaken pre-construction to establish tree inventory and tagging viable trees for translocation. Detailed translocation procedures will be employed, including root ball preparation and timing preferably during rainy season. The designated receptor sites have suitable soil and hydrological conditions either within the project area or off-site within the University.

(vi) In the event translocation will not be feasible, an enhanced replanting ration will be considered with the indigenous trees of same ecological structure.

7.3.5 Air pollution

During the construction phase air quality is expected to decline because of an increase in levels of fugitive dust from excavation works, the stockpiled earth materials, dusty roads and concrete mixing. Respirable particulates are a public health hazard and may otherwise create considerable nuisances to the public. This is expected to be a short term, reversible impact lasting only for the duration of the construction activity. Some Construction machinery and trucks (including small vehicles) will also generate hazardous exhaust fumes such as Carbon Oxides (COx), Sulphur Oxides (SOx) and Nitrogen Oxides (NOx). Dust (particles) as caused by vibrations of machines and vehicle movement suspends in the air mostly during dry spells. Such dust and emissions have direct negative impact to the quality of air.

Air Pollutants will be in the form of solid particles, liquid droplets, or gases essentially PM 2.5 and PM 10 during excavation and VOCs emitted by moving vehicles and machinery. In addition, they

may be natural or man-made. People living within particulate matter air pollution are predisposed to an increased risk of pulmonary exacerbations and decrease in lung function.

Mitigation

(i) Enclose the site with a dust-proof net during construction.
(ii) Water should be sprayed during the construction phase of excavated areas during dry conditions.
(iii) Prohibit idling of vehicles
(iv) Ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases.
(v) Ensure appropriate speed limits are observed along all road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dust.
(vi) Construction workers will be provided with dust masks to mitigate.

7.3.6 Soil erosion

Excavation would expose the topsoil to agents of soil erosion. Movement of machinery would also cause disturbance to the present structure of soil particles causing compaction in undesired areas. This would increase the runoff-to-infiltration ratio accelerating erosion in the project areas.

The Proponent will implement measures to minimize soil erosion and associated sediment release from the project site during construction. These measures will include levelling the project site to reduce run-off velocity and increase rainwater infiltration. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off.

7.3.7 Increased water and energy demand

Both the construction works, and the workers will create additional demand for water and energy in addition to the existing demand. The increased demand will be in concrete preparation, use by construction workers and other construction works.

To mitigate, the proponent shall ensure that water and energy is used efficiently at the site by sensitizing construction staff to avoid irresponsible use. The proponent should install water-conserving automatic taps and toilet flush systems. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.

7.3.8 Workers Accidents and Hazards during Construction

All construction sites are inherently unsafe and for those employed on the project the risks are varied and omnipresent. They are however well understood and documented, and providing normal, accepted Health and Safety procedures are followed they are easily minimized. The

workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, injuries from hand tools and construction equipment. Risk of accidents and incidents will be heightened with the construction activities. Construction workers will be in direct contact with heavy machinery and equipment; however, this risk is activity specific and will only be within the construction area. Heavy ground vehicles (HGVs) such as excavators might be of risk while.

(i) Moving and strikes a pedestrian, particularly while reversing.
(ii) Slewing trapping a person between the excavator and a fixed structure or vehicle; or
(iii) Working when the moving bucket or other attachment strikes a pedestrian or when the
(iv) Bucket inadvertently falls from the excavator.
(v) Health, safety, and security are important aspects through all the stages of the proposed project.

Mitigation

(i) The Contractor should ensure registration of the workplace by the Director, Directorate of Occupational Safety and Health (DOSH) forming the basis of his work statistics.
(ii) The Contractor must ensure establishment of a Health and Safety Committee for the project team as per the Health and Safety Committee Rules 2004.
(iii) The Contractor should contract an approved fire safety auditor to undertake annual fire safety audits every year.
(iv) The Contractor should contract an approved plant inspector to exam all plants and equipment periodically as per the safety and health act (2007).
(v) The contractor should develop written Health and Safety, and Fire Safety Policies for the construction site.
(vi) The Contractor should ensure provision of appropriate Personal Protective Equipment (PPE) for project;
(vii) All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the Project Manager. If appropriate, symbolic warning signs must be erected;
(viii) Maintain an incident/accident register, in accordance with the Occupational Safety and Health Act 2007 and report incidences to the Safety Officer and Directorate of Occupational Safety and Health (DOSH).
(ix) The Project Manager should ensure that the Contractor is instructed in the use of all materials that may have negative environmental (including health) effects.

(x) The Project Manager should ensure that if any material or substance is used that is at any point in the future deemed to be deleterious to health, and then it must be replaced with an acceptable alternative;

(xi) The Project Manager should ensure strict safety management through close attention to design, work procedures, materials and equipment.

(xii) Public sensitization on safety issues around the project site should be adopted;

(xiii) The implementation unit and the contractor should adopt strict construction practices to ensure safety of local communities and construction workers;

(xiv) The community should be notified in advance of possible activities that may cause disturbance. In addition, construction should follow a schedule, and the contractor must adhere to that schedule, so that the public can know when to expect disturbances;

(xv) Warning/informative signs should be erected at the fence, indicating that construction works are in progress, and possible disruption to pedestrian or vehicular traffic. Signs Should indicate when works are likely to begin and end, and what alternatives are available for access;

(xvi) Safety concerns, review incidents, and determine actions needed to implement job safety.

7.3.9 Oil Leaks and Spills

Oil spills may be accidental from construction machinery and vehicles through refueling and the construction of permanent and temporary fuel storage facilities. The most likely impact will be contamination of soil and surface and groundwater. Contaminated soil is injurious to plant growth and must be removed. Contamination of water is potentially more serious since pollutants may move fast destroying aquatic life and rendering water unsafe for domestic and livestock use.

Mitigation

(i) Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps.

(ii) Ensure that all equipment is in good condition, clean and free from leaks.

(iii) Oil spill containment and clean-up equipment should be kept at the contractor's camp;

(iv) Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps; Standard operating practices for refueling mobile equipment such as a minimum 15m from any water channel should be practiced;

(v) Operator training is an important aspect of preventive approach and should be put into use before assignment or during duty;

(vi) Ensure that all equipment is in good condition, clean and free from leaks;

(vii) Oil spill containment and clean-up equipment should be kept at the contractor's camps.

7.3.10 Traffic congestion/routing

Activities related to construction works will increase vehicular traffic at the site and roads leading to the site. Related issues of vehicle congestion and reckless driving by truck drivers delivering construction materials and supplies to the site and market will be sources of potential accidents to road users and pedestrians. Disturbance of normal living conditions to the local population and businesspeople due to the increased traffic in the area will also be expected especially during the construction period.

Mitigation

(i) Contractor to prepare a Traffic Management Plan for approval

(ii) Educate workers and local community traffic safety through awareness and educational campaigns

(iii) Installation of appropriate road signage, speed signs, and other warning signs at the site and access roads

(iv) Copies of insurance policies for the contractor's drivers and vehicles should be provided to the Supervision Consultant.

(v) The contractor ensures proper driving discipline by its employees, and sanctions those in breach.

(vi) Excavated sites, embankments, and dangerous locations are protected with proper safety barriers, tape and warning signs.

(vii) Maintain a log detailing every violation and accident on site or associated with the project

7.3.11 Interference with the Physical Setting and Visual intrusion

Visual impacts occur during earthworks for the foundation of projects and throughout to the completion of the project. The proposed site construction will result to a short-term impact to the aesthetics of the project site. Construction activities would require the use of heavy equipment and storage of materials at construction sites. During construction, vegetation clearance, excavated areas, stockpiled soils, iron sheet barriers and other materials within the construction site and staging areas would constitute negative aesthetic elements in the visual landscape.

Mitigation

(i) Shield off the areas of construction with suitable materials.

(ii) On completing the earthworks, the worked area should be restored through backfilling, leveling and planting of vegetation to blend in a way to merge with existing environment.

(iii) All solid waste and debris from construction site must be cleared on completion

7.4 Positive Impacts during Operational Phase

7.4.1 Creation of Employment

During the operational phase, there will be employment opportunities, especially for those who will be involved in the activities taking place within the complex. Increased student population will result in an increased demand for both teaching and non-teaching staff. This will improve their living standards and by engaging, they will also change their social behaviour.

7.4.2 Improved research levels

The proposed engineering and science complex will host facilities for high research levels including lecture theatres, modern engineering and science laboratories and other associated amenities that will enhance students and researcher experience at the University of Nairobi. The partnerships associated with implementation of the proposed project will also enhance the research capability of the University.

7.4.3 Creation of Market for Goods and Services

With operations in the complex, it is expected that there will be creation of market for goods and services. Those working in the complex will need to eat, drink and enjoy themselves. This will lead to new business such as cafeteria, shop, printing booths among others. This will be an opportunity for those in business to create market and sell their goods. In turn, this will boost their profit margin which is an advantage to their businesses. The spill-over effect because of tax remittance will contribute towards economic development of the nation.

7.4.4 Better Resource Use

The proposed project will use incorporate green building technologies with minimal environmental impacts. This includes recycling and allows maximum use of renewable technologies in the operation of the complex. The complex will also be utilizing natural lighting where possible and adopt other ways that save on energy and water costs.

7.4.5 Decreased congestions

The proposed facility will create more lecture theatres, laboratory, offices and other associated amenities. This will reduce pressure on the already existing facilities and therefore reducing congestions in other facilities within the University.

7.5 Negative Impacts during Operation Phase

7.5.1 Water pollution

Wastewater generated within sanitary facilities is of significant concern concerning health and the environment, particularly water and soil. In its raw form, it is a serious health hazard and emits bad Odors. The proposed site will be connected to existing sewer system.

Mitigation

(i) Make internal and external sewerage systems hard, strong, durable, smooth, impervious, and non-corrodible materials and well-designed and laid pipe networks.

(ii) All waste pipes must have cleaning Roding eyes which must be accessible.

(iii) Sanitary facilities must be kept clean always, through regular washing and disinfecting.

7.5.2 Increased water demand

Water is such an important component in life that almost all processes and activities require this crucial commodity. Quality and quantity of water thus become very important parameters. The proposed development may cause some strain on the existing water supply during the operation.

Mitigation

(i) Avoid wastage of water.

(ii) Sensitize all stakeholders on means and needs to conserve water resources.

(iii) Have close tap after use warnings.

7.5.3 Increased energy demand

Energy is an integral part of most activities especially where machinery is involved. There will be increased use of energy due to increased energy uses during the operation phases.

Mitigation

(i) Efficient use and conservation of energy in buildings

(ii) Use of green building technology and techniques

7.5.4 Effluent discharge

During operation, the Complex will generate several wastewater streams:

(i) Grey wastewater from washrooms and kitchens.

(ii) laboratory/process wastewater from teaching/research labs and workshops (e.g., rinses, acids/alkalis, solvents, metals).

(iii) equipment/plant room drainage (e.g., chilled-water blow-down, boiler blow-down if any, cooling tower bleed if used); and

(iv) clean condensate from HVAC systems.

Uncontrolled discharge could overload the sewer, corrode pipes, harm treatment processes, or degrade surface waters.

Mitigation

(i) separate lab/process drains and install pre-treatment withhold/divert, sampling manholes, backflow/bunding, grease traps, condensate reuse, all integrated with BMS/SCADA.

(ii) Enforce drain-disposal SOPs, pre-approve atypical effluents, label drains, collect solvents for off-site treatment, maintain/calibrate equipment, stock spill kits, and meet consent limits.

(iii) Appoint an Environmental & Utilities Officer, deliver regular training, and embed effluent/waste obligations in all service and tenancy contracts.

(iv) Enable automatic divert to hold, activate a spill SOP for containment/recovery/sampling/disposal, provide duty/standby with UPS, and investigate incidents.

7.5.5 Surface drainage

Sound drainage of runoff is very necessary to prevent a myriad of consequences in various facets including flooding, silting of drainage channels, ground water recharge, health and safety, water stagnation etc. The drainage layout should ensure effective flow of the anticipated surface run-off emanating from the roof catchments and other paved areas within the site.

Mitigation

(i) The designs should ensure that surface flow is drained suitably into the public drains effectively. The internal channels should be designed with regard to the peak volumes and must ensure the safe final disposal of run-off /surface water and must be self-cleaning.

(ii) Drainage channels should be installed in all areas that generate or receive surface water. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off.

(iii) Storm water generated from roof catchments should be harvested, stored and made use in various household activities i.e., general cleaning and garden watering. This will reduce run-off.

(iv) Paving of the side walkways, driveway, parking and other open areas should be done using pervious materials i.e., cabro blocks to encourage water percolation, reducing run-off volume and facilitating ground water recharge.

7.5.6 Solid Waste Generation

On completion, the project will generate waste products from various operations and activities, mostly house refuse.

Mitigation

(i) The wastes should be properly segregated to encourage recycling of some useful waste materials; This calls for source reduction, recycling, composting and reuse.

(ii) There should preferably be bins maintained for each waste, one for organic matter and the other for mineral matter. The receptacles (bins) must be kept in a good condition, and frequently washed and disinfected.

(iii) All the collection bins and collection points/stations shall be properly maintained on regular basis

(iv) Train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during operation phase.

7.6 Positive impacts during the decommissioning phase

7.6.1 Ecological restoration

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to a better state than it was originally. This will include re-vegetation which will lead to the improved visual quality of the area.

7.6.2 Employment

For demolition to take place properly and in good time, several people would need to be involved. As a result, several employment opportunities would be created for demolition staff during the decommissioning phase of the project.

7.6.3 Recycling of usable materials

Decommissioning phase will prioritize recovery and recycling of usable materials through selective dismantling. Reusable materials will be salvaged for refurbishment, resale or donation to other departments or the community. High value recyclables will be salvaged for resale or sent to licensed recyclers.

7.7 Negative impacts during the decommissioning phase

7.7.1 Noise and Vibration

Demolition works would lead to significant deterioration of the environment within the project site and the surrounding area. This would be as a result of the noise and vibrations that would be experienced.

Mitigation

(i) Schedule noisy activities during the day

(ii) Use of ear protectors by workers when performing noisy operations.

(iii) Establish inspection and a regular and thorough maintenance program for equipment.

(iv) Post appropriate notices to warn drivers against unnecessary hooting of vehicles.

(v) Switch off engines or reduce idling time when not in use.

(vi) Keep machinery covers and panels closed and well fitted. Bolts/fasteners done up tightly avoids rattles.

7.7.2 Solid Waste Generation

Demolition of the complex and related infrastructure would result in noticeable quantities of solid waste. The waste would contain the materials used in construction including concrete, metal, wood, glass, paint, adhesives, sealants and fasteners. Although demolition waste is generally considered less harmful to the environment since it is composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

Mitigation

(i) Provision of solid waste collection facilities (waste bins)

(ii) Contracting licensed solid waste handlers

(iii) Sensitization of workers on proper disposal of solid wastes

(iv) The contractor will maintain all site vehicles and equipment in a serviceable state.

(v) Oils and greases emanating from repair and maintenance activities will be collected in containers and then disposed of.

(vi) Water from cleaning of equipment will be utilized within the project site.

7.7.3 Air pollution

There would be dust and exhaust emissions from demolition works. Large quantities of dust would be generated during demolition works. This would affect the demolition personnel as well as the neighbours. Machinery and vehicles that would be used during decommissioning would emit exhaust fumes which would affect the ambient air quality. Demolition staff should wear protective clothes and masks during demolition to eliminate hazards and accidents at the site.

Mitigation

(i) Ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases.

(ii) Practice dust management techniques, including watering down dust.

(iii) Minimize the period for machinery idling.

(iv) Set up dust barriers/ screens at strategic locations.

(v) Provide and enforce the appropriate use of Personal Protective Equipment (PPE) against dust

7.7.4 Health and Safety Hazards

Workers and the local community will be susceptible to health and safety hazards during the decommissioning phase of the project. Inherent occupational risks include muscular-skeletal injuries, falls into un-marked/ uncovered trenches and accidents from construction vehicles. The influx of demolition workers may put pressure on existing local resources, cause social conflicts, promiscuity and related sexually transmitted diseases.

Mitigation measures:

(i) The Contractor should ensure provision of appropriate Personal Protective Equipment (PPE) for workers.

(ii) All works which may pose a hazard are to be protected, fenced, demarcated or cordoned off as instructed by the Project Manager. If appropriate, symbolic warning signs must be erected;

Warning/informative signs should be erected at the fence, indicating that construction works are in progress, and possible disruption to pedestrian or vehicular traffic. Signs Should indicate when works are likely to begin and end, and what alternatives are available for access.

7.7.5 Increased Vehicular and Human Traffic

An influx of workers to the project sites will be experienced during the decommissioning phase of the project. This might contribute to the disruption of social order within the local communities. Increased vehicular traffic during the transportation of decommissioning wastes and salvaged materials might result in the destruction of light traffic roads and increase the risk of transportation accidents.

Mitigation

(i) Transportation of decommissioned material to specific sites will be done through the existing local roads where possible.

(ii) The contractor will rehabilitate the local roads that will be damaged during decommission phase.

(iii) Vehicular and human traffic shall be restricted to the road reserve as much as possible.

(iv) Drivers/ operators of vehicles will be advised to comply with prescribed speed limits to reduce the risk of road accidents.

7.7.6 Soil Erosion

Excavation activities during decommissioning will loosen soil thereby making it vulnerable to erosion due to wind and surface water run-off. Excavated soils could be swept into surface water bodies by storm water floods during rains.

Mitigation

The project contractor shall ensure that excavated earth materials during decommissioning should be well extracted. Gentle compaction of soil will be done manually to prevent it from being washed away. The cleared sites will be vegetated to improve ground cover and minimize soil erosion and improve on aesthetics of the decommissioned area.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 Preamble

The purpose of the ESMMP is to ensure that environmental and social impacts and risks identified during the ESIA are effectively managed during the construction, operation and decommissioning of the proposed project. The ESMMP specifies the mitigation and management measures for each impact/ risk, party allocated responsibility, means of monitoring and frequency, objective verifiable indicators and an indicative budget. The ESMP also establishes a monitoring plan, capacity building plan and institutional arrangements to support its implementation.

The project proponent shall avail this ESMMP to the successful contractor awarded the tender for the construction works. The contractor will be required to formulate a more specific ESMMP and work methods that will ensure construction of the project in compliance with established standards and legislation. The contractor will factor the costs of implementing the ESMMP into their budget. The project proponent will take the necessary measures to ensure that the ESMMP is fully implemented.

8.2 Purpose and objectives of ESMMP

The ESMMP describes the range of environmental and social issues associated with the project and outlines corresponding management strategies that will be employed to mitigate potential adverse environmental impacts. It conveys the Project's environmental and social constraints. The project will comply with all local laws and regulations, which seek to ensure that the construction work does not adversely affect the environment and social community resources.

The project's environmental supervisory team may periodically revise the ESMMP in consultation with the Contractor, and subject to the approval from proponent and the National Environment Management Authority (NEMA) revisions may be made to accommodate changes in work, weather and site conditions. The ESMMP should be made available to all the project staffs.

The objectives of the ESMMP are:

- To serve as a commitment and reference for the project planners and implementers including conditions of approval from NEMA.
- To serve as a guiding document for the environmental and social monitoring activities for future studies for the proponent implementation Unit, on requisite progress reports.

- To provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment.
- To provide instructions to relevant project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the project goal of minimal or zero incidents.
- To document environmental concerns and appropriate protection measures, while ensuring that corrective actions are completed in a timely manner.
- To address capacity building requirements within proponent implementation Unit such as project Environmental and Social monitoring and Health and Safety.

8.3 Auditing of the ESMMP

The proponent and the contractor shall conduct regular audits to the ESMMP to ensure that the system for implementation of the ESMMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The ESMMP being used is the up-to-date version;
- Variations to the ESMMP and non-compliance and corrective action are documented.
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints) is in place and other documentation related to the ESMMP; and
- Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued.

8.4 Responsibilities of the ESMMP

To ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project. The following entities will be involved in the implementation of the ESMMP:

- The Proponent, University of Nairobi Project Management Committee.
- National Environment Management Authority
- Supervising Consultant / Project Engineer
- Contractor

8.4.1 The Proponent

The proponent will be responsible for:

- providing strategic and policy guidance for Project implementation;
- review and approve annual work plans for the Project; and
- Payment of statutory fees to NEMA;
- Implementation of the ESMMP; and
- Ensuring that during construction and operations, the NEMA license conditions are adhered to since it is the principle holder of NEMA license.
- Review project financial reports.

The proponent, led by a technical specialist, will oversee the technical aspects and quality control of the implementation of the project activities. Project Management Committee (PMC) will be responsible for promoting effective implementation, oversight and coordination of the project.

8.4.2 National Environment Management Authority (NEMA)

The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment and to ensure that all mitigation measures proposed are implemented. The project must first be approved by NEMA before construction commences. During construction, NEMA approval conditions must be adhered to.

8.4.3 Supervising consultant / Project Engineer

The Supervising Consultant / Project Engineer will be required to oversee the construction programme and construction activities performed by the Contractor, in compliance with the present ESMMP. The Consultant will have an Environmental and Social Officer (ESO) in its team to co-ordinate all aspects of the environment during project implementation. This will include following the construction to monitor, review and verify the implementation of the project's ESMMP.

It is recommended that prior to commencement of actual construction; the Consultant should submit a work site plan that complies with environmental guidelines and an updated ESMMP for the different phases of the work.

During construction, the ESO will be responsible for the following tasks:

- Updating environmental aspects (not covered in the EIA/ESMMP) during project implementation.
- Auditing environmental and safety aspects at the work sites.

- Participate in the definition of the no working-areas and the location of campsite, borrow pits, quarries and other areas.
- Recommending solutions for any emerging environmental problems.
- Overseeing strategies for sensitising the local population on health and safety problems.
- Attending consultations held at key stages of the project with the community and interested parties;
- Liaise with the respective Environmental Authorities on the level of compliance with the ESM&MP achieved by the Contractor on a regular basis for the duration of the contract.
- Controlling and supervising the implementation of the ESMMP.
- Preparing quarterly environmental and social progress or "audits" reports on the status of implementation of measures and management of work sites and annual audit reports for submission to NEMA

8.4.4 Contractor

The contractor will be required to comply with the requirements of the EIA/ESMMP and the Standard Specifications for construction works in Kenya, which include specifications for environmental protection and waste disposal, borrow pit and quarry acquisition and exploitation, landscaping and grassing among others.

The contractor must have an Environmental Health and Safety (EHS) officer responsible for to oversee the implementation of the construction ESMMP. To ensure this, the proponent should include the construction environmental management plan in the contractor's tender documents ensuring that they are adequately budgeted for.

8.5 Environmental and Social Management & Monitoring Plan (ESM&MP)

Table 8-1: Environmental and Social Management Plan

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
Construction Phase					
Noise Pollution and Vibrations	• Scheduling: Construction activities that generate significant noise can be scheduled during the day when the impact on nearby establishments is expected to be lower. • Equipment Selection: Choosing construction equipment and machinery that are specifically designed to minimize noise emissions can significantly reduce noise levels. Opting for quieter alternatives and using equipment with noise-reducing technologies can be effective in mitigating noise impacts. • Equipment Maintenance: Regular maintenance and inspection of construction equipment can prevent excessive noise caused by mechanical issues, ensuring that the machinery operates at optimal noise levels. • Limit pickup trucks and other small equipment to a minimum idling time observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible. • Acoustic Enclosures: Enclosing noisy equipment or machinery within soundproof enclosures can effectively contain and reduce noise emissions. These enclosures are designed to absorb and block noise, preventing it from spreading to the surroundings.	Contractor	During construction	• State of machines used • Type of machines used • Earmuffs/ Buffers/ Mufflers • Site muster roll indicating working times for the different workers	50,000.00

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• Provision of Personal Protective Equipment and clothing (PPE/C) including earmuffs for ear protection to the workers on site • Communication and Education: Maintaining open communication with nearby residents and workers about the construction activities, expected noise levels, and the duration of noisy operations can help manage expectations and minimize disruption. Educating workers about the importance of minimizing noise and following proper noise control measures can also contribute to noise reduction				
Solid Waste Generation	• Put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is minimal. • Proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once used or recovered construction materials will lead to financial savings and a reduction of the amount of construction debris disposed of as waste. • Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers to ensure proper disposal and recycling of construction waste. • Sensitization of construction workers on proper disposal of solid wastes • The contractor will maintain all site vehicles and equipment at a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels.	Project Engineer and Contractor	Daily Inspection	• Presence/ absence of scattered solid wastes at sites • Number of waste receptors on site • Number of latrines on site • Number of sensitization meetings held with workers	**150,000.00**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.				
Water pollution	• Oils and greases emanating from repair and maintenance activities will be collected in containers. • Waste from the sanitation facilities should be collected and transported by a licensed waste transporter. • All polluted water treated before discharging to the environment. • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from construction site. • Wash areas shall be placed and constructed in such a manner to ensure that the surrounding areas are not polluted. • Storage areas or secondary containment should be constructed of waterproof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them. • Ensure compliance with the Water Act 2016 and the Water Quality Regulations.	Project engineer, and contractor	Throughout the construction phase	• Presence of functional Sewage disposal system. • Installation of interceptors	200,000.00
Loss of Biodiversity	• Implementing best construction practices: It involves minimizing the impact construction on biodiversity. This includes minimizing land clearing, soil erosion, • Adopting biodiversity friendly design principles: It involves preserving the existing natural features, such as mature trees, and avoid unnecessary disturbance to sensitive areas. Any area around the project	Project engineer, and contractor	Throughout the construction phase		**100,000.00**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	site that will not be used for construction purposes will be restored and landscaped to the original state with addition of aesthetic beauty.				
Air pollution	• Enclose the site with a dust-proof net during construction. • Water should be sprayed during the construction phase of excavated areas during dry conditions. • Prohibit idling of vehicles • Ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases. • Ensure appropriate speed limits are observed along all road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dust. • Construction workers will be provided with dust masks to mitigate.	Project Engineer and Contractor	Daily Monitoring	• Records of speed limits signs erected • Records of machine and vehicle service • Evidence of use of dust masks by workers on site • Evidence of use of Dust Proof Net	contractor's cost
Soil erosion	• Levelling the project site to reduce run-off velocity and increase rainwater infiltration. • Construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off.	Design Engineer, Project Engineer and Contractor	On a needs-basis	• Revegetated excavated areas • Excavated runoff channels • Soil erosion levels	Contractor cost
Increased water and energy demand	• the proponent shall ensure that water and energy is used efficiently at the site by sensitizing construction staff to avoid irresponsible use. • The proponent should install water-conserving automatic taps and toilet flush systems. • Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.	Project engineer, and contractor	Throughout the construction phase		Contractor cost

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
Workers Accidents and Hazards	• The Contractor should ensure registration of the workplace by the Director, Directorate of Occupational Safety and Health (DOSH) forming the basis of his work statistics. • The Contractor must ensure establishment of a Health and Safety Committee for the project team as per the Health and Safety Committee Rules 2004. • The Contractor should contract an approved fire safety auditor to undertake annual fire safety audits every year. • The Contractor should contract an approved plant inspector to exam all plants and equipment periodically as per the safety and health act (2007). • The contractor should develop written Health and Safety, and Fire Safety Policies for the construction site. • The Contractor should ensure provision of appropriate Personal Protective Equipment (PPE) for project; • All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the Project Manager. If appropriate, symbolic warning signs must be erected; • Maintain an incident/accident register, in accordance with the Occupational Safety and Health Act 2007 and report incidences to the Safety Officer and Directorate of Occupational Safety and Health (DOSH).	Contractor	Daily Monitoring	• HSE instructions • PPE available • Workers OHS compliance (use and adequacy) • Number of construction activities related accidents • Recording of violations and corrective measures • Workplace risk assessment undertaken before start of operations • Presence of a HSE on site.	

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• The Project Manager should ensure that the Contractor is instructed in the use of all materials that may have negative environmental (including health) effects. • The Project Manager should ensure that if any material or substance is used that is at any point in the future deemed to be deleterious to health, and then it must be replaced with an acceptable alternative; • The Project Manager should ensure strict safety management through close attention to design, work procedures, materials and equipment. • Public sensitization on safety issues around the project site should be adopted; • The implementation unit and the contractor should adopt strict construction practices to ensure safety of local communities and construction workers; • The community should be notified in advance of possible activities that may cause disturbance. In addition, construction should follow a schedule, and the contractor must adhere to that schedule, so that the public can know when to expect disturbances; • Warning/informative signs should be erected at the fence, indicating that construction works are in progress, and possible disruption to pedestrian or vehicular traffic. Signs Should indicate when works are likely to begin and end, and what alternatives are available for access; • Safety concerns, review incidents, and determine actions needed to implement job safety.				

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
Electrical Hazards (electrocution from meter boxes, wiring, poles)	Utility mapping; RCDs; lock-out/tag-out; licensed electricians only.	Contractor	Daily / Weekly	Electrical inspection records; fault reports.	Contractors Cost
Hazardous Materials (asbestos, lead paint, PCBs, solvents)	Licensed abatement; enclosures; PPE (P100 respirators); clearance certificates.	Contractor	Activity-based / Weekly	Air monitoring results; waste manifests. Clearance certs obtained; No uncontrolled releases.	Contractors Cost
Oil Leaks and Spills	• Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps. • Ensure that all equipment is in good condition, clean and free from leaks. • Oil spill containment and clean-up equipment should be kept at the contractor's camp. • Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps; Standard operating practices for refueling mobile equipment such as a minimum 15m from any water channel should be practiced. • Operator training is an important aspect of preventive approach and should be put into use before assignment or during duty.	Contractor	Throughout the construction phase	• Inspection of discharge into drainage channels • Complaints from the neighboring communities • Presence of a licensed waste handler on site.	Contractors' costs

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• Ensure that all equipment is in good condition, clean and free from leaks. • Oil spill containment and clean-up equipment should be kept at the contractor's camps.				
Traffic congestion/routing	• Contractor to prepare a Traffic Management Plan for approval • Educate workers and local community traffic safety through awareness and educational campaigns • Installation of appropriate road signage, speed signs, and other warning signs at the site and access roads • Copies of insurance policies for the contractor's drivers and vehicles should be provided to the Supervision Consultant. • The contractor ensures proper driving discipline by its employees, and sanctions those in breach. • Excavated sites, embankments, and dangerous locations are protected with proper safety barriers, tape and warning signs. • Maintain a log detailing every violation and accident on site or associated with the project	Project Engineer and Contractor	Monthly	• Installation of appropriate road signage, speed signs, and other warning signs • Inspection and accident Reports • No of accidents • Complaints from the local people • Copies of insurance policies for the contractor's drivers and vehicles should be provided to the Supervision Consultant.	Contractor Costs
Interference with the Physical Setting and Visual intrusion	• Shield off the areas of construction with suitable materials. • On completing the earthworks, the worked area should be restored through backfilling, leveling and planting of vegetation to blend in a way to merge with existing environment. • All solid waste and debris from construction site must be cleared on completion	Contractor	Prior to project implementation	• Minutes of sensitization meetings. • Map of surveyed area. • Number of seedlings planted.	**250,000.00**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
Operation Phase					
Water pollution	• Make internal and external sewerage systems hard, strong, durable, smooth, impervious, and non-corrodible materials and well-designed and laid pipe networks. • All waste pipes must have cleaning Roding eyes which must be accessible. • Sanitary facilities must be kept clean always, through regular washing and disinfecting.	Proponent	Continuous	• Presence of functional Sewage disposal system. • Installation of interceptors	**25,000.00**
Increased water demand	• Avoid wastage of water. • Sensitize all stakeholders on means and needs to conserve water resources. • Have close tap after use warnings.	Proponent	Throughout operation phase	• Quantity of water used • Availability of a water harvesting structures in place • Number of trainings on water conservation measures	**40,000.00**
Increased energy demand	• Efficient use and conservation of energy in buildings • Use of green building technology and techniques	Proponent	Throughout operation phase	• Type of energy facility used • Green energy technologies on the Complex structure	**(Part of contractors' cost**
Effluent discharge	• Separate lab/process drains and install pre-treatment withhold/divert, sampling manholes, backflow/bunding, grease traps, condensate reuse, all integrated with BMS/SCADA. • Enforce drain-disposal SOPs, pre-approve atypical effluents, label drains, collect solvents for off-site treatment, maintain/calibrate equipment, stock spill kits, and meet consent limits.	**Proponent**	Throughout operation phase		**(Part of contractors' cost**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• Appoint an Environmental & Utilities Officer, deliver regular training, and embed effluent/waste obligations in all service and tenancy contracts. • Enable automatic divert to hold, activate a spill SOP for containment/recovery/sampling/disposal, provide duty/standby with UPS, and investigate incidents.				
Surface drainage	• The designs should ensure that surface flow is drained suitably into the public drains effectively. The internal channels should be designed considering the peak volumes and must ensure the safe final disposal of run-off /surface water and must be self-cleaning. • Drainage channels should be installed in all areas that generate or receive surface water. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off. • Storm water generated from roof catchments should be harvested, stored and made use in various household activities i.e., general cleaning and garden watering. This will reduce run-off. • Paving of the side walkways, driveway, parking and other open areas should be done using pervious materials i.e., cabro blocks to encourage water percolation, reducing run-off volume and facilitating ground water recharge.	Proponent	Throughout operation phase	• Flooding characteristics of the area. (Number of reported cases) • Number of drainage channels • Presence of pervious materials along walkways, driveway, parking and other open areas	Part of contractors' cost
Solid Waste Generation	• The wastes should be properly segregated to encourage recycling of some useful waste materials; This calls for source reduction, recycling, composting and reuse.	Proponent	Throughout operation phase	• Presence/ absence of scattered solid wastes at sites	**50,000.00**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• There should preferably be bins maintained for each waste, one for organic matter and the other for mineral matter. The receptacles (bins) must be kept in a good condition, and frequently washed and disinfected. • All the collection bins and collection points/stations shall be properly maintained on regular basis • Train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during operation phase.			• Number of waste receptors • No. of sensitization meetings held with workers • Evidence of oil leaks and greases on site • Evidence of wastewater flowing through local drainage channels	
Decommissioning Phase					
Noise and Vibration	• Schedule noisy activities during the day • Use of ear protectors by workers when performing noisy operations. • Establish inspection and a regular and thorough maintenance program for equipment. • Post appropriate notices to warn drivers against unnecessary hooting of vehicles. • Switch off engines or reduce idling time when not in use. • Keep machinery covers and panels closed and well fitted. Bolts/fasteners done up tightly avoids rattles.	Contractor	Weekly or on need basis	• Workers or neighbor complaints • State of machines used • Type of machines used	**80,000.00**

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
Solid Waste Generation	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of workers on proper disposal of solid wastes • The contractor will maintain all site vehicles and equipment in a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers and then disposed of. • Water from cleaning of equipment will be utilized within the project site.	Contractor	Throughout decommissioning phase	• Presence/ absence of scattered solid wastes at site • Availability of waste receptors • No. of sensitization meetings held with workers • Evidence of oil leaks and greases on site • Evidence of wastewater flowing through local drainage channels	Contractor's cost
Air pollution	• Ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases. • Practice dust management techniques, including watering down dust. • Minimize the period for machinery idling. • Set up dust barriers/ screens at strategic locations. • Provide and enforce the appropriate use of Personal Protective Equipment (PPE) against dust.	Contractor	Regular inspection/daily	• Records of water sprinkling • Evidence of use of dust masks by workers on site	Contractor's cost
Health and Safety Hazards	• Continuous supervision of occupational, health and safety management to ensure compliance	Contractor	Routine Inspection	• No. of HSE trainings • PPE provided • First Aid Kits availability • Availability of sanitation facility • Potable water • No. of Accidents/incidents • Serviced Fire extinguishers	100,000.00

Potential Impact	Mitigation/Enhancement Measures	Responsibility	Monitoring means / Frequency	Parameters for Monitoring/ Indicators	Estimated Costs (Ksh.)
	• Occupational Safety and Health Training for contractor's staff	Contractor	Throughout decommissioning phase	• Training reports • Training attendance sheets	30,000.00
	• Orientation talks and visits	Contractor	At employment of new staff	• Orientation report	No direct costs anticipated
	• Toolbox talks	Contractor	Daily	• No. of toolbox talks conducted	No direct costs anticipated
Increased Vehicular and Human Traffic	• Transportation of decommissioned material to specific sites will be done through the existing local roads where possible. • The contractor will rehabilitate the local roads that will be damaged during decommission phase. • Vehicular and human traffic shall be restricted to the road reserve as much as possible. • Drivers/ operators of vehicles will be advised to comply with prescribed speed limits to reduce the risk of road accidents.	Contractor	Routine inspections	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated • Community complaints	Routine project activity
Soil Erosion	• Ensure that excavated earth materials during decommissioning should be well extracted. • Gentle compaction of soil will be done manually to prevent it from being washed away. • The cleared sites will be vegetated to improve ground cover and minimize soil erosion and improve on aesthetics of the decommissioned area.	Contractor	Monthly	• Presence/ absence of stockpiled excavated earth material	No direct costs (Integrated in the works)

8.6 Environmental and Social Monitoring

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable response to new and developing issues of concern.

Environmental monitoring is also carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractor shall employ an officer responsible for implementation of social/environmental requirements. This person will maintain regular contact with the project implementation Unit Environmental Safeguards Officer and the Nairobi County Environmental Officers. The contractor and the implementation Unit have responsibility to ensure that the proposed mitigation measures are properly implemented during the construction phase.

The environmental monitoring program will operate through the pre-construction, construction, and operation phases. It will consist of several activities, each with a specific purpose with key indicators and criteria for significance assessment.

Monitoring includes:

- Visual observations.
- Selection of environmental parameters.
- Sampling and regular testing of these parameters.
- Periodic on-going monitoring will be required during the life of the Project and the level can be determined once the Project is operational.

Monitoring will be done in three fronts:

- Physical monitoring.
- Biological monitoring; and
- Social monitoring.

8.6.1 Internal Monitoring

It is the responsibility of the Proponent, The University of Nairobi, to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMMP and construction contract clauses for the Project.

The objective of internal monitoring and audit will be:

- To find out any significant environmental hazards and their existing control systems in place.
- Meeting the legal requirements as stipulated in the Environmental Management & Coordination Act, EMCA-2015 (Amended.)

8.6.2 External Monitoring and Evaluation

NEMA has the overall responsibility for issuing approval for the Project and ensuring that their environmental guidelines are followed during Project implementation. Its role therefore is to review environmental monitoring and environmental compliance documentation submitted by the implementing authorities and they would not normally be directly involved in monitoring the Project unless some specific major environmental issue arose.

The proponent through the consultant will therefore provide NEMA with reports on environmental compliance during implementation as part of their progress reports and annual environmental auditing reports. Depending on the implementation status of environmentally sensitive project activities, NEMA will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

8.6.3 Monitoring During Construction and Operation

Not all impacts on the environment can be foreseen during the design and construction phases. For this reason, it is proposed that a component of environmental monitoring and auditing be included in both the construction and operation phases of the Projects. During the construction phase, it is particularly important to ensure that all the features of the designs as presented in the design reports and drawings are implemented.

Environmental and social monitoring during construction and operation helps to predict unforeseen environmental and social impacts and allows measures to prevent or avert adverse impacts to be developed or introduced in a timely manner. During the construction and operation phase, monitoring will be undertaken to ensure that proposed mitigation measures for negative impacts and enhancement measures for positive impacts are implemented.

8.6.4 Grievance Redress Mechanism

Any disputes or disagreements between role players on the site (regarding environmental and social management) will be referred to the proponent

A worker and community grievance procedure will be implemented which will ensure fair and prompt resolution of problems arising from the Project. The grievance procedures will be underpinned by the following principles and commitments:

- Implementation of a transparent grievance procedure, and dissemination of key information to directly impacted stakeholders.
- Implementation and maintenance of a complaints register.
- Seek to resolve all grievances timeously; and
- Maintenance of full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with the proponent, The University of Nairobi project implementation committee.

This Chapter details the procedure that will be followed by the Contractor for processing and addressing of community and environmental grievances during the construction process.

Step 1: Receiving and Reviewing Grievances

- To begin the Grievance procedure process, a grievance form must be submitted formally to the Contractors by the grievant. To formally register a grievance, the grievance form provided must be filled out.
- Completed grievance forms collected by the Contractors representative must be forwarded to the Supervising Consultant upon receiving, as soon as possible.
- On receipt of the grievance form, the Contractors representative and the Supervising Consultant will record the details of the grievance form into the grievance registry and ensure that the appropriate authorities such as the PMC have received copies of the grievance form.
- The Supervising Consultant and the Contractors representative then review all grievance forms for completeness of information.

Step 2: Grievance Response Development

- The contractor will develop a formal written response within 7 days of the date on which the grievance form was recorded in the grievance registry.
- The verbal and written grievance response will be provided to the grievant. The reasons for the response will be explained to the grievant.
- If the grievant accepts the Contractors' formal response, this decision will be documented with the grievant signature on the grievance response form, and then the grievance response form will be returned to the Supervising Consultant for recording into the grievance registry.
- If the grievant rejects formal response, the Supervising Consultant will have to inform the Proponent
- This grievance will then have to go through a second review process to review the merits of the rejection and determine whether other avenues could be approached by the proponent together with the grievant, such as third-party conciliation or consultation with community or other appropriate stakeholder groups.
- During this second review process either another formal written response will be provided to the grievant in 14 days or it may be decided to hold a meeting with contractor and the grievant. Formal notes documenting the meeting will be issued and signed by the attending representatives.
- The outcomes of this meeting will be recorded, and if agreement is reached between the contractor and the grievant, the agreement will be captured on the grievance form with signature of the grievant. If no agreement can be reached, then the grievant can pursue other avenues (such as administrative or legal) at his/her discretion.

Step 3: Completing Actions, Grievance Closeout & Community Feedback

- Following the completion of action specified in the grievance response form, photos and/or other documentary evidence will be collected by the Supervising Consultant to form a comprehensive record of the grievance and how it was resolved.
- Where the formal written response identified action that needed to be taken to resolve the grievance, the grievant will confirm the work has been completed by signing the grievance response.
- If no agreement can be reached with the grievant, the Supervising Consultant will record the rationale and close-out decision into the grievance registry.

- The Supervising Consultant will prepare on a quarterly basis a summary grievance report to determine if there are any recurring grievances that point to a need for changes in contractor's policies, procedures or activities.

The Supervising Consultant will periodically review the adequacy of the grievance process procedure and agree modifications following consultation with the proponent. The purpose of this review is to determine if there are any recurring grievances that point to a need for changes in contractors or activities.

9 CONCLUSION AND RECOMMENDATIONS

The following are the recommendations made to minimize or mitigate for the adverse environmental and social impacts from the proposed project:

I. There is need for rigorous implementation of the Environmental Management and Monitoring Plan which will facilitate the mitigation and/or prevention of potentially adverse environmental impacts.

II. The proposed ESMMP should be followed fully by the contractor with the supervision from the proponent. A report on the findings from the monitoring of the ESM&MP right from implementation all through to decommissioning phase submitted quarterly.

III. The mitigation measures proposed should be followed by the proponent as it is highlighted in this ESIA report.

IV. The design, construction and operation should be carried out in accordance with the specific report for the proposed project.

V. All contractor's employees and any other person visiting the site should be provided with appropriate PPE and trained on their proper use.

VI. On completion of the construction works, the proponent to commission an Independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by Environment Impact Assessment and Audit Regulations of 2003. The audit will identify non-conformities which the Contractor together with proponent will address through the defect's liability period of the Project. This audit will also form basis of annual Project self-audits by proponent

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11 APPENDICES

Appendix 1: Experts' NEMA Licenses



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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

ENVIRONMENT MANAGEMENT AND COORDINATION ACT, Cap 387

Experts License - Associate/Lead Experts

License No.: NEMA/ENVIS/EL/1304

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David Ongare

For DIRECTOR GENERAL

National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

EAE 23062720

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Mazingira Yetu | Uhai Wetu | Wajibu Wetu

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

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Application Reference No: NEMA/EIA/EL/29401

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Issued Date: **12/16/2024** Expiry Date: **12/31/2025**

Signature.....

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Director General
The National Environment Management Authority

P.T.O.

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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

ENVIRONMENT MANAGEMENT AND COORDINATION ACT, Cap 387

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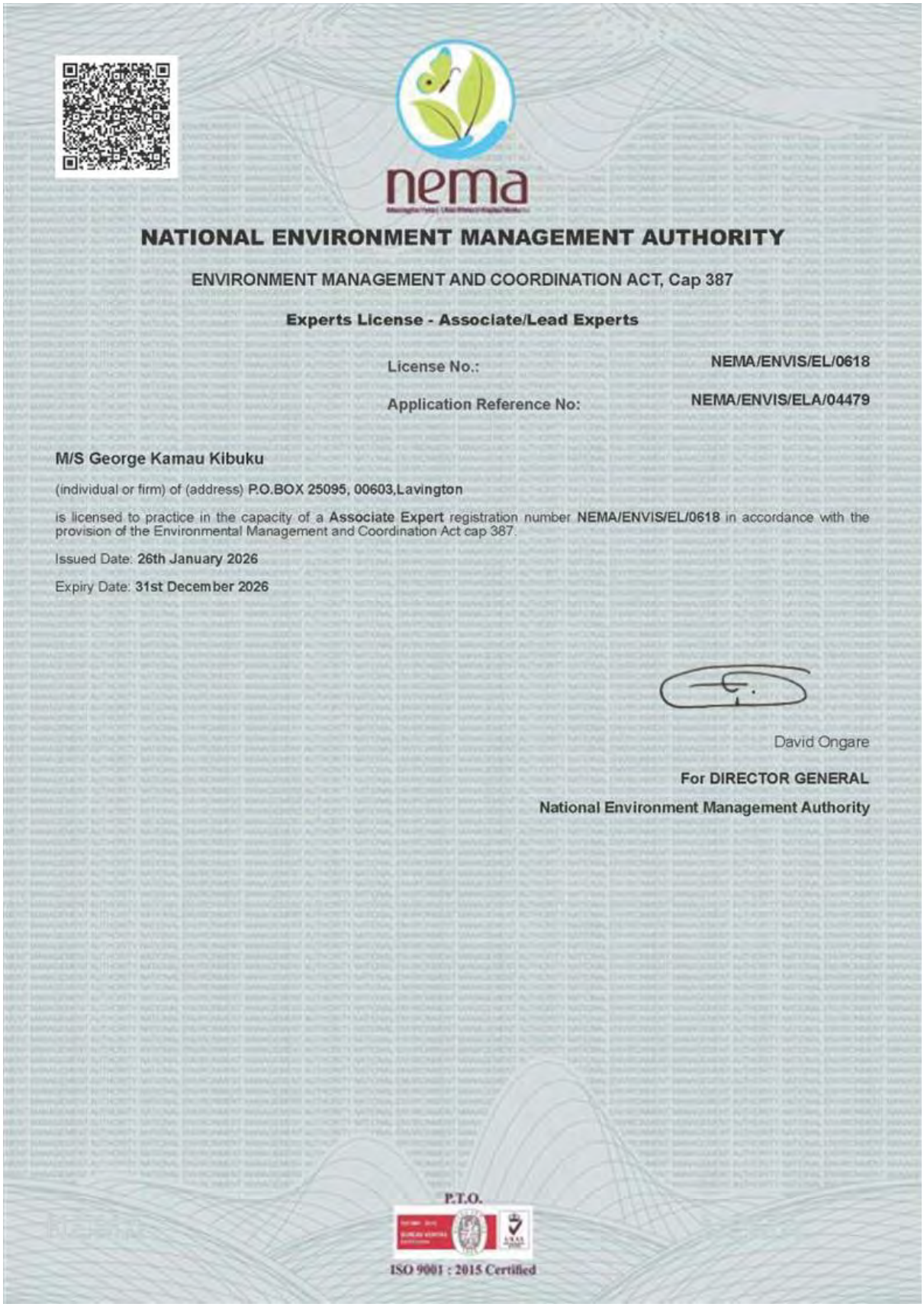
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Appendix 2: Reports

A-2.1 Geotechnical Report

Geotechnical and MASW Investigation Report for the Proposed Engineering and Science Complex, University of Nairobi – Chiromo Campus

Executive Summary

The geotechnical investigations undertaken for the proposed Engineering and Science Complex at the University of Nairobi, Chiromo Campus, comprised two studies, a factual geotechnical investigation conducted by Terraconsult Ltd between October and November 2024 and a seismic MASW-based study carried out in September 2025. The factual investigation involved the drilling of 30 boreholes, standard penetration testing, plate load and field CBR testing, electrical resistivity tomography, MASW profiling, and collection of samples for laboratory analysis. The MASW study supplemented these findings by providing seismic velocity profiles and enabling site classification.

Subsurface conditions indicate that the upper 2.0–4.0m are composed of weathered silts and clayey silts of medium to high plasticity which are weak and unsuitable for supporting significant structural loads. Beneath depths of approximately 4.0–6.0m, the site is underlain by phonolitic trachyte and tuff formations. The trachyte is generally moderately strong to strong, while the tuff is weak to moderately weak. Groundwater was encountered at varying depths across the site with seasonal fluctuations anticipated due to the influence of the Nairobi River. The MASW data revealed average shear-wave velocities for the top 30.0m (Vs30) ranging from 771 to 1,063 m/s, corresponding to Site Class B rock under UBC, IBC, and NEHRP seismic provisions.

The site is considered geotechnically suitable for the intended high-rise and heavy structural development subject to appropriate treatment of the weak near-surface soils. Recommended engineering measures include removal, replacement or stabilization of soils within the top 0.0–5.0m and founding of structural elements on competent trachyte rock below approximately 5.0m. Structural design should incorporate seismic considerations in accordance with the Kenya Building Code (2020) and Eurocode 8. The construction should include effective surface water management through drainage and erosion control.

The final foundation type will be at the Discretion of the project structural Engineer.

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List of Abbreviations

- DCP – Dynamic Cone Penetrometer
- SPT – Standard Penetration Test
- MASW – Multichannel Analysis of Surface Waves
- kPa – Kilopascal
- m – Metre
- UCS – Unconfined Compressive Strength
- GPS – Global Positioning System
- ESIA – Environmental and Social Impact Assessment
- UBC – Uniform Building Code
- IBC – International Building Code
- NEHRP – National Earthquake Hazards Reduction Program
- **Vs30** – Average shear-wave velocity in the top 30 metres of soil/rock

1.0 INTRODUCTION

The Geotechnical investigation and MASW survey was conducted to provide baseline geotechnical input for the ESIA and for foundation design of the proposed complex. The proposed site area is located in Chiromo. The site location is approximately defined by coordinates UTM zone 37 M, Eastings 256057 and Northings 9859150, and Eastings 255863 and Northings 9858991.

The seismic survey was done along six profiles as shown in Figure 1.

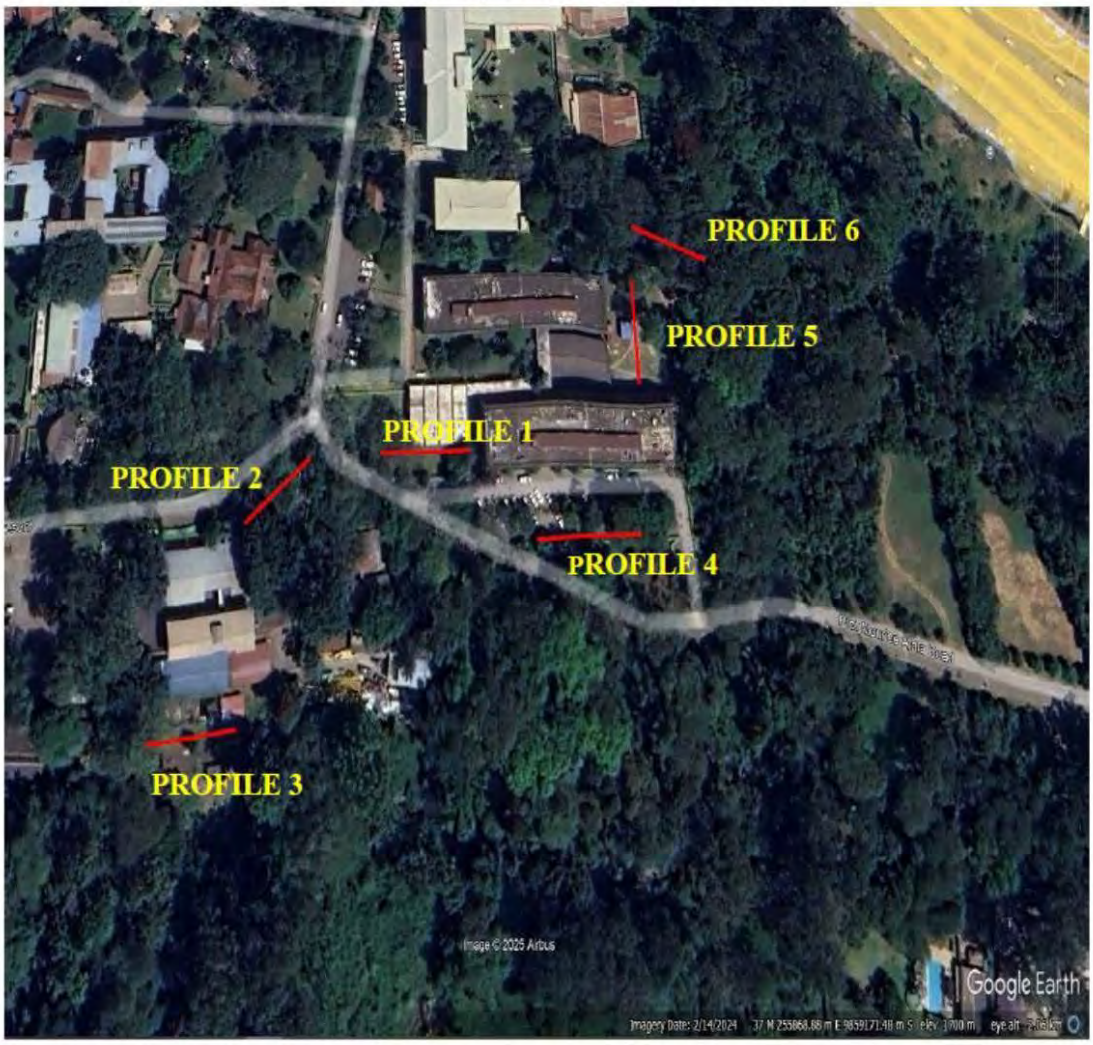


Figure 1: Showing the 6 Profiles



Figure 2: Showing the 30 Boreholes points

2.0 OBJECTIVES

The main objective of the study was to characterize the subsurface conditions at the proposed site for the University of Nairobi Engineering and Science Complex. The survey sought to assess the presence and extent of weathered zones, fractures and other potential geohazards that may influence construction.

The investigation further aimed to provide baseline geotechnical information to support the Environmental and Social Impact Assessment process and to supply parameters for structural and foundation design.

3.0 GEO-TECHNICAL EXPLORATION

The subsurface investigation combined borehole drilling, soil/rock sampling and geophysical testing to establish the site's stratigraphy and engineering properties. Disturbed soil samples were collected from boreholes in accordance with BS 5930 for laboratory analysis. A total of thirty boreholes were drilled with unconsolidated formations advanced using a 150 mm continuous flight auger and rock sections cored using an 86 mm diamond bit in a double-tube core barrel with water flushing to remove cuttings and cool the bit. Complementing the intrusive works, a Multichannel Analysis of Surface Waves survey was undertaken to derive shear-wave velocity profiles by analysing Rayleigh-wave dispersion, enabling the identification

of stiffness contrasts, weathered zones and the depth to competent strata. These methods together provided an integrated characterization of the subsurface and seismic response of the site.

3.1 Scope of Work

- The geotechnical works involved the drilling of thirty (30) boreholes to depths of up to 20 metres. Standard Penetration Tests (SPTs) were conducted at 1.5-metre intervals to assess the in-situ soil resistance. Representative soil and rock samples were obtained for detailed classification and testing. Comprehensive laboratory tests were then carried out on the collected samples to determine their engineering properties. The findings from the field and laboratory investigations were compiled and analyzed to prepare a detailed geotechnical report.
- The MASW investigations comprised six (6) seismic profiles with a total survey length of 288 metres. Data acquisition was carried out using a 24-channel seismograph equipped with geophones to capture shear wave propagation. The recorded field data were subsequently processed and analyzed using WinMASW software to generate shear wave velocity profiles. The outcomes of the MASW analysis were then compiled and presented in the geotechnical report

3.3 Data Analysis Approach

The investigation data were analysed using laboratory, field and geophysical methods to determine the engineering characteristics of the site. Laboratory tests on soil samples, carried out, provided information on classification, strength, and compaction properties, while rock cores were logged for lithology, strength and recovery. In-situ test results, including SPT, were used to assess bearing capacity and deformation behavior. Seismic data from the MASW survey were processed with WinMASW software to develop 1D and 2D profiles of shear-wave velocity (Vs), compressional-wave velocity (Vp), density, Poisson's ratio and shear modulus. These results helped define the stratigraphy, identify competent layers, and determine the seismic site classification (Vs30).

4.0 SITE GEOLOGY

The site is underlain by Nairobi phonolites of fine to coarse grained volcanic rocks. Near-surface materials exhibit weathering to depths of approximately 5.0m then underlain with competent rock extending to at least 30m within the investigation window.

4.1 Geological Setting

The site is founded on **Nairobi phonolites**, volcanic rocks that are fine to coarse grained and typically dark grey to bluish. Near the surface, the rocks are **weathered into weak soils and murram**, generally to depths of between 1.0 to 5.0m. Underneath, the materials grade into **moderately strong to strong phonolitic rock** which are competent and suitable for

foundations. No significant faults or structural discontinuities were noted within the investigated 30m depth.

4.2 Subsurface Profile

The MASW survey indicates a subsurface profile with **variable stiffness**. Table 2 below shows representative parameters of profile 1.

Table 1: Representative Parameters of Profile 1

Depth (m)	Thickness (m)	Vs (m/s)	Vp (m/s)	Density (g/cc)	Shear Modulus (MPa)
0–2	2	200	416	1.8	74
2–5	3	500	1041	2.06	516
5–10	5	1200	2478	2.28	3278

The data above shows a progressive increase in stiffness with depth, starting with weak weathered soils near the surface and transitioning into competent phonolitic rock below 5 m. This trend of low shear-wave velocities and shear modulus at shallow depths, followed by significantly higher values with depth was consistently observed across all six MASW profiles.

4.3 Borehole Stratigraphy

The subsurface conditions across the site were established from thirty (30) boreholes sunk to depths of up to 20.0 m. The borehole logs generally indicate a near-surface cover of gravelly or clayey silts of varying plasticity, typically extending to depths of 1.0–3.5 m. This layer is underlain predominantly by tuffaceous deposits of **moderately weak to weak strength**, underlain with zones of decomposed or weathered rock at isolated locations. Below these deposits is **Phonolitic Trachyte of moderately strong to strong strength** which forms the competent bearing stratum across most of the site.

Table 2: Borehole description

Borehole	Depth (m)	Soil/Rock Type
BH01	0.0 – 2.5	Gravelly silt
	2.5 – 14.5	Phonolitic Trachyte
	14.5 – 16.5	Decomposed rock
	16.5 – 20.0	Trachyte
BH02	0.0 – 1.4	Clayey Silt
	1.4 – 3.0	Tuff
	3.0 – 8.3	Phonolitic Trachyte
	8.3 – 9.0	Decomposed rock

Borehole	Depth (m)	Soil/Rock Type
	9.0 – 20.0	Trachyte
BH03	0.0 – 2.0	Gravelly silt
	2.0 – 9.0	Tuff
	9.0 – 13.5	Phonolitic Trachyte
	13.5 – 20.0	Tuff
BH04	0.0 – 2.0	Gravelly silt with rock cobbles
	2.0 – 3.5	Tuff rock with partly decomposed material
	3.5 – 5.0	Tuff
	5.0 – 8.0	Phonolitic Trachyte
	8.0 – 10.0	Tuff
	10.0 – 20.0	Phonolitic Trachyte
BH05	0.0 – 0.2	Decomposed rock
	0.2 – 13.5	Phonolitic Trachyte
	13.5 – 20.0	Tuff
BH06	0.0 – 4.0	Gravelly silt
	4.0 – 9.0	Phonolitic Trachyte
	9.0 – 11.5	Tuff
	11.5 – 20.0	Trachyte
BH07	0.0 – 3.0	Gravelly silt
	3.0 – 9.0	Tuff
	9.0 – 20.0	Phonolitic Trachyte
BH08	0.0 – 2.5	Gravelly silt
	2.5 – 4.0	Tuff
	4.0 – 20.0	Phonolitic Trachyte
BH09	0.0 – 2.0	Gravelly silt
	2.0 – 5.0	Tuff
	5.0 – 9.0	Phonolitic Trachyte
	9.0 – 15.0	Tuff
	15.0 – 20.0	Weathered Trachyte
BH10	0.0 – 2.0	Gravelly silt
	2.0 – 3.5	Tuff
	3.5 – 20.0	Phonolitic Trachyte

Borehole	Depth (m)	Soil/Rock Type
BH11	0.0 – 6.5	Tuff
	6.5 – 20.0	Phonolitic Trachyte
BH12	0.0 – 1.0	Gravelly silt
	1.0 – 16.5	Phonolitic Trachyte
	16.5 – 20.0	Tuff
BH13	0.0 – 2.5	Clayey Silt
	2.5 – 3.3	Tuff
	3.3 – 5.8	Decomposed rock
	5.8 – 6.8	Tuff
	6.8 – 20.0	Phonolitic Trachyte

Localized variability was noted particularly where decomposed or weathered rock horizons interrupt the continuity of the trachyte and where thicker tuff layers are present.

5.0 Design Considerations

The proposed foundations should be founded on the competent **phonolitic trachyte stratum encountered below depths of approximately 5.0 m**, ensuring adequate bearing capacity and long-term stability. Weak near-surface soils, including gravelly and clayey silts as well as decomposed rock horizons, should either be removed or stabilized prior to construction to prevent excessive settlement. Appropriate erosion control measures must be implemented during excavation and construction activities to minimize surface degradation and siltation. Structural design should comply with the **Kenya Building Code (2020)** and incorporate **Eurocode 8 seismic provisions** to address site-specific seismic risks. In line with the ESIA requirements, mitigation measures should include dust suppression, noise and vibration control, safe handling and disposal of unsuitable soils, and the protection of riparian vegetation in and around the site.

5.1 Site Classification Based on Vs30

To evaluate the seismic response of the site, **average shear-wave velocity in the top 30m (Vs30)** was determined for each MASW profile. The results are summarized in Table 3.

Table 3: Summary of Vs30 Across Profiles

Profile	Avg Vs30 (m/s)	Site Class
1	891	B (Rock)
2	1063	B (Rock)
3	822	B (Rock)
4	863	B (Rock)
5	912	B (Rock)
6	771	B (Rock)

The results show that **all six profiles fall within Site Class B Rock**, with Vs30 values ranging from **771–1,063 m/s**. This classification confirms that the site is underlain by **competent rock with low seismic amplification potential** making it suitable for heavy structural development with minimal seismic design concerns.

Table 4 below presents the UBC/IBC site classification criteria, which were applied in categorizing the site based on the computed Vs30 values.

Table 4: UBC/IBC site classification

Site class	Soil type	UBC V_s30	IBC V_s100
Class A	hard rock	$V_s30 > 1{,}500$ m/s	$V_s100 > 5{,}000$ ft/s
Class B	rock	$760 < V_s30 \leq 1500$ m/s	$2{,}500 < V_s100 \leq 5{,}000$ ft/s
Class C	very dense soil, soft rock	$360 < V_s30 \leq 760$ m/s	$1{,}200 < V_s100 \leq 2{,}500$ ft/s
Class D	stiff soil	$180 < V_s30 \leq 360$ m/s	$600 < V_s100 \leq 1{,}200$ ft/s
Class E	soft soil	$V_s30 < 180$ m/s	$V_s100 < 600$ ft/s
Class F	soils requiring site specific evaluation	Non-applicable	Non-applicable

Based on these criteria, the computed Vs30 values for the six MASW profiles (771–1,063 m/s) fall within the range for Site Class B (Rock).

6.0 CONCLUSIONS

The site is geologically competent for the proposed development, with foundations expected to be safely designed on the moderately strong rock encountered from approximately 5.0m depth and below. The weak near-surface layers should be carefully addressed in both design and construction to minimize settlement and stability risks.

7.0 RECOMMENDATIONS

Based on the Geotechnical Investigations, MASW survey and site assessment, the following recommendations are provided to guide the design and construction of the proposed development:

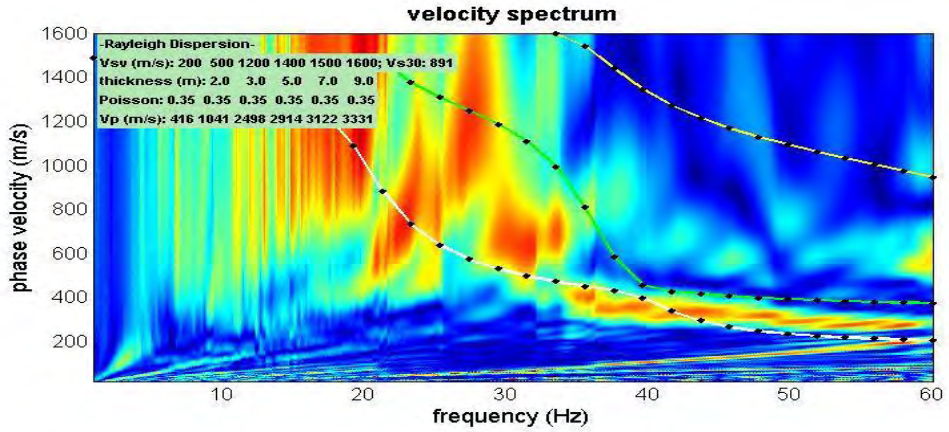
- The weak soils encountered within the upper 0.0–5.0m of the site should be carefully managed to ensure a stable foundation platform. Where feasible, these soils should be excavated and replaced with suitable engineered fill to improve bearing capacity.
- Foundations for the proposed structure should be placed on the competent trachyte rock underlying the site as it provides sufficient bearing capacity and long-term stability. For moderate structural loads, pad footings are considered suitable while raft foundations are recommended in areas where control of differential settlement is critical. For heavily loaded sections, piled foundations socketed into the trachyte are advised to ensure structural safety and performance
- Groundwater should be closely monitored during excavation and construction, with dewatering applied where needed. Proper drainage systems must also be installed to prevent water accumulation that could weaken soils and compromise foundation stability
- All structures should be designed in accordance with the **Kenya Building Code (2020)** and **Eurocode 8** seismic provisions to account for potential earthquake loading. Adhering to these standards will enhance the resilience of the development against ground shaking, ensuring both structural safety and long-term performance under seismic conditions.
- Environmental protection measures should be implemented in full compliance with the Environmental and Social Impact Assessment requirements. This includes suppressing dust during construction activities, controlling noise and vibration from equipment to minimize disturbance and ensuring safe disposal of unsuitable or excavated soils.

A-2.1.1 Site Response Parameters at Respective Profile

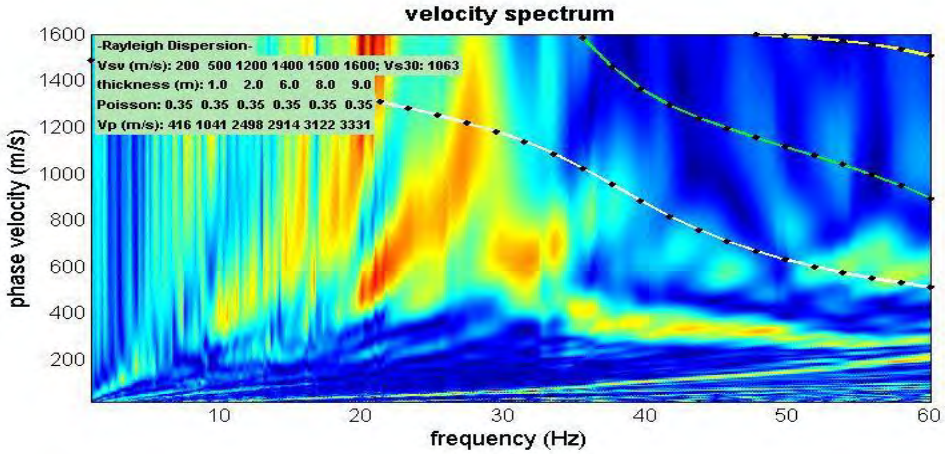
	Depth (m)	Thickness (m)	S-wave velocity (m/s)	P-wave velocity (m/s)	Density (g/cc)	Poisson Ratio	Shear Modulus (MPa)
Profile 1	0-2	2	200	416	1.8	0.35	74
	2-5	3	500	1041	2.06	0.35	516
	5-10	5	1200	2478	2.28	0.35	3278
	10-17	7	1400	2914	2.23	0.35	4536
	17-26	9	1500	3122	2.33	0.35	5254
	26-30	4	1700	3331	2.35	0.35	6008
Profile 2	0-1	1	200	416	1.84	0.35	74
	1-3	2	500	1041	2.06	0.35	516
	3-9	6	1200	2498	2.28	0.35	3278
	9-17	8	1400	2914	2.31	0.35	4536
	17-26	9	1500	3122	2.33	0.35	5245
	26-30	4	1600	3331	2.35	0.35	6008
Profile 3	0-1	1	100	208	1.68	0.35	17
	1-3	2	300	624	2.06	0.35	175
	3-8	5	1000	2082	2.23	0.35	2232
	8-16	8	1400	2914	2.31	0.35	4536
	16-25	9	1500	3122	2.33	0.35	5245
	25-30	5	1600	3331	2.35	0.35	7698
Profile 4	0-1	1	200	416	1.84	0.35	74
	1-3	2	500	1041	2.11	0.35	516
	3-8	5	700	1475	2.28	0.35	1051
	8-16	8	1000	2082	2.31	0.35	2232
	16-25	9	1200	2498	2.35	0.35	3278
	25-30	5	1600	3331	2.38	0.35	6023
Profile 5	0-1	1	300	624	1.94	0.35	175
	1-4	3	500	1041	2.06	0.35	516
	4-9	5	800	1665	2.18	0.35	1391
	9-18	9	1000	2082	2.23	0.35	2232
	18-27	9	1400	2914	2.31	0.35	4536
	27-30	3	1600	3331	2.33	0.35	6008
Profile 6	0-1	1	100	208	1.68	0.35	17
	1-3	2	300	624	1.94	0.35	175
	3-7	4	800	1665	2.18	0.35	1394
	7-17	10	1200	2498	2.28	0.35	3278
	17-26	9	1400	2914	2.31	0.35	4538
	26-30	4	1600	3531	2.34	0.35	6008

A-2.1.2 Velocity spectrum for each profile

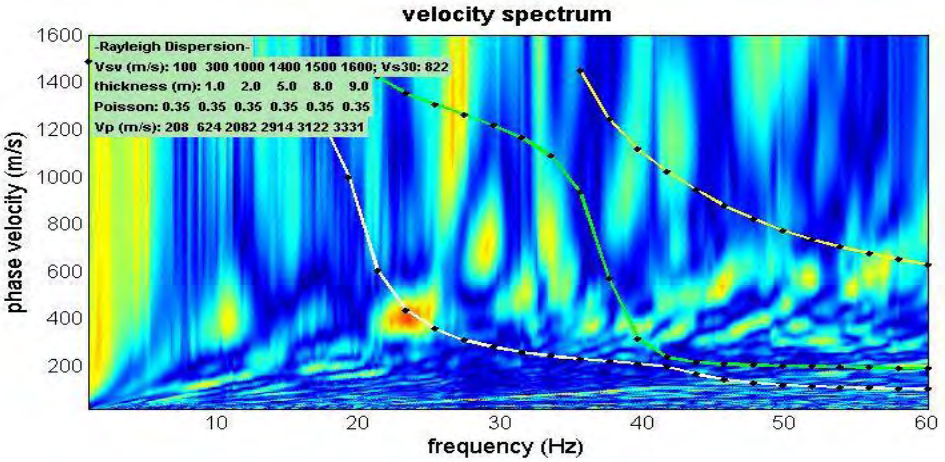
Profile 1



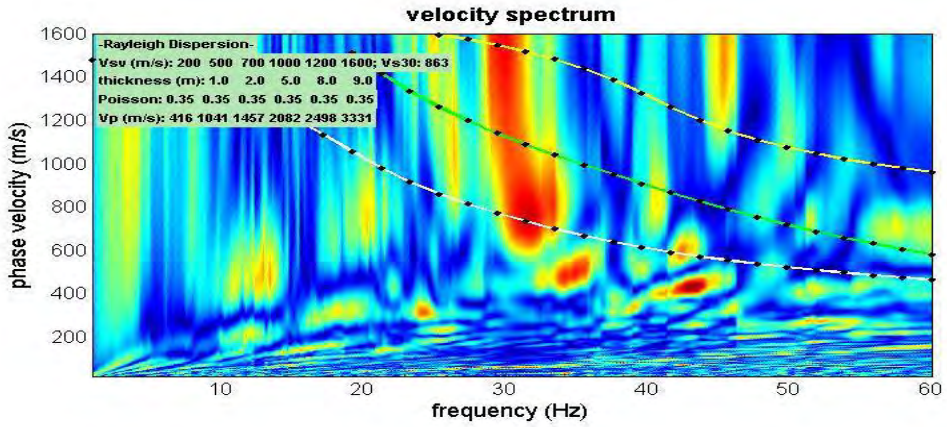
Profile 2



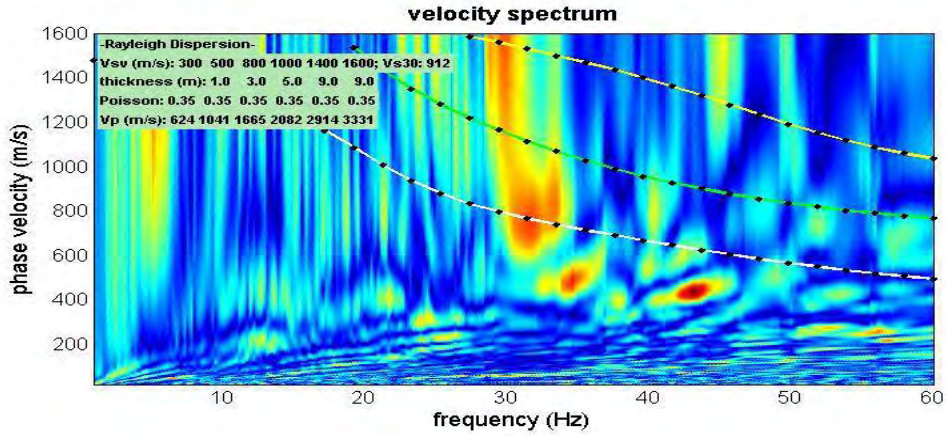
Profile 3



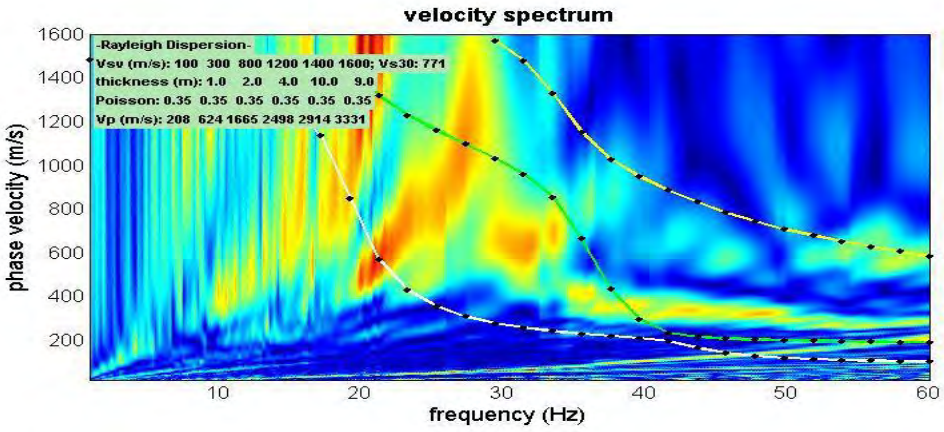
Profile 4



Profile 5



Profile 6



A-2.1.3 Photographs of site works





A-2.1.4 Photographs of the adjacent site showing the rock formation



A-2.2 Air Quality Study Report

Report on Air Quality Study at Two Sites within the University of Nairobi, Chiromo Campus for an Environmental Impact Study.

Introduction

Urban air quality is a pressing public health challenge and one of the climate forcing factors, particularly in rapidly developing megacities like Nairobi, Kenya. The city's growth has been accompanied by increasing emissions from a growing vehicle fleet, extensive construction projects, and industrial activity, leading to a complex mixture of atmospheric pollutants (Gaita et al., 2014). Particulate Matter (PM), especially the fine fraction ($PM_{2.5}$), is of critical concern due to its ability to penetrate deep into the respiratory system and its association with adverse cardiopulmonary health outcomes. In addition Black Carbon (BC) a key component of $PM_{2.5}$ from combustion, is now recognized as the second-largest contributor to global warming after carbon dioxide (CO_2) in terms of its direct warming impact.

Numerous studies have sought to characterize Nairobi's air pollution. Research by Gaita et al. (2014) and Gatari et al. (2019) has been instrumental in quantifying source contributions, frequently identifying vehicle emissions and road dust resuspension as dominant sources of harmful pollutants, including Black Carbon (BC). Furthermore, studies such as those by Mutahi et al. (2021) have highlighted the significant impact of construction activities, demonstrating that they are major emitters of particulate matter, contributing to localized air quality degradation.

While these city-wide assessments provide a crucial macro-level understanding, air quality is inherently local and can vary dramatically over short distances due to microenvironments. Urban green spaces, like university campuses, are often perceived as clean air refuges. This study focuses on the microenvironment of the University of Nairobi's Chiromo Campus to investigate the air quality and assess project impact on air quality. The objectives were:

1. To assess and compare the diurnal (day and night) variations in air quality at two t sites within the campus: one adjacent to a main highway and another near an active construction site.

2. To analyze the Black Carbon (BC) content of collected particulate matter.

3. To interpret the results in the context of air quality impact assessment, identifying key implications for construction project.

Location

This study was conducted at two distinct sites within the Chiromo Campus in the University of Nairobi to assess the air quality. Site 1, located near an active construction site, demonstrated poorer air quality during the day and an improvement at night. Site 2, adjacent to a main highway but surrounded by trees.

Site 1



Site 2



Methodology

Particulate Matter

Sampling of particulates was conducted personal samplers, at an average flow-rate of 4 LPM thereby enabling the collection of $PM_{2.5}$ particle size on loaded filters. During the assessments, the sampling durations were 10 hours (9am to 7pm) during the day and 12 hours (7pm to 7am) during the night on 28th August 2025

Sampled $PM_{2.5}$ was later analyzed for concentration and black carbon.

Results

Tables 1 show the $PM_{2.5}$ and BC concentration.

Location	Time of the Day	$PM_{2.5}$ (µg)	BC (ng)
Site 1(Near the construction site)	Day	**5.3**	**14.3**
	Night	**6.4**	**13.5**
Site 2 (Near Uhuru Highway)	Day	**3.0**	**14.2**
	Night	**7.4**	**12.7**

Both sites: $PM_{2.5}$ concentrations levels did not exceeded the World Health Organization (WHO) 24-hour guideline (15 µg/m³) and the Kenyan standard (35 µg/m³).

Site 1: Near Construction Site

This site's primary pollution source is construction dust e.g., soil, and concrete from earthmoving and vehicle movement from a nearby site. These emissions are rich in primarily PM_{10} and $PM_{2.5}$ that contributed heavily to $PM_{2.5}$ but contains very little Black Carbon. Construction equipment e.g., diesel bulldozers emit BC from the fossils fuel, but it is diluted by the massive amount of non-combustion dust.

The sample with the highest $PM_{2.5}$ concentration (6.4 µg) and the lowest BC (13.5 ng) is highly characteristic of a dust-dominated sample, perfectly matching the profile of a construction site. Without the presence of the nearby construction site, the concentration of $PM_{2.5}$ and BC

Site 2: (Near Highway): This site's primary pollution source is vehicular exhaust, which is a potent source of Black Carbon. Low levels of $PM_{2.5}$, visible dust particles. However, the invisible combustion particles (BC) would still be present. At night, the inversion layer trapped all pollutants, leading to higher readings for both.

The samples with higher BC relative to their PM2.5 (5.3 µg / 17.3 ng) could be representative of samples influenced more by traffic emissions.

Discussion

This study demonstrates that both sites on the Chiromo campus have good air quality below the WHO's guidelines and Kenyan national standards. It is a typical example of an Urban green spaces. In this case, the effectiveness of natural mitigation strategies like tree canopies acts as acts as a physical barrier, effectively trapping and retaining particulate matter (PM) from vehicle exhaust and nearby construction activities before it can disperse deeply into the campus site. Therefore, the university should consider planting even more tress and maintaining dense vegetative buffers along other campuses boundaries near pollution sources to leverage the natural air filtering benefits.

Destroying an existing forest to build a structure does not only change the view, it fundamentally degrades the air quality dynamics of that location forever. The building project would replace an active, protective asset with a passive, vulnerable one. It is not just a collection of trees; it is a functional

ecosystem that provides the service of air purification. Destroying it has several permanent consequences:

1. Loss of Particulate Matter (PM) Filtration:

Mechanism: Trees are physical barriers. Their leaves and needles have large surface areas with sticky surfaces that capture and retain PM_{10} and $PM_{2.5}$ particles from the air. The forest acts as a massive, living air filter.

Result: Without this barrier, PM from nearby roads, industrial areas, or construction operations will travel unimpeded.

2. Loss of Chemical Pollutant Scavenging:

Mechanism: Trees absorb harmful gaseous pollutants like nitrogen oxides (NOx), sulfur dioxide (SO2), and ground level ozone (O3) through their leaf stomata. They either use them in metabolic processes.

Result: These pollutants will no longer be scavenged. Their ambient concentrations in the air around the new building will be higher, leading to increased corrosion of building materials and potential health impacts for occupants and other university occupants.

3. **Microclimate Degradation and Increased Pollutant Concentration:**

Mechanism: Forests moderate local climate through shade and evapotranspiration hence releasing water vapor, which has a cooling effect in the atmosphere.

Result: Urban Heat Island Effect: Replacing trees with paved surfaces and building materials like concrete, asphalt, glass leads to heat absorption and retention making a micro climate of a high temperature zone. Hotter air can increase the rate of chemical reactions that form ground-level ozone (smog).

Altered Airflow: A forest disrupts and slows wind patterns. A building creates complex wind turbulence. Without the forest to filter it, this turbulent air can funnel and concentrate pollutants around the building itself.

4. **Increased Carbon Burden:**

Mechanism: The destroyed trees no longer trees absorb carbon dioxide from the atmosphere and lock it away as carbon in their wood and roots through photosynthesis. Furthermore, their decomposition, if not properly handled and the embodied carbon from the new construction materials add a significant one-time carbon debt.

Result: The project contributes negatively to the regional and global carbon balance, increasing the root cause of climate change

Recommendations

The only environmentally sound recommendation is to avoid destroying the forest. The following hierarchy should be applied:

1. Avoidance (Highest Priority):

Do not build on the forested portion. If you must build on the land, choose a already-cleared or low-value ecological area. The highest and best use of the forested parcel is to remain a forest.

· Re-design the project to be nestled within the forest, preserving the majority of trees, especially those upwind of prevailing winds which serve as the primary PM barrier.

2. If Destruction is Absolutely Unavoidable: The mitigation must be drastic to attempt to compensate for the immense loss.

Conclusion.

Destroying a forest that provides a clean air barrier to build a building is an environmentally unsustainable decision that permanently degrades local air quality. It replaces an active, protective asset with a vulnerable liability.

A-2.3 Ecology Technical Report

Ecology Technical Report - University of Nairobi, Chiromo Campus for an Environmental and Social Impact Assessment Study

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1. Biodiversity Assessment

1.1 Introduction

Nairobi has a population of approximately 4 million people, making it the largest and most populous city in Kenya and East Africa (KNBS, 2019). Its large and growing population is a major driver of the city's overwhelming environmental challenges, which have come at the expense of the natural environment. The city was once known as a pleasant place to live, earning the nickname "Green City in the Sun" (CCN, 2007). Urbanization has led to the destruction and removal of vast areas of forests, significantly impacting indigenous tree species.

The University of Nairobi's Chiromo Campus is situated within a remnant of Nairobi's original riverine forest ecosystem. Education infrastructure and other related activities have partially modified the area around the proposed Science and Engineering Complex. However, the remaining vegetation in this project area still offers habitats for a diverse array of species in addition to other ecological significance.

Similarly, urban development is a major driver of biodiversity loss in urban riverine ecosystems. Establishment of infrastructure always results in altered hydrological state, increased sedimentation and pollution, and habitat fragmentation (Walsh et al., 2005). Nairobi faces rapid urbanization leading to the degradation of its freshwater ecosystems (Musila et al., 2019). Construction of large-scale projects such as the Science and Engineering complex may intensify these effects through land clearing, soil erosion, and increased impervious surfaces, thereby affecting runoff and water quality in nearby aquatic systems.

UN Sustainable Development Goal 11 recognizes the important role of urban forests in achieving integrated urban environments. The absence of ecological attention throughout the planning stages of development is one among the causes of environmental issues. According to Barron et al. (2016) and Paracchini et al. (2014), only a small number of urban development plans worldwide adequately prioritize environmental integrity, sustainability, biological diversity, and the conservation of urban landscapes, which are essential for protecting urban nature and sustaining biodiversity, including addressing cumulative and indirect impacts as well as the sensitivity and resilience of species and habitats.

In Kenya, biodiversity assessment is a legal requirement under the Environmental Management and Co-ordination Act (1999) and the EIA Regulations (2003), forming part of Environmental Impact Assessments (EIAs) and Strategic Environmental and Social Assessments (SESAs). International frameworks such as IFC Performance Standard 6 and the World Bank's ESS 6 emphasize integrating biodiversity into project planning and mitigation. Effective ESIA processes must identify species of conservation concern early, using robust field methodologies (Hardner et al., 2015; IUCN, 2020).

This study provides comprehensive information on ecological baseline conditions of the entire project area. While the study encompasses assessing the site habitat, soil types and conditions, aquatic resources, flora, and fauna of the entire area, specific attention is given to the habitat, flora, and fauna inventory, aquatic biodiversity, and ecosystem services.

1.2 Baseline Ecological Characterization

Habitat Typing.

This assessment involves mapping different habitat types. In this context, we provide a framework for understanding and managing different conditions of the proposed (Chiromo Science and Engineering Complex) project site based on

Headwaters/ zone of sediment production.

The term refers to the upland areas where streams or rivers are shallow and fast-flowing. Its waters are capable of unearthing boulders, coarse gravel, rock outcrops, and other debris, which form the primary load. Such a load has considerable scouring potential, leading to steep-sided valleys, typical of the upper reaches of the stream. In the case of the Nairobi River, the headwaters zone refers to Nderi, Ondiri, and Kabete swamps, the main springs of this river. Here, the waters are of considerable quality, and the residents still scoop up clear spring water for domestic consumption.

Middle-order stream/ zone sediment transfer or transport

This refers to the central zones of a river, where the input of sediment can equal the output. Here, the rate of flow is slower, and the size of the sediment is reduced to gravel. The middle-order streams of the Nairobi River are mainly found traversing the various parts of the developed city, including central areas of Nairobi (Chiromo, Ngara, Kamukunji, and Gikomba).

Lowland Rivers/ Zone of deposition

At this zone, the river starts to deposit its loads as it meanders through flood plains. The zone is characterized by increased channel dimensions, with widths greater than the depths. As the gradient decreases, the velocity may remain fairly constant, since the flow is unchecked by obstructions on the riverbank.



Figure 1: A map for the project area for description

The site falls within the middle-order stream, making it part of a critical urban watershed. According to Vane et al. (2022), Msongawai and Kirichwa tributaries traverse through areas affected by various unsustainable land-use activities, including informal settlements, industrialization, urban waste dumping sites, and inappropriate agricultural practices. These activities have made the entire Nairobi River one of the most highly polluted in Kenya, thereby adversely affecting the stream ecosystem.

In the upper Nairobi River Basin, deforestation, inefficient irrigation, overuse of agrochemicals, and construction of dams have led to over-abstraction of water, reducing flows, and degrading water quality. These upstream pressures affect the Chiromo area by lowering river volumes, increasing sedimentation, and introducing pollutants that threaten aquatic biodiversity. Channel fragmentation and altered environmental flows disrupt habitats along the Msongawai and Kirichwa tributaries, compounding the ecological stress in this section of the river system.

Flora Inventory.

An urban forest plays a fundamental role in shaping an ecological city (Berglihn & Gómez-Baggethun, 2021). This is due to the role of improving environmental quality and the aesthetic benefit of the urban landscape. Urban residents use urban forests for recreation, enjoyment, leisure, and other outdoor activities (Levandovska et al., 2020). This is in addition to the ecosystem services (Berglihn & Gómez-Baggethun, 2021) that urban forests provide to urban areas. Urban forests and other urban public spaces need to be managed and utilized sustainably to support the city with ecosystem services (Han & Yeo-Chang, 2021; Berglihn & Gómez-Baggethun, 2021). Urban forests are for people (Zhao et al., 2020) and their conservation, planning, design, utilization, and enjoyment must focus on the residents. Residents of a particular urban setting have specific feelings, attitudes, and values attached to urban trees and landscapes (Lamhamedi et al., 2021). According to (Barron et al., 2021), local preferences and priorities for urban forests provide a clear framework for their conservation. These preferences (Barron et al., 2021) sometimes contradict expert opinions on urban forest preferences and opinions on design and planning, as noted by Barron et al. (2021).

Vegetation plays a vital role in preventing heat buildup through processes like shading buildings and ground, ventilation, and evapotranspiration (English et al., 2007). It also contributes to effective stormwater control and enhances air quality in urban areas. Vegetation offers numerous services to the environment, like carbon storage (Ren, 2011), reducing air pollution, and acting as an urban biodiversity habitat. Human-induced disturbance alters ecosystem structure and function and is likely to cause significant loss of plant diversity. From an environmental perspective, trees and forests in urban areas primarily contribute to carbon dioxide sequestration, improved air quality, noise reduction, urban hydrology, and regulation of both land surface and air temperatures (L. Tyrväinen et al., 2005).

Similarly, studies have linked the general quality of life of urban populations to urban forests and other green spaces. Moreover, these habitats are rich in biodiversity, with plants and animals that coexist closely with urban dwellers, providing a platform for learning, exploration, and research (S. J. Livesley et al., 2016). As urban areas expand, existing forests may be destroyed, fragmented, or included as part of urban landscapes, thus exposing them to several threats, including destruction of native species, invasion by exotic species, fires caused by human activities, pests and pathogen outbreaks, as well as unmanaged outdoor recreation activities (Chavez, 2005).

Exotic plant species invasions are recognized as one of the most prevalent threats to biodiversity and have disrupted ecosystems globally (Mungi et al. 2023, Lusizi et al. 2024). According to FAO 2020, Non-Native Species (NNT) make up 44% of plantation forests globally (approximately 58 million ha). The prevalence of these species' forestry plantings varies significantly between regions. For example, plantation forests in North and Central America mostly comprise native species, whereas those in South America consist almost entirely of species (FAO 2020). This large amount of non-native species is in part due to the rapid decrease in the extent of natural forests. Many ongoing large-scale planting initiatives, sometimes with these non-native species, aim to compensate for the loss of natural forests. Some examples of drivers of these losses are the reduction of natural forests caused by human activities in tropical regions of Brazil (Klug et al. 2020).

Today, invasive species management and the prevention of new invasions are government priorities, as highlighted by the recent passage of the Invasive Alien Species Act 2021 (Government of Bermuda 2021). *Acacia mearnsii is one of 141 Acacia species that were introduced to the country 150 years ago from Australia for timber and tannin production; currently, 33 of these species are still present, and A. mearnsii ranks among the top 10 invasive species in Africa (Lusizi et al. 2024).* A. mearnsii is also known to alter soil chemicals that favor their productivity, changes

that remain after the species has been cleared (Lusizi et al. 2024). It occupies approximately 25 000 km² (2.5 Mha) in South Africa (Lusizi et al. 2024), corresponding to approximately 2% of the surface (1.2 Mkm²; Boston University n.d.). It is largely found in the Eastern Cape, Kwa-Zulu Natal, Gauteng, and Limpopo provinces (Luisizi et al. 2024). Its short generation time contributes to its success in invasiveness (Lusizi et al. 2024).

The project site is within the Lower Upper Catchment of the Nairobi River and is endowed with riverine forest and indigenous vegetation, including woodland and grassland species, with the dominant forest trees characterized by the dry semi-deciduous type. The plants include a variety of native riverbank forest species, such as Ficus sycomorus, Croton megalocarpus, Trichilia emet These species thrive along the banks of the rivers Kirichwa and Msongarai, which flank the campus. The forest understory includes shrubs, ferns, and climbers, with patches of grassland and disturbed areas due to urban encroachment and infrastructure development. Bamboo (*Bambusa vulgaris*) dominates the riverine vegetation around this area. This plant was imported from India as an ornamental plant but has colonized some sections of the rivers.

In closed reaches upstream, the dense overhang forms canopies of riparian trees, some of which are exotic while others are indigenous. The dominant species are *Croton megalocarpus, Brachylaena huillensis, Calodedrum capense, Teclea spp., Strychnos henningsii,* and *Diospyros abyssinica* (NRBP Phase II Report, 2003). There are pockets of Eucalyptus spp. within the Lavington area and the Chiromo and Riverside areas. Along Kirichwa River, passing through Chiromo, are plots of arrowroots, bananas, kales, and tree nurseries. Within Lavington, Riverside, and Arboretum areas, the river valley has been reduced to a very narrow valley due to land grabbing by real estate developers.

Common	Scientific Name	Frequency
Ficus Tree	*Ficus sycomorus*	
Croton Tree	*Croton megalocarpus*	
Cape Mahogany Tree	*Trichilia emetica*	
Nile Tuli Tree	*Markhamia lutea*	
Muhuhu Tree	*Brachylaena huillensis*	
Cape Chestnut Tree	*Calodedrum capense*	
Red BitterBerry Tree	*Strychnos henningsii*	
Jacaranda Tree	*Jacaranda mimosifolia*	
Diospyros Tree	*Diospyros abyssinica*	
Bamboo Tree	*Bambusa vulgaris*	
Africana Tree	*Prunus africana*	
Meru Oak	*Vitex keniensis*	

Fauna Inventory: Mammals, birds, reptiles, amphibians, and insects.

Herpetofauna.

Urban forest ecosystems, such as the remnant riverine and fragmented forest patches within the University of Nairobi's Chiromo Campus, serve as critical habitats for sustaining biodiversity, particularly for amphibians and reptiles (herpetofauna). Environmental studies frequently underrepresent these taxa, which are sensitive indicators of environmental health. Herpetofauna is essential to the health of ecosystems because it helps with nutrient cycling and pest control and provides food for other species. Malonza et al. (2016) assert that Kenyan urban green spaces, such as the forests, wetlands, and dams of Nairobi, exhibit an unexpected diversity of herpetofauna, notwithstanding the growing fragmentation of habitats. The absence of baseline data and consistent monitoring has resulted in deficiencies in biodiversity management within urban development plans (Malonza et al. 2016).

For terrestrial and semi-aquatic herpetofauna, urban fragmented forests like Chiromo, which are home to species like *Ficus sycomorus* and *Croton megalocarpus*, offer crucial cover and breeding grounds. For species that depend on riparian ecosystems, the forest's closeness to the Kirichwa and Msongawai rivers improves habitat suitability. Amphibians are particularly vulnerable to hydrological changes, pollution, and vegetation loss, all of which may be exacerbated by infrastructure development, according to previous biodiversity assessments conducted by Wasonga et al., 2020. According to recent preliminary surveys and biodiversity assessments, African helmeted terrapin (*Pelomedusa subrufa*), Jackson's chameleon (*Trioceros jacksonii*), Nile monitor (*Varanus niloticus*), African common toad (*Sclerophrys regularis*), red-eyed tree frog (*Leptopelis concolor*), house gecko (*Hemidactylus mabouia*), Battersby's green snake (*Philothamnus battersbyi*), brown house snake (*Boaedon capensis*), and puff adder (*Bitis arietans*) are among the species found in and around the University of Nairobi's project area (Muriuki et al., 2024; Malonza et al., 2021; Spawls et al., 2023). These species represent a range of ecological niches, from aquatic and riparian zones to forest edges, grasslands, and urban habitats, illustrating the adaptability and ecological importance of herpetofauna in peri-urban landscapes.

Mammals

Mammals play vital ecological roles, including seed dispersal, pollination, predation, and herbivory, making them important indicators of ecosystem health (Ripple et al., 2024). In East Africa, mammalian diversity is particularly rich due to the mosaic of savannahs, forests, wetlands, and montane habitats (Kingdon et al., 2022). However, mammal populations are under increasing pressure from habitat loss, human-wildlife conflict, poaching, and climate change (Mwangi et al., 2023). Environmental and Social Impact Assessments (ESIAs) therefore require robust mammal surveys to document species diversity, assess conservation status, and identify potential project impacts (IUCN, 2024).

According to recent surveys and biodiversity assessments, African palm civet (Nandinia binotata), spotted hyena (Crocuta crocuta), vervet monkey (Chlorocebus pygerythrus), African savanna hare (Lepus victoriae), Gambian giant pouched rat (Cricetomys gambianus), and African civet (Civettictis civetta) are among the species found in and around the University of Nairobi's project area (Muriuki et al., 2024; Musila et al., 2019). These species act as indicators of a structurally diverse landscape that accommodates both diurnal and nocturnal mammals.

Aquatic Biodiversity: Macroinvertebrates, fish, and aquatic plants in the two streams.

Riparian lands occur along the edges of water bodies such as rivers, streams, lakes, wetlands, springs, and ponds. According to Karisa (2020), they are classically defined as areas of woody vegetation cover associated exclusively with surface-flowing water, forming the interface between land and a flowing water body. In many urban settings, including Nairobi, these linear strips of vegetated riparian corridors often represent the last remaining

tracts of natural bushland. As such, they hold immense ecological, environmental, social, economic, and aesthetic value (Gurnell et al., 2017). Riparian zones form riverine vegetation and rivers. The Water Act, 2016, specifies riparian reserves ranging from a minimum of 6 meters to a maximum of 30 meters from the riverbank.

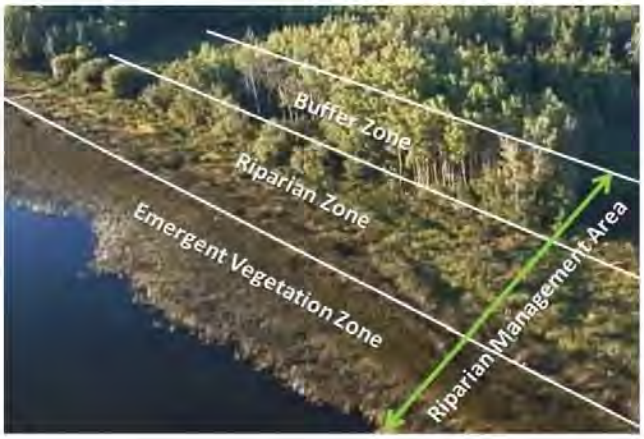


Plate 2 showing the Riparian reserve management area

However, the rules do not clarify the criteria for applying either the minimum or maximum width. This ambiguity, combined with conflicting interpretations regarding reference points for measuring riparian widths, complicates the effective enforcement of related policies and laws (Makindi, 2024). Riparian zones are highly sensitive to human activities, encroachment, and development (Koskey et al., 2021). In the Nairobi River Basin, agricultural activities and domestic water abstraction contribute to canopy loss (Waturu et al., 2023), while built-up areas within and around riparian zones reduce biological integrity (Lia, 2022). Land use changes, mainly informal settlement, have led to the loss of riparian vegetation in urban rivers like the Nairobi River, impairing natural filtration and disrupting aquatic ecosystems (Nyakora, 2016).

The riparian zones along the Nairobi River are predominantly overgrown with herbaceous vegetation, including short grasses and fringing reeds, particularly in the lower reaches. These areas are ecologically significant, as tree canopies contribute terrestrial invertebrates to the aquatic food web. The riparian vegetation comprises a stratified structure of groundcovers, understory, and canopy layers, with mature trees supporting hydrophytic plant communities. Notable aquatic and semi-aquatic species observed include *Veronica anagallis-aquatica*, *Rorippa nasturtium-aquaticum*, *Leersia hexandra*, *Polygonum salicifolium*, and *Ranunculus multifidus*, indicating a diverse and functional riparian ecosystem.



Veronica anagallisaquatica



Rorippa nasturtium-aquaticum



Ranunculus multifidus

Plate 3 showing some hydrophytic vegetation

The riverine area is typically inhabited by pioneer species of sesbanias that are usually not found in closed forest areas but can occur occasionally away from streams. S. sesban var. nubica is possibly endemic to Nairobi River streams (FAO). Sesbanias are nitrogen-fixing legumes and are used for soil improvement purposes, as stakes, fodder, and fuel wood. Sesbania sesban has shown particular promise for improved fallows, where its soil improvement potential in local farming systems is widely recognized.

Table 4: Collection details for Sesbania in the urban environment of Nairobi

Species	Site	Long. (°E)	Lat. (°S)	Alt. (m)	Nbr. of parent trees
Sesbania sesban var. *nubica*	Brookside Drive	36°47.740'	01°15.395'	1740	6
	James Gichuru Road	36°46.339'	01°16.669'	1720	5
	Loreto Convent	36°46.569'	01°16.066'	1740	1
	Muthangari Police Station	36°46.404'	01°15.969'	1740	1
	St. Mary's Boys School	36°46.720'	01°16.068'	1720	1
Sesbania keniensis	Loreto Convent	36°46.569'	01°16.066'	1740	4 (8)[1]
	Muthangari Police Station	36°46.404'	01°15.969'	1740	2 (6)[1]
	St. Mary's Boys School	36°46.664'	01°16.091'	1720	1 (3)[1]

[1] Figures in brackets represent number of *Sesbania keniensis* trees extant at each location.

Mbao et al. (2023) analyzed diatom assemblages in the Nairobi River Basin to assess their response to water pollution. Using multivariate analysis, the following environmental gradients were identified.

- ✔ The **first gradient** represented the upper stream stations, whose water samples had high oxygen levels.
- ✔ The **second gradient** was represented by midstream stations whose water was characterized by high agricultural pollution and high nitrate concentrations.
- ✔ Lower stream stations whose water corresponded to both industrial and domestic waste, with all stations having high measurements of total dissolved solids, represented the third gradient, total suspended solids, and orthophosphates.

Sections of the river with lower pollutant concentrations tend to support a richer diversity of macroinvertebrates, though their presence is also strongly influenced by each species' pollution tolerance. For example, during dry periods, midge larvae (*Cricotopus lebetis*) and aquatic earthworms (*Limnodrilus hoffmeister*) dominate despite high pollution levels, owing to their remarkable resilience. Aquatic earthworms, in particular, can survive in low-oxygen environments and even endure weeks without oxygen. Their ability to regenerate lost body parts and their relatively long lifespan allow them to thrive in disturbed and polluted habitats. However, rainy seasons see an abundance of both midge larvae and mosquito larvae *(family Culicidae),* which are adaptable to a range of pollution levels, surviving in freshwater, saltwater, and waters contaminated with organic waste.

On the other hand, species such as leeches and gilled snails exhibit low pollution tolerance, resulting in their sparse presence, especially in the river's heavily polluted lower sections. While some leech species can withstand extreme environmental conditions such as variations in salinity, light, temperature, and moisture, they generally require better water quality.

The aquatic environment in the vicinity of the project area is characterized by permanent/semi-permanent tributaries linked by shallow ephemeral depressions. Banks are steep and deep, while macrophytes occur but are sparse. The substrate is silty and muddy, with small boulders and bedrock in places, and coarse woody debris, overhanging branches, and fallen timber are present—almost always exotic vegetation.

Diatom and Phytoplankton Assessment

Diatoms are the unicellular algal group most widely used as indicators of river health, as they provide a rapid response to specific physico-chemical conditions in the water and are often the first indication of change. The presence or absence of indicator taxa can be used to detect specific changes in environmental conditions, such as eutrophication, organic enrichment, salinization, and pH changes. Diatoms and the blue-green algae dominate the phytoplankton in the two tributaries (Vane et al., 2022). They include the filamentous and *coccoid cyanophytes Lyngbya conorta, Anabaenopsis tanganyikae, Oscillatiria spp., Microcystis spp., Microcystis aeruginosa, and bacillariophyta like Melosira sp. Chlorophytes include the Pediastrum duplex, Closterium sp., Ankistrodesmus sp.,* and *Cosmarium sp.* Algal blooms as a result of increased primary production were observed along some sections of the river channel. Microcystis is an indicator of high levels of organic pollution in freshwater bodies.

Macro-invertebrates and Macroflora

The distribution of the invertebrate fauna in the project site is characterized by continuous replacement in taxonomic composition and a general decrease in the number of individuals, with few species being dominant from season to season. Five taxonomic groups are described as indicators of water quality. *Caenis* and *Baetidae* are typically associated with cleaner, well-oxygenated waters, while *Simulium* and *Chironomidae* can tolerate a wider range of conditions, including moderate pollution. *Cheumatopsyche*, a *caddisfly genus*, often indicates well-to-fair water quality. Together, their presence and distribution offer valuable information regarding the ecological health and habitat quality of the studied river system.

Distribution of Macroinvertebrates along the Nairobi River tributaries

Group	Characteristics
Caenis: Mayflies 	• This group of invertebrates is ecologically diverse and is commonly found in pristine habitats with high temperatures and lower dissolved oxygen levels. • They occurred in low densities: 20 ind./0.2 m². • Its distribution was related to the type of habitat. • *Caenis* are sediment or deposit feeders; hence, their presence was related to coarse particulate debris and decaying vegetation. • Higher numbers were recorded in the upper stream, and current speeds did not affect them. • In stations downstream of reservoirs along the river, *Caenis* numbers were relatively low due to the trapping of silt, hence reducing the habitats for *Caenis*.
Simulium	• The larvae of the blackfly *Simulium sp.*, in the order Diptera, are typical filter feeders; hence, they rely on water currents to provide them with fine particulate debris. They specifically occurred in areas where current speeds are above 32 cm/s. *Simulium* are epibenthic on solid substrates; hence, they are only found in areas having rigid attachment substrates. Abundance of *Simulium* is related to several factors, like • High current speeds (above 32 cm/s) • Presence of reservoir upstream which provides planktonic material and traps sand and silt, which may have an abrasive effect on these organisms

	• Stability of the riverbed surface provides an increased effective area for larval colonization. • The shallowness of the water allows for effective filtering of suspended particulate matter, phytoplankton, and bacterioplankton. • This group of invertebrates is an indicator of cool and well-oxygenated waters.
Chironomidae: Midge flies 	• The larval stages of the family are widely distributed along the Nairobi River. • The commonest forms found were the 'little green forms' (commonly found in sub-family *Orthocladiinae*) and the large reddish *Chironominae* 'Plumosus' (Chironominae), mainly in polluted reaches. • Many *Chironomidae* are filter feeders; other groups are collectors and grazers. *Chironomids* are able to live in areas with limited oxygen levels and high organic pollution and are hence useful as biological indicators of water quality in riverine ecosystems. • They are indeed found all along the polluted sections of the three river tributaries in Nairobi, below the Museum Bridge to the Dandora outfall.
Cheumatopsyche 	• The net-spinning *trichopterans Chematopsyches (caddisflies) are classified as filter feeders, and their diet varies with the season.* • The larvae of two types of species were identified, i.e., Cheumatopsyche sp. A (tolerant species) and Cheumatopsyche sp. B (intolerant species). • The same factors cited in the case of Simulium can explain the high occurrence of Cheumatopsyche in the Nairobi River. These two groups showed similar longitudinal distribution along the river. • The tolerant species had a wide distribution and appeared at the Nairobi Falls below Dandora among the first species recovering from the silt pollution. The less tolerant species were exclusively observed at the sources of the river. • This distribution was attributed to the size and abundance of particulate matter and the amount of suspended silt carried by the water. The presence of less tolerant species indicates high-quality waters, while the presence of tolerant species indicates poor water quality, where less tolerant species are absent
Baetidae: Mayflies 	• Two genera, *Baetis* and *Centroptilum* (Baetidae), were identified along the Nairobi Rivers. • The family exhibited a longitudinal distribution that depended on the availability of attachment substrate, food sources, and the amount of suspended silt. Numbers increased from the river source downstream. • Naturally, *baetids* tend to live in unpolluted waters with densities of up to 10,000 ind/m². Species of *Baetis* are the least tolerant to pollution, and therefore their absence is a useful indicator of water quality.

Source: *Impacts of water pollution on Nairobi River, Kenya. (2022). Journal of Physical Sciences, 4(1).*

Zooplankton taxa in the Nairobi dam

Class	Species

Insecta	*Chaoborus sp.*
Cladocera	*Daphnia pulex*
Cladocera	*Diaphanosoma sp.*
Cladocera	*Ceriodaphnia rigaudi*
Cladocera	*Moina micrura*
Copepoda	*Thermocyclops oblongatus*
Copepoda	*Mesocyclops equatorialis*
Rotifera	*Asplanchna brightwelli*
Rotifera	*Brachionus angularis*
Rotifera	*Brachionus calyciflorus*
Rotifera	*Brachionus caudatus*

Source: Lusweti, 1992

Ecosystem Services: Pollination, water purification, and carbon sequestration.

Ecosystem services can be defined as the benefits received by a community through functioning ecosystems. They can be broadly categorized as provisioning, regulating, cultural, and habitat services, with many services co-occurring and most ecosystems providing a wide range of services across several categories. Forests are suitable habitats for birds and mammals and a refuge for wildlife and humans downstream. The Kikuyu forest, which is the source of the Nairobi and Mathare rivers, is an important riverine forest within the Nairobi River basin. It is densely populated with natural trees, and it also serves as transitional habitat that supports many migratory birds and mammals such as baboons, birds, and monkeys (KDI, 2022).

Mammalian species contribute both aesthetic and economic value through tourism (surrounded by Nairobi Arboretum), highlighting the interconnectedness of biodiversity conservation and sustainable livelihoods within the basin. Population pressure, encroachment, illegal poaching, excessive and illegal timber extraction, and agroforestry pose threats to Nairobi's fragmented forests (KDI, 2022). Laxity from forest regulating agencies, poor enforcement of existing laws, and poor community policing of forests also pose threats to the forests' sustainability. Transitional habitats in the river support numerous migratory and resident birds and include seasonal rocky pools and riverine reservoirs such as Kirichwa (KDI, 2022).

Apart from serving as food in the catchment, fisheries maintain the ecological balance of aquatic invertebrate and plankton communities and link food webs of birds, larger vertebrates, and birds. However, anthropogenic pressures, including uncontrolled water abstraction and point and non-point source pollution, continue to affect the aquatic ecosystem.

Pollinators such as bees, butterflies, and nectar-feeding birds contribute to the reproduction of native flora, linking ecosystem integrity to agricultural productivity. Forest biomass and soils store significant carbon stocks, supporting climate change mitigation

2. Methodology

2.1 Project Site

The proposed project site is situated within a remnant of Nairobi's original riverine forest ecosystem, between the two river tributaries, Kirichwa and Msongawai. The vegetation is characterized by a mix of indigenous riparian forest species, including *Ficus sycomorus, Croton megalocarpus, Trichilia emetica*, and *Markhamia lutea*. These species thrive along the banks of the Rivers Kibagare and Nairobi, which flank the campus. The forest understory includes shrubs, ferns, and climbers, with patches of grassland and disturbed areas due to urban encroachment and infrastructure development.

We are cognizant of the need to select the right taxonomic groups for ecological assessment. This is crucial given the site's location within a remnant riverine forest ecosystem. We have chosen groups that are ecologically informative, sensitive to disturbance, and representative of biodiversity in the area. The table below highlights a simple justification, which this technical report will later describe in detail.

Taxonomic group	Justification
Vascular plants	The foundation of the ecosystem is easy to map and monitor.
Birds/Avifauna	The area is known for its high diversity and good indicators of habitat quality.
Fish, & Herpetofauna	Sensitive to water and microclimate changes.
Insects/Butterflies	These are indicators of plant diversity and microhabitat quality.
Macroinvertebrates	Reflect water quality in Nairobi Rivers.
Bats	Important pollinators and insect controllers.

A detailed habitat typing has been undertaken above to establish the baseline biodiversity characterization of the area. These include the forest structure, riparian zones, and aquatic habitats. More specifically, the flora inventory looks at tree species, understory vegetation, and invasive species. The fauna inventory has mammals, birds, reptiles, amphibians, and insects. Aquatic biodiversity will investigate macroinvertebrates, fish, and aquatic plants in the two streams. We will further describe the ecosystem services, such as pollination, water purification, and carbon sequestration.

The construction of the proposed Science and Engineering Complex will result in the direct loss of riverine habitat due to vegetation clearing within the site. Aquatic biodiversity assessment, therefore, will help collate and review the extensive available ecological information related to macroinvertebrates, fish species, and aquatic plants in the two rivers. Kudhair (2019) emphasizes that benthic macroinvertebrates are key indicators of water quality in wetlands due to their varied pollution tolerance. They support river ecosystems by decomposing organic matter and recycling nutrients, while toxic conditions reduce aquatic biodiversity. Supporting this, Ndichu and Okeyo (2023) reported that the spatial and temporal distribution of aquatic macroinvertebrates in the Nairobi River Basin is shaped by specific environmental factors.

2.2 Sampling Techniques

Flora.

Observations and photographs of plants within the project sites were made, and data was recorded. A plant expert analyzed information on status, including endemicity, invasive species, and threats. Plants, as with animals, are sensitive to a diversity of conditions. However, in this study, we looked at their diversity to establish the current level of endemism and the conservation status of the species. This knowledge helps indicate the level of pressure on species due to changes in the ecosystem, influenced by the condition of the water or human activities around deriving benefits from the ecosystem—including water, fodder, wood, and others.

Fauna

Birds: Point counts and mist-netting.

Bird species, terrestrial and aquatic, were counted using a method for avian point counts (Gregory et al., 2004). The total populations per bird species were enumerated. Observation points will be identified depending on the habitat size and accessibility around the area. At each observation point, professional ornithologists will count the birds for 20 minutes. We will identify birds to the species level using 8.16 x 40 DPS Olympus binoculars and our naked eyes. Field observations will be corroborated with field handbook Birds of Kenya and Northern Tanzania, (Zimmerman et al., 2018)

Mammals: Camera traps, track surveys.

We recorded visual sightings during transect walks, typically at dawn or dusk when animals are most active, by using binoculars (10x42). Field notebooks were used for recording mammal species. Mammal field guides (e.g., The Kingdon Field Guide to African Mammals) were also used.

Sherman live traps, which, when used consistently, yield accurate abundance and diversity data, will be used to sample small mammals like rodents and shrews (Monadjem et al., 2022). To identify ground-dwelling species that other approaches might overlook, pitfall traps with drift fences will be employed (Ferguson et al., 2024).

Aquatic Biodiversity

Macroinvertebrate Sampling

Macroinvertebrates were sampled in separate microhabitats or biotopes (e.g., runs, pools, riffles, in macrophytes/vegetation, boulders, etc.) and later combined to form a composite sample. An area equivalent to 1 m^2 within this biotope was sampled for 2 minutes. Sampling was done using a 0.3 m wide and 0.3 m vertical height V-shaped dip net of mesh size 0.5 µ. This was used as a kick net or for dipping, jabbing, and sweeping where appropriate as per Barbour et al. (1999). Collected samples will be preserved in 70% ethanol and taken to the laboratory for taxonomic identification at the National Museums of Kenya laboratories. All specimens were identified morphologically to the family level using available keys, and they were subsequently vouched for and permanently stored in the National Museum's collection. Family taxon is the basic unit used in water quality assessments (Gerber & Gabriel, 2002).

Macroinvertebrates are organisms large enough to see with the naked eye, hence the word "macro," and that lack a backbone, hence "invertebrate." They inhabit all forms of running water, from fast-moving to slow-moving, and include larval stages of insects, snails, worms, and others. Water quality easily affects them, and they are particularly sensitive to pollution, making them good indicators of a stream's health. Physical disturbances leading to sedimentation and reduced clarity in rivers also have an effect on them.

The basic principle behind the study of macroinvertebrates is that some are more sensitive to pollution than others. Therefore, if organisms that can tolerate pollution inhabit a stream site and the more pollution-sensitive organisms are missing, a pollution problem is likely. Therefore, the presence or absence of certain families of

these organisms can be used as an indicator of water quality and quantity over time and thus provide guidance to environmental flows required to sustain proper environmental health of a stream.

Fish Sampling

Fish sampling was carried out using a backpack electrofisher in combination with a seine net. This sampling technique uses electric currents and electric fields to control fish movement and immobilize fish in such a way that they can be captured with nets. Two people block the lower end of the river section using a seine net while one person stuns the water. The two people continuously blocked the lower end of the river section for 15 minutes while trampling rock boulders and riverbanks. Fish are also important indicators of ecosystem health and useful for assessment of environmental flows. Fish in high-altitude streams are adapted to high oxygen levels and thrive at levels above 6 mg/l.

Herpetofauna: Visual encounter surveys.

We used both pitfall traps with drift fences and time-limited search sampling methods to compile baseline data on the abundance and diversity of amphibians and reptiles in the study area.

Insects: Sweep nets, pitfall traps.

3. Results

3.1 Herpetofauna

A total of 35 individuals representing five of our species were recorded (Table 1). The most abundant species was the Kilimanjaro five-toed skink (*Trachylepis kilimensis*), with 31 individuals found near debris close to Kirichwo Ndogo and Kirichwo Kubwa and near the fish ponds.

Table 1: Species recorded and their IUCN conservation status

No	Species	Common Name	Number of Individuals	IUCN Red List Status (2024)
1	*Trachylepis kilimensis*	Kilimanjaro Five-toed Skink	31	Least Concern (LC)
2	Hemisus marmoratus	Marbled Snout-burrowing Frog	1	Least Concern (LC)
3	*Hemidactylus mabouia*	Tropical House Gecko	1	Least Concern (LC)
4	*Panaspis masaiensis*	Snake-eyed Skink	1	Least Concern (LC)
5	*Trachylepis striata*	Striped skink	1	Least Concern (LC)





GPS coordinates of where the species were collected.

Trachylepis kilimensis

S 1.27525, E 36.80531, ALT. 1665M - 6
S1.275565, E36.80557, ALT. 1669M -10
S 1.27481, E 36.80718, ALT. 1670M – 3
S 1.274785, 36.80818, ALT. 1680M – 2
S 1.274785, 36.81044, ALT. 1665M – 2
S 1.2736505, E 36.80893, ALT 1666M -4
S 1.27238, E 36.80817, ALT 1662M - 4

Hemisus marmoratus

S 1.27525, E 36.80531, ALT. 1665M

Hemidactylus mabouia

S 1.274785, 36.80818, ALT. 1680M
Panaspis masaiensis
S 1.27525, E 36.80531, ALT. 1665M - 6
Trachylepis striata
S 1.2736505, E 36.80893, ALT 1666M -4

Species Accumulation

The **species accumulation curve** did not plateau during the survey, indicating that additional sampling effort would likely yield more species (Figure 1). This suggests that the recorded diversity represents only a subset of the herpetofauna present in the area.

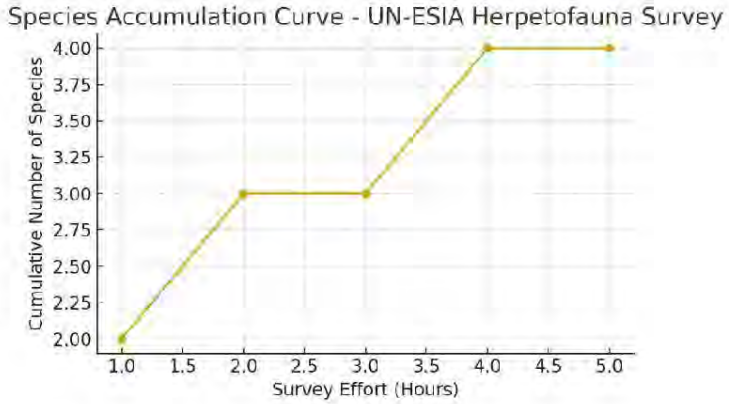


Figure 2

Discussion

The dominance of *Trachylepis kilimensis* highlights the adaptability of certain reptile species to disturbed or semi-modified habitats. The presence of Hemisus marmoratus and *Panaspis masaiensis* demonstrates that the area supports both fossorial and semi-aquatic species, indicating diverse microhabitats.

All recorded species fall under the **Least Concern (LC)** category on the IUCN Red List (IUCN, 2024). No Near Threatened, Vulnerable, or Endangered species were observed during this survey. However, the lack of a plateau in the accumulation curve suggests under-sampling, and further surveys, particularly during different seasons, are recommended to establish a comprehensive species inventory.

Conclusion

The herpetofauna species in the University of Nairobi project area comprise widespread and adaptable species of amphibians and reptiles, all currently listed as **Least Concern**. Documenting seasonal variations and potentially rare or threatened species requires ongoing monitoring.

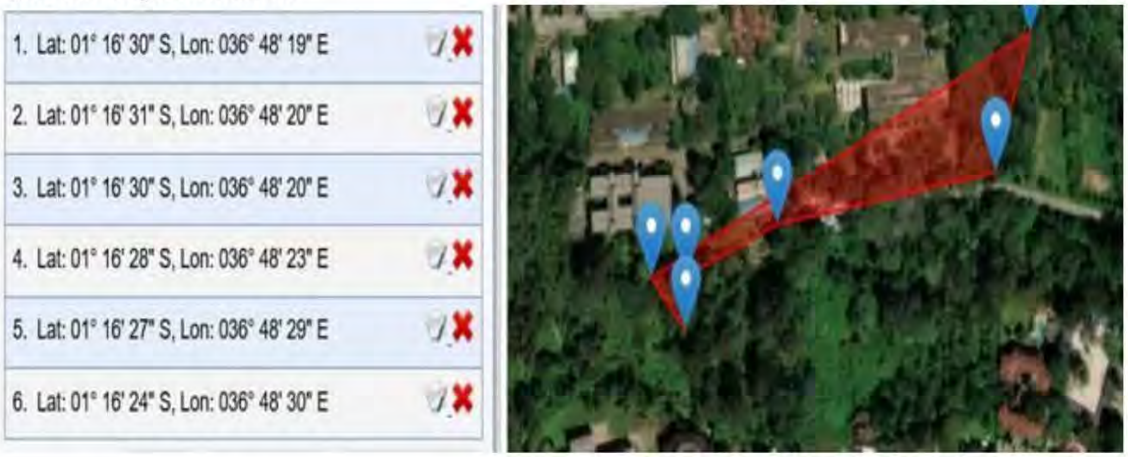
3.2 Vegetation Structure

General Observations





Quadrat Representation



Quadrat 1

Habitat Type: Transitional edge between residential plots and riparian strip, characterized by mixed ornamental plantings, scattered exotics, and a few indigenous remnants.

Tree Inventory:

>5 m tall: ~15 individuals, dominated by *Eucalyptus spp.*, *Grevillea robusta*, and *Cupressus lusitanica.*

<5 m tall: ~25 individuals, including *Croton megalocarpus*, young bamboo shoots, and ornamental **Thika palms (*Filicium decipiens*)** planted along homestead boundaries.

Understory: Sparse cover with scattered herbs and grasses due to trampling and residential clearing. There are open patches where the invasive Trumpet bush (Tecoma stans) is present.

Anthropogenic Activities

- **Residential encroachment:** Gardens and fenced plots border the quadrat, reducing natural regeneration.
- **Logging:** Selective removal of tall *Grevillea* and *Eucalyptus* for firewood was observed.
- **Waste Disposal:** Plastic litter and construction debris were noted along the river edge, contributing to local eutrophication.
- **Soil Disturbance:** Evidence of soil compaction and localized erosion due to footpaths connecting residences to the river.

Habitat Condition

- **Riparian Connectivity:** Broken canopy, with isolated tall trees and mixed ornamentals rather than continuous indigenous riparian forest.

- **Groundcover:** Grass cover patchy; bare soil common in trampled areas.
- **Hydrology:** The river edge shows signs of bank destabilization from removal of vegetation and waste dumping.
- **Ecological Implications**
- Quadrat 1 represents a highly disturbed edge habitat, shaped more by residential activities than natural succession.
- **Thika palms (*Filicium decipiens*)**, though culturally valued, provide limited ecological services compared to indigenous riparian species.
- Encroachment and logging reduce **habitat quality** for wildlife, fragmenting the riparian corridor.

Quadrat 2
Habitat: Riverine edge with patches of bare grassland, shrubs, weeds, and scattered exotics.
Tree Inventory:
>5 m tall: 5 individuals (*Grevillea robusta, Eucalyptus spp., Cupressus lusitanica, Casuarina equisetifolia*).
There are fewer than 20 individuals, including saplings and poles, that are less than 5 meters tall, primarily consisting of exotic regeneration.
Ornamental Presence: *Filicium decipiens* (Thika palm) is occasionally planted near residences.
Invasives: Tecoma stans (yellow trumpetbush) is widespread, benefiting from eutrophication.
Understory: Herbs, Napier grass (*Cenchrus purpureus), and* ruderal weeds.
Human Activities: Logging, poor waste disposal, and bank erosion.
Condition: Highly disturbed, sparse canopy; invasives dominate, and riparian vegetation integrity is weak.

Quadrat 3
Habitat: Semi-closed forest patch with an exotic and indigenous mixture.
Tree Inventory:
>5 m tall: 18–20 trees, dominated by *Grevillea robusta* (exotic), *Eucalyptus spp., Croton megalocarpus* (indigenous).
Ornamental Presence: *Filicium decipiens* (Thika palm) interspersed near residential margins, adding mid-story shade.
Understory: Flowers, shrubs, climbers, and herbs, moderately diverse.
Human Activities: Construction, waste dumping, and small-scale mining degrade habitat quality.
Condition: The canopy is relatively intact compared to other quadrats, but edge effects and anthropogenic pressures threaten regeneration and species composition.
Quadrat 4 (Riparian with slow-moving water, rocky substrate)
Habitat: Riparian forest with planted exotics and bamboo stands.
Tree Inventory:
>5 m tall: 30 trees (Cupressus lusitanica, Eucalyptus spp., Croton megalocarpus, Casuarina equisetifolia).
<5 m tall: 12 younger trees or saplings.
Ornamental Presence: *Filicium decipiens* planted near residential boundaries, complementing riparian tree cover.
Riparian Layer: Dense bamboo (*Bambusa vulgaris*), Napier grass, and invasive *Tecoma stans.*
Hydrology: Slow-moving stream section, rocky soil aiding drainage.
Human Activities: Residential encroachment, ornamental plantings, and logging at the edges.
Condition: Structurally complex canopy, but exotic-dominated with limited indigenous regeneration. Invasives continue to pressure native elements.

Quadrat 5 (Riparian Forest strip)

Habitat: a transitional riparian forest fragment adjoining a residential area.

Tree Inventory:

>5 m tall: *Eucalyptus spp., Grevillea robusta, Cupressus lusitanica, Filicium decipiens (Thika palm), Croton megalocarpus.*

<5 m tall: Mix of saplings and bamboo poles.

Riparian Elements: Indigenous riparian trees are still present (*Croton megalocarpus, Syzygium guineense, and Markhamia lutea*), though fragmented.

Invasive species: *Tecoma stans* scattered.

Human Activities: Logging (especially of tall eucalyptus), encroachment, and waste dumping leading to eutrophication.

Condition: Disturbed riparian forest with canopy gaps. While Thika palms provide ornamental value, the ecological integrity of the riparian zone is declining.

Quadrat 6 (Riverine bamboo belt with fauna)

Habitat: Riverine forest strip dominated by bamboo.

Tree Inventory:

>5 m tall: ~10 trees (*Eucalyptus spp., Croton megalocarpus, occasional Filicium decipiens*).

<5 m tall: ~100 bamboo culms, with no undergrowth due to shading.

Ornamental Presence: *Filicium decipiens* planted near paths and gardens along the river edge.

Fauna: Presence of monkeys and birds, indicating use of bamboo and tree crowns for roosting and movement.

Human Activities: Planting of bamboo as riparian stabilization, selective cutting of exotics, and edge dumping.

Condition: Effective riparian buffer with bamboo, but low understory diversity. Large trees were recorded with a circumference of 3 m at breast height (CBH) ≈ 3.0 m. DBH ≈ CBH/π ≈ 0.95 m—exceptionally large

Overall Observations

i) Vegetation Structure

Canopy density varies from sparse (Quadrat 2) to moderately closed (Quadrats 3–4, 6).

Exotic trees (*Grevillea robusta, Eucalyptus spp., Cupressus lusitanica, Casuarina equisetifolia*) dominate most quadrats.

Indigenous species (*Croton megalocarpus, Syzygium guineense, and Markhamia lutea*) occur but are poorly represented.

ii) Ornamental Species

Filicium decipiens (Thika palm) is present in most quadrats, mainly planted along residential margins for aesthetic and shade value. While it contributes structure, it offers limited ecological functions compared to indigenous riparian trees.

iii) Invasive Species

Tecoma stans is widespread across disturbed edges and open gaps, promoted by eutrophication and canopy opening.

Napier grass forms dense ground cover, sometimes limiting native regeneration.

iv) Human Pressures

Logging and wood extraction have opened canopies and destabilized banks.

Poor waste management and dumping contribute to eutrophication and invasive growth.

Construction and residential encroachment fragment riparian forest and reduce habitat connectivity.

v) Fauna

Monkeys and birds still occur, especially in bamboo-rich Quadrat 6, showing the site retains biodiversity value if restored.

vi) Ecological Integrity

The site shows a shift toward exotic- and ornamental-dominated riparian vegetation, with reduced indigenous representation.
Invasive Tecoma stans are a key management concern.
Riparian forest fragments remain but require urgent restoration with native tree and shrub species.

3.3 Macro-invertebrates

Phylum	Class/Sub class	Order	Family	Species	Common Name	Pollution Sensitivity	IUCN STATUS	Kirichwa Kubwa Upstream	Kirichwa Kubwa Downstream	Kirichwa Ndogo Upstream	Kirichwa Downstream
Arthropoda	Insecta	Diptera	Chironomidae		Midge			45	29		
Arthropoda	Insecta	Diptera	Culicidae		Mosquito			2			
Annelida	Oligochaeta	Haplotaxida	Lumbricidae		Earthworm			2		1	
Annelida	Hirudinea	Rhynchobdellida	Hirudinea		Leech				1		





3.4 Fish

Phylum	Class	Order	Family	Species	Common name		IUCN STATUS	Kirchwa kubwa upstream	Kirichwa kubwa downstream	Kirichwa ndogo upstream	Kirichwa ndogo downstream
Chordata	Actinopterygii	Cyprinodontiformes	Poeciliidae	Poecilia reticulata	Mosquitofish		Least Concern (LC)	1			







3.5 Avifauna

Phylum	Class	Order	Family	Species	Common name	Kirichwa kubwa	Kirichwa ndogo stretch
Chordata	Aves	Piciformes	Lybiidae	*Pogoniulus bilineatus*	Yellow-rumped Tinkerbird		1 (heard)
Chordata	Aves	Pelecaniformes	Threskiornithidae	*Bostrychia hagedash*	Hadada ibis	4 (seen)	2 (seen)
Chordata	Aves	Coliiformes	Coliidae	*Colius striatus*	Speckled mousebird		2 (seen)
Chordata	Aves	Pelecaniformes	Scopidae	*Scopus umbrella*	Hammerkop		1 (seen)
Chordata	Aves	Passeriformes	Turdidae	*Turdus abyssinicus*	Abyssinian Thrush	2 (seen)	1 (seen)
Chordata	Aves	Passeriformes	Motacillidae	*Motacilla aguimp*	African pied wagtail	1 (seen)	2 (seen)
Chordata	Aves	Pelecaniformes	Ardeidae	*Ardea menocephala*	Black-headed heron		1 (seen)
Chordata	Aves	Passeriformes	Motacillidae	*Motacilla clara*	Montane wagtail		2 (seen)
Chordata	Aves	Accipitriformes	Accipitridae	*Haliaeetus vocifer*	African fish eagle		1 (seen)
Chordata	Aves	Accipitriformes	Accipitridae	*Milvus aegyptius*	Yellow-billed kite	2 (heard and seen)	
Chordata	Aves	Passeriformes	Nectariniidae	*Cynnyris venustus*	Variable sunbird	1 (seen)	
Chordata	Aves	Musophagiformes	Musophagidae	*Turaco hartlaubi*	Hartlaub's Turaco		1 (seen)
Chordata	Aves	Passeriformes	Monarchidae	*Terpsiphone viridis*	African paradise flycatcher		1 (seen)
Chordata	Aves	Passeriformes	Estrildidae	*Lonchura cucullata*	Bronze manikin		23 (seen)
Chordata	Aves	Passeriformes	Estrildidae	*Lagonosticta senegala*	Red-billed firefinch		9 (seen)

Chordata	Aves	Passeriformes	Muscicapidae	*Melaenornis fischeri*	White-eyed slaty flycatcher		5 (seen)
Chordata	Aves	Passeriformes	Cisticolidae	*Cisticola cantans*	Singing cisticola		49 seen)
Chordata	Aves	Passeriformes	Fringillidae	*Crithagra striolata*	Streaky seedeater		3 (seen)
Chordata	Aves	Passeriformes	Ploceidae	*Ploceus baglafecht*	Baglafecht weaver		1 (seen)
Chordata	Aves	Passeriformes	Nectariniidae	*Chalcomitra amethystina*	Amethyst sunbird		1 (seen)
Chordata	Aves	Passeriformes	Pycnonotidae	*Pycnonotus barbatus*	Common bulbul		1 (seen)
Chordata	Aves	Apodiformes	Apodidae	*Cypsiurus parvus*	Palm swift		1 (seen)
Chordata	Aves	Passeriformes	Fringillidae	*Crithagra reichnowi*	Reichnow's seedeater		4 (seen)
Chordata	Aves	Passeriformes	Muscicapidae	*Melaenornis pammelaina*	Southern black flycatcher		1 (seen)

Appendix 3: Key Informant Interviews with Different Stakeholders

1. The Ariziki Restaurant

Ariziki Restaurant, represented by Chief Chef Jovin Ochieng, welcomed the proposed Engineering and Science Complex, noting it would boost business through catering for workers, students, and researchers while creating job opportunities. Concerns included dust, noise, security, and potential harm to campus wildlife, with recommendations for biodiversity protection, clear communication, and signage during construction. The restaurant also proposed an MoU with the University for catering services to maximize mutual benefits.

2. Metropolitan Estate – Chiromo Neighbourhood

Metropolitan Estate, represented by Estate Manager Patrick N. Kimotho, welcomed the proposed Engineering and Science Complex for its potential social, economic, and educational benefits, including higher property values and business opportunities. However, concerns were raised about noise, dust, traffic congestion, strain on local infrastructure, and risks of river pollution during construction and operation. The estate recommended proper planning, road maintenance, waste management, enhanced security, and clear communication through email, WhatsApp, and notice boards to minimize disruptions and ensure community needs are addressed. Attached is a photo during this exercise.

3. Homeowner – Eulam Hussein

Long-term Chiromo resident Eulam Hussein, who has lived in the area since 1963, acknowledged the University's growth as positive but raised concerns about biodiversity loss, pollution, traffic, and security during construction of the proposed Engineering and Science Complex. They recommended tree replanting, rerouting trucks through an alternative gate, and repairing any damaged infrastructure. While no direct opportunities were identified, expectations included installing additional gate barriers and maintaining green cover. The respondent preferred email updates and consented to further engagement.

4. Clean shelf Supermarket (Qwetu)

Cleanshelf Supermarket, managed by Solomon, has operated in Chiromo for four months and welcomed the proposed Engineering and Science Complex, seeing it as a boost for business through increased student traffic and revenue. While no major construction-phase impacts, concerns, or mitigation measures were identified, the supermarket anticipated long-term benefits during the operational phase. The respondent preferred email updates, had no specific

expectations or local priorities, and consented to further engagement in the ESIA process. Attached is photo taken during the exercise.

5. UNES HQ – University of Nairobi

UNES HQ, represented by Mr. Sam Ochieng, expressed strong support for the proposed Engineering and Science Complex, recognizing its potential to drive innovation, research partnerships, and commercial growth while boosting the University's reputation. Anticipated challenges include construction noise, sewer capacity, and possible river pollution, with recommendations for strict regulatory compliance and proactive environmental management. Opportunities include expanded consultancy, hospitality, and community engagement, with preferred communication through email and community meetings. Overall, UNES HQ welcomed the project, emphasizing careful planning and continuous stakeholder engagement

6. Kolobot Gardens Ltd

Kolobot Gardens Ltd, represented by Mr. Jackson Sare, welcomed the proposed Engineering and Science Complex, viewing it as a boost to educational infrastructure and a potential driver of future business opportunities through hosting visiting academics and researchers. The main concern was construction noise, which could disrupt guests, with recommendations for limiting works to daytime hours and using noise barriers. While operational impacts were expected to be minimal, the institution emphasized adherence to schedules, noise management, and conservation of nearby water sources, supporting the project under these conditions.

7. PWD Representative- University of Nairobi (Main Campus)

Ms. Ramadhana Ireri, the university's representative for students with disabilities, strongly supported the proposed Engineering and Science Complex, describing it as a valuable initiative to drive innovation, creativity, and research. She emphasized, however, that the project's success would depend on deliberate integration of accessibility and inclusivity, noting that existing university facilities already present barriers to PWD students. Anticipated challenges include reduced mobility, dust, and noise during construction, as well as potential exclusion in the operational phase if laboratories, lecture halls, and pathways are not designed for wheelchair access, visual impairments, and inclusive use. Her recommendations included incorporating ramps, elevators, wide pathways, proper signage, and engaging trained PWD staff and engineers throughout the project lifecycle. She further urged continuous engagement with PWD students through email, WhatsApp, official notices, and in-person meetings to ensure their voices are considered. While recognizing opportunities for research, innovation, and even employment for

PWD students, she stressed that the project should set a new standard for inclusivity on campus by ensuring no student is excluded from fully benefiting from the facility.

8. Olive Crescent International School

Olive Crescent International School, a two-year-old institution represented by its administrator, expressed cautious optimism about the proposed Engineering and Science Complex, noting opportunities for future collaboration, educational programs, and shared facilities with the University. The school reported no negative impacts from nearby construction, anticipated minimal disruption, and raised no significant environmental or social concerns. While preferring not to receive frequent updates, the school supports the project and remains open to future engagement with the University community

9. Faculty of Science and Technology

The Faculty of Science and Technology, represented by the Dean, strongly supports the proposed Engineering and Science Complex, viewing it as a bridge between science, engineering, and industry that will enhance the University's academic profile and global recognition. Key concerns include managing dust during construction, ensuring security and adherence to NEMA guidelines, and conserving campus walkways. The faculty emphasized the need for its oversight to align the complex with academic objectives, integrate it into research programs, and ensure it remains functional and impactful, while highlighting opportunities for collaboration, innovation, and community skill development

10. Examination Centre – University of Nairobi

The Examination Centre, represented by Mr. Peter Mbuthia, welcomed the proposed Engineering and Science Complex, noting benefits such as additional examination space and improved coordination for growing student numbers. Key concerns include noise during exams, disruption to cabro roads, student safety, and vehicle security during peak periods. The Centre emphasized proper scheduling of disruptive activities, designated gates for material deliveries, and transparent communication through emails, notice boards, and meetings. Overall, it supports the project, provided exam integrity, safety, and traffic management are safeguarded.

11. Chemistry Department – University of Nairobi

The Chemistry Department, represented by Prof. Karuki, strongly supports the proposed complex, viewing it as a key opportunity to integrate engineering and science, enhance practical learning, and expand research. Key concerns include construction vibrations affecting labs and

exams, site accessibility, and provision of proper worker facilities, which can be addressed through careful scheduling and alternative delivery routes. The department emphasized active consultation in lab design, security, and functionality,highlighting needs such as proper lighting, ventilation, sanitation, and accessibility. Communication through email, meetings, and WhatsApp was preferred to ensure ongoing involvement.

12. Director, University Security and safety Office

An interview with the Director of Security at the University of Nairobi highlighted that the Security Office is responsible for safeguarding students, staff, assets, and facilities, with current physical and procedural measures described as effective. Key risks anticipated during construction include theft, vandalism, and the challenge of managing increased human traffic, which can be addressed through strict access control and coordination with contractors. For the operational phase, the Director emphasized baseline security measures such as CCTV coverage, security guards on each floor, controlled access to restricted areas, and a comprehensive Disaster Response Management Plan. He further recommended professional training, awareness programs, and drills to enhance preparedness, while noting that technology, particularly CCTV, alarms, and biometric access, will be critical in strengthening security. Coordination will rely on the University's existing three-tier security framework involving internal staff, outsourced private guards, and government agencies. The most critical investments identified were robust electronic surveillance systems and physical security infrastructure, especially perimeter fencing

13. Corporate Affairs -UON

The Key Informant Interview with the University of Nairobi Corporate Affairs highlighted overall support for the proposed Engineering and Science Complex at Chiromo Campus, noting opportunities for research collaboration, industry partnerships, innovation spaces, and media engagement. Key expectations include inclusive design (PWD facilities, childcare spaces), enhanced security, recreation and dining facilities, and effective communication through multiple channels, including UNCTV. Concerns raised focused on ensuring the complex is functional, not underutilized, and responsive to stakeholder needs, while recommendations emphasized producing internationally competitive graduates and creating facilities that strengthen partnerships and mainstream university activities.

14. Project Architect -Botrack Ltd

The interview with Botrack Ltd's Project Architect, Laban Kibichi Kiprono, welcomed the proposed Engineering and Science Complex at Chiromo Campus, noting it would add value to

the area. Key concerns included noise, dust, and traffic congestion during construction, and potential dust impacts during operation, which could be mitigated through adherence to NEMA guidelines, traffic marshals, and dust nets. He emphasized proper project planning to protect natural resources, compliance with KCAA building height restrictions, and adequate mitigation of environmental impacts, while also highlighting opportunities for local neighborhood benefits.

15. Riverfront

The interview with John Maina, caretaker at Riverfront, welcomed the proposed Engineering and Science Complex but noted possible challenges including noise, dust, vibration, and traffic congestion that could affect nearby businesses, including a dairy enterprise. He suggested mitigation through controlled routing, dust suppression, and road repairs if damaged, while highlighting opportunities for local job creation. His expectations focused on maintaining accessibility for tenants and ensuring effective communication throughout the project via email updates.

Directorate of Occupational Safety and Health Services (DOSHS)

A Key Informant Interview with the Directorate of Occupational Safety and Health Services (DOSHS), the national regulator for workplace health and safety, underscored its role in enforcing OSHA (2007) and WIBA through inspections, accident investigations, statutory approvals, and the mandatory appointment of certified Safety and Health Officers and Committees on construction sites. In relation to the proposed Engineering and Science Complex, DOSHS emphasized that large-scale multi-storey projects present heightened risks, notably falls from heights, dust and noise exposure, scaffold and excavation collapses, manual handling injuries, machinery-related accidents, and electrocution hazards. To mitigate these, DOSHS recommended a proactive safety management system incorporating hazard identification and risk assessments, strict provision and enforcement of PPE, continuous medical examinations and worker health surveillance, clear site demarcation with barricades and signage, preventive equipment maintenance, and the deployment of trained fire marshals and first aid personnel. Looking ahead to the operational phase, DOSHS stressed the need for annual workplace registration and audits, maintenance of Safety Data Sheets (SDS) for laboratory and research materials, regular risk assessments and training for staff, students, and contractors, and strict compliance with approved building plans, particularly regarding fire safety systems, ventilation, and emergency preparedness, to ensure a safe and resilient facility



A-3.1 Key Informant Interviews Attendance Registers

University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- Cleanshelf - Quetu Riverside. Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	Solomon Kimani W	Cleanshelf Supermarket	Skimaniw@gmail.com	0728280170	
2.	Jonathan Githiga Wanjaki	UNES	Jona.vay17@gmail.com	0729138831	
3.	Raphael Ngalu	UNES	raphaelngalu9c@gmail.com	0792293181	
4.	Dr. Leah Muchemi	Consultant UNES	leahwm@uonbi.ac.ke	0721334736	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- METROPOLITAN ESTATE NO.5 Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	PATRICK N. KIMOTHO	EUREKA TECHNICAL SERVICES LTD	info@eurekaafrica.com	0722553085	
2.	JONATHAN WAITAKY	UNES	jonkray17@gmail.com	0729138831	
3.	RAPHAEL OGALO	UNES	raphaelngalu96@gmail.com	0792293181	
4.	Dr. Leah Mudavi	Consultant UNES	leahwm@uonbi.ack.	0721334736	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- ARZIKI RESTAURANT Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	JOVIN OCHIENG'	UNES-ARZIKI	ochieng@che@uneswonbi	0702295923	
2.	Dr. Leah Muchemi	UNES Consulting	leahwm@uonbi.ac.ke	0723334736	
3.	Raphael Ngalu	UNES	raphaelngalu96@gmail.co	0792253181	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- Cleanshelf - Gweta Riverside. Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	Solomon Kimani W	CleanShelf Supervisor	Skimaniw@gmail.com	0728280170	
2.	Jonathan Githiga Waiyaki	UNES	Jona.way17@gmail.com	0729135831	
3.	Raphael Ngalu	UNES	raphaelngalu9c@gmail.com	0792293181	
4.	Dr. Leah Muchemi	Consultant UNES	leahwm@uonbi.ac.ke	0721334736	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- METROPOLITAN ESTATE NO.5 Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	PATRICK N. KIMOTHO	EUREKHA TECHNICAL SERVICES LTD	info@eurekhaafrica.com	0722553085	
2.	JONATHAN WAITAKU	UNES	jong-ray17@gmail.com	0729138831	
3.	RAPHAEL OGALO	UNES	raphaelngala96@gmail.com	0792293181	
4.	Dr. Leah Mudavi	Consultant UNES	leahwm@uonbi.ac.ke	0721334736	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- ARZIKI RESTAURANT Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	JOVIN OCHIENG'	UNES-ARZIKI	ochieng@ghcl@unesnairobi	0702295923	
2.	Dr. Leah Muchemi	UNES Consulting	leahwm@uonbi.ac.ke	0723534736	
3.	Raphael Ngalu	UNES	raphaelngalu96@gmail.co	0792253181	
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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: KEY INFORMANT INTERVIEW WITH UNES CONSULTING TEAM

VENUE- ARZIKI RESTAURANT. Date: 06/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	Lewida Matha	UNES LTD-ARZIKI	martha@unes.uonbi.ac.ke	0700507361	
2.	Tony Owino	UNES LTD – ARZIKI	owinotiero000@gmail.com	0712776551	
3.	Eugine Isesasi	UNES LTD-ARZIKI	eugine.isesasi@uonbi.ac.ke	0727927921	
4.	Gilbert Ombima	UNES LTD. ARZIKI	gogmbima@uonbi.ac.ke	0720745787	
5.	JOVIN OCHIENG'	UNES-ARZIKI	ochieng'chef@unes.uonbi.ac.ke	0702295923	
6.	Ar. Leah Mucheni	UNES Consultancy	leahwm@uonbi.ac.ke	0721354736	
7.	JONATHAN WAIYAKI	UNES	Jona.ray17@gmail.com	0729138831	
8.	Raphael Ngalu	NDEP	raphaelngalu96@gmail.com	0792293181	
9.					
10.					

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University of Nairobi Enterprise Services (UNES) Limited,

ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI

ACTIVITY: ~~KEY INFORMANT INTERVIEW~~ WITH UNES CONSULTING TEAM

VENUE- Mahatma Gandhi Wing Grounds. Date: 22/08/2025

ATTENDANCE LIST

NO	NAME	ORGANIZATION	EMAIL	PHONE	SIGN
1.	Brandon Mark	UON	brandondonmarkstudent@uonbi.ac.ke	0706078805	
2.	Vincent Otieno Otieh	UoN	vincentoti254@gmail.com	0111336672	
3.	Maurica Otieno Achar	UoN	acharmaurica066@uonbi...	0796832692	M.O
4.	Nicholas Makanda	UoN	nkeroy146@gmail.com	0758508566	
5.	Ramadhana Mwendia	UON	idrisimwendia@gmail.com	0757617888	
6.	JONATHAN WANYAMA	UNES	Jonarayi7@gmail.com	0729138831	
7.	Raphael Ngalu	UNES	raphaelngalu98@gmail.co	0792293181	
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A-3.2 Key Informant Interviews Feedback

Key Informant Interview (KII) Guide – Directorate of Occupational Safety and Health Services (DOSHS), Nairobi

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Science & Engineering Complex, Chiromo Campus

Introduction

Thank you for agreeing to participate in this discussion. We are conducting a Key Informant Interview to gather expert insights on occupational safety and health (OSH) requirements, compliance expectations, and their implications for the proposed Engineering and Science Complex at the University of Nairobi.

The purpose of this interview is to understand the role of DOSHS in regulating and monitoring OSH matters, identify potential risks, and highlight best practices to ensure the project complies with legal and safety requirements. The information you provide will be treated with strict confidentiality and will only be used to inform project planning and implementation.

Estimated Duration: 10–15 minutes

Sections and Questions

1. Background and Role

i. Can you briefly describe the mandate of DOSHS in relation to construction projects in Kenya?

Regulator of OSH & WIBA Act & Hygeine Surveillance.
Routine Inspection } Prominent or Imminent
Check Inspection } Injuries at workplace
Special Inspections Health status

ii. What are the key regulations and compliance requirements that a university project of this nature should meet?

→ Risk Assessment → First Aid audit (still not implemented) (2 each)
→ OSH Audit → Firesafety audit - (Fire Marshals : 2).
- Approval of Plans.
- Contractor appoints Safety and Health : Certified Professional: OHS.
- 7 days prior and 7 days after notification to DOSHS → Workplace
→ OSH safety Committee if site employs more than 20 Minimum 7 people. Certificate.

2. OSH Requirements for Construction Phase

i. What are the most critical occupational health and safety risks during large-scale construction works?

- Fall from height - Occupational diseases: dust. (Hygeine Surveillance)
- Scaffold collapse - Ergonomics: (Techniques, Heavy loads)
- Machinery safety: mixing : Crane excavation } all plants have to be approved and inspected.
- lifting. 1
- Traffic: (Accidents) - underground cables

ii. What measures are recommended for contractors to ensure worker and community safety? Control hazards

- Risk Assessment
- Barricading site (Safety nets)
- Medical Exams (Surveillance)
- Noise to the worker (PPEs)
- Signages
- Plant inspection and Consistent maintainance
- PPEs use

iii. What role does DOSHS play in monitoring compliance during construction?

- Inspections (regular) →
- OSH audit
- Minutes from OSH committee (Quarterly basis) every 3 months
- Accident Investigations
- Fire safety Audit
- Maintain machine inspections and plant
- Risk assessment

3. OSH Considerations for Operational Phase

i. Once the facility is complete, what key OSH issues should the University of Nairobi consider for students, staff, and visitors?

- Registration and renewal of OHS certificate every year after handover
- Audit (work place) Every after 12 months
- Safety trainings
- Material and safety data sheets

ii. What are the mandatory certifications or inspections required before occupation of the new complex?

Since Plannes were approved:
- Ventilation
- Art: 3m high (10m³ of space)
- Biosafety cabinet

} Risk Assessment done to oversee ~~following~~ hazard

& H equipment:
- Certificate of inspection and maintainence

4. Risk Mitigation and Best Practices

i. What best practices in OSH should be adopted to prevent accidents and occupational illnesses?

Pro-active Approaches:
- OHS Policies
- Keep environment clean → Safety and health culture: Sensitization & training
- look into welfare of workers: Firecome management
- Emergency Preparedness plans:
  - First Aid Kits and Aiders
  - Extinguishers
  - Ambulance

ii. How should the University ensure continuous compliance with DOSHS requirements?

- Compliance with the law:
- Report any accidents
- Liaise with DOSHS office:
- Open communication

2

5. Coordination and Communication

i. How should the project team engage DOSHS throughout the project lifecycle?

- Notify DOSHS before commencement — (Registration and self assessment)
- Regular Inspections / monitoring / Audit - Routine inspection (randomly)
  - Check visit
  - special inspection:

ii. What reporting or inspection protocols should be observed?

- Reporting of injuries under WIBA: - (3 or more days) } online
- Registration: is online — Reporting in the Portal: non fatal - 7 days fatal: 24hours.

6. Closing OHS committee: share the minutes with DOSHS: (email + hardcopy)

i. What key recommendations would you give to ensure that the Engineering and Science Complex fully complies with OSH regulations?

7. Personal Details

Date: 02/09/2025

Time: 9:00am - 10:00am

Name of Respondent: Naaicla Salim

Name of Interviewer: Jonathan Wanyaka

Position: Ass. Director OSHs

Contact (if consented): 0728001366

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Science & Engineering Complex, Chiromo Campus

Introduction

Thank you for agreeing to this interview. We are seeking to gather insights from the University Security Office on potential safety and security risks related to the proposed Engineering and Science Complex. Your expertise will help us identify appropriate security measures during construction and operational phases, ensuring that the facility remains safe for students, staff, contractors, and visitors.

The information provided will be treated confidentially and used only for project planning and safety management.

Estimated Duration: 10–15 minutes

Culture:

Sections and Questions

1. Background and Security Mandate

Could you describe the role of the University Security Office in ensuring campus safety and security?

→ Overall student, staff and assets of the university.
also Parents, Suppliers and calender events.

What current security protocols and systems are in place within the University, and how effective have they been?

i. Physical Security Measures	Quick Security Analysis to classify measures.
2. Electrical " "	- Mostly 2 or most of them.
3 Procedural " "	- Very effective.

2. Security Risks During Construction

What are the key security challenges expected during the construction of a large-scale facility on campus?

i Problem around the city: Vandalism (internally and externally)
Scrap metal vandalism. - (manage to as low as acceptable.)
2. Managing of human traffic especially workers: access management.
3. Culture to ignore the Security during development of projects
eg: lifts for evacuation
- PWD involvement and measures } evacuation

How should contractors and site workers be managed to reduce risks such as theft, trespass, or vandalism?

walls - Routes and..

① - Combination of the three measures

CCTV -

Police officers shift

What coordination should exist between the contractor's security arrangements and the University's security office?

Close working relationship: Constant meeting

" Coordination

Sharing of intelligence

3. Security Considerations for Operational Phase

Once the complex is complete, what security risks are anticipated for students, staff, and property?

- Theft

-

What access control measures (e.g., ID systems, CCTV, perimeter fencing, guards) should be put in place?

Management: Building Security Protocols must be adhered.

Baseline Security Measures - Public Spaces: CCTV covered

- Respect territorial spaces

- Every floor must have a security guard.

How should the University prepare for emergencies such as fire, terrorism, or civil unrest in relation to this new facility?

University is well organized Disaster Response Management Plan: Incorporate and Implement.

4. Risk Mitigation and Best Practices

What best practices in campus security would you recommend for the new complex?

Employ baseline security measures.

How should the University handle security sensitization and awareness for students and staff?

2

is advised -
Professional Protocol security and awareness brainwashed
Training, awareness, Sensitization, drills

What role can technology (CCTV, alarm systems, biometric access, etc.) play in enhancing campus security?
Very crucial security systems latest technology -
Class attendance, room access, laboratories, food mess

5. Coordination and Communication

How should the University Security Office coordinate with external stakeholders such as the police or private security firms?
This is a public institution: Government takes lead role
Our location in CBD and Nairobi. City challenges spill over into the university

What reporting and monitoring structures would you recommend for day-to-day security management?
University has 3 : Internal - staff former from disciplined forces
Outsource: Private security guards
Government Security (NIS)

6. Closing

In your opinion, what is the most critical security investment the University should prioritize for the new complex?
1. Electronic Security Measures → CCTV
2. Physical security measures - Fence

Are there other security issues we haven't discussed that you believe are important for this project?

7. Personal Details

Date: 08.09.2025
Time: 16.19 HRS
Name of Respondent: Kipyegon Cheruiyot (May Ag)
Name of Interviewer:
Position: Director Security Unit
Contact (if consented):

Appendix 4: Focus Group Discussions with Different Stakeholders

Focus Group Discussion – Ariziki Restaurant Staff (UNES LTD, University of Nairobi)

A Focus Group Discussion (FGD) was held with staff members of Ariziki Restaurant, a key hospitality provider located within the University of Nairobi. The session was attended by five staff representatives: The purpose of the discussion was to capture their perspectives on the proposed Engineering and Science Complex at Chiromo Campus, focusing on anticipated impacts, opportunities, and recommendations from a service provider's standpoint.

(i) Background and Role

The Ariziki staff described their primary role as offering catering and hospitality services to students, staff, and visitors within the university. Their work involves daily meal preparation, customer service, and event catering. While the duration of service varied among the respondents, they collectively represented extensive experience in managing food service operations on campus. As a frontline service provider, their operations are directly influenced by changes in campus activity, foot traffic, and institutional developments.

(ii) Awareness and Initial Reactions

The majority of participants were not initially aware of the proposed construction of the Science and Engineering Complex. However, upon being informed, they expressed optimism and support for the project. Their immediate reaction was that the new development would boost business by attracting more people to the campus, thus increasing restaurant revenue. They also saw the complex as adding academic value to the University of Nairobi and enhancing opportunities for knowledge creation and innovation among young people. Furthermore, they identified potential partnerships in catering, including the provision of meals, snacks, and refreshments to contractors, students, and future users of the complex. Importantly, the staff emphasized that the project could create employment opportunities for young people, tapping into the underutilized potential of Kenyan youth.

(iii) Perceived Impacts

During the **construction phase**, the staff anticipated both positive and negative impacts. On the positive side, they expected increased business through partnerships with contractors and construction workers who may require catering services. However, they also raised concerns regarding noise, dust, and traffic congestion during material deliveries, which could disrupt normal operations and deter customers.

In the **operational phase**, the anticipated impacts included increased activity that would likely benefit the restaurant through higher demand for catering. At the same time, the staff raised security concerns, noting that greater human traffic could create risks if not well managed. They also pointed to the potential disruption of the local ecosystem, particularly the displacement of monkeys and other small animals frequently seen around Chiromo, which might lead to nuisance or safety issues for restaurant users.

(iv) Environmental and Social Concerns

A key environmental concern highlighted was the disruption of the ecological balance within Chiromo Campus, particularly regarding monkeys and other wildlife. Social concerns included the risk of theft or insecurity arising from an influx of external workers. The staff also feared possible damage to landscaping and green areas around the restaurant.

To mitigate these concerns, the group proposed several practical measures. These included installation of dust nets around the construction site, provision of adequate fencing and barricades, vetting and registering workers, strict record-keeping of stock and tools, and conducting regular security checks. They also suggested traffic control measures such as proper signage and designated passageways for construction trucks.

(v) Opportunities and Expectations

The Ariziki staff identified multiple opportunities arising from the project. They anticipated increased partnerships with both students and the university administration, enhanced visibility of the University of Nairobi globally, and value addition through improved infrastructure. Their primary expectation was to be considered as a catering partner for contractors and users of the new complex, thereby expanding their customer base. They also requested that drilling and excavation activities be conducted with minimal disruption to daily restaurant operations.

(vi) Communication and Engagement

The group indicated a strong preference for being kept updated throughout the project. Their preferred channels of communication included notice boards within the university, physical presentations to stakeholders, and digital platforms such as WhatsApp groups for timely updates.

(vii) Recommendations

Key recommendations included using Gate B near Qwetu Hostels and Chiromo Morgue for the delivery of construction materials, thereby reducing congestion near the restaurant. They also suggested scheduling deliveries during off-peak hours to minimize disruption to dining services. Finally, they emphasized the importance of deliberate partnerships with Ariziki in providing hospitality services to the complex, requesting priority consideration as a long-standing campus service provider.

(viii) Conclusion

Overall, the Ariziki Restaurant staff expressed strong support for the proposed Engineering and Science Complex, viewing it as both an academic milestone for the university and an economic opportunity for service providers. While they acknowledged potential disruptions from construction activities, they provided practical mitigation measures and stressed the importance of communication, security, and ecological management. Their central appeal was for the university and contractors to partner with Ariziki in delivering catering services, ensuring that local businesses benefit directly from the project's implementation. Attcahed is a photo during the meeting.

Focus Group Discussion – Students with Disabilities (PWD), University of Nairobi

The Focus Group Discussion (FGD) with students with disabilities (PWD) at the University of Nairobi was conducted with five student representatives: The discussion focused on accessibility

challenges, perceptions of the proposed Engineering and Science Complex at Chiromo Campus, and recommendations to enhance inclusivity. The students represented different types of disabilities and shared lived experiences of navigating existing campus facilities.

(i) Background and Experiences on Campus

The students reported that their experience navigating current university facilities has not been satisfactory. Key challenges include lecture halls that are not disability-friendly: Taifa Hall seats are designed only for right-handed students; lecture halls lack ramps or accessible stairs for wheelchair users; and narrow seating arrangements make manoeuvring difficult. Students with vision impairments face challenges due to poorly labelled lecture halls and the absence of braille or audio support in lifts. Additionally, during the rainy season, the underpass connecting Chiromo Campus to the hostels becomes flooded, forcing PWD students to jaywalk across the busy Waiyaki Highway. Toilet facilities for PWD are largely inadequate, with only one functional unisex accessible toilet available at the UoN Towers, which frequently malfunctions. These issues highlight systemic barriers to inclusion.

(ii) Awareness and Perceptions of the Proposed Complex

Most in the group indicated they were not initially aware of the proposed Engineering and Science Complex. However, once informed, they expressed strong support for the project. They felt the facility would enhance research capacity, foster innovation, and strengthen the university's academic profile. They also saw the project as a potential hub for collaboration with innovators and researchers from other institutions, thereby increasing opportunities for students, including those with disabilities.

(iii) Accessibility Concerns during Construction

PWD students anticipated that construction activities would present additional barriers to mobility and accessibility. Delivery of materials and re-routing of movement within Chiromo would be particularly challenging for blind students and those using wheelchairs. They also identified noise and dust pollution as concerns, especially during sensitive periods such as examinations or graduation ceremonies.

(iv) Anticipated Challenges during the Operational Phase

In the operational phase, the group highlighted several accessibility challenges that may arise if universal design principles are not incorporated. These include inadequately sized laboratory workspaces, excessively high lab benches, a lack of ramps and wheelchair-accessible pathways, and limited provision of adjustable seats. Students with vision impairments emphasized the need for

clear signage, braille labelling, and support staff to guide users within the building. The absence of such features, they warned, would perpetuate existing inequalities in access to facilities.

(v) Opportunities for Inclusion

The students identified potential opportunities that the project could bring for PWD inclusion. Employment opportunities for interpreters and support staff were mentioned as a priority. They also saw the project as a chance to create innovation spaces that are accessible to PWD, ensuring they can fully participate in research and innovation. Ensuring inclusivity in the design would set a precedent for PWD-friendly infrastructure in higher education.

(vi) Recommendations and Expectations

The group emphasized that all workers and staff at the new complex should undergo training on disability awareness to ensure respectful and supportive engagement with PWD. They recommended incorporating lifts, ramps, spacious pathways, braille labelling, and clear signage as standard features. They also suggested that stalls for food, printing, and other essential services be incorporated within the complex to reduce mobility burdens for PWD researchers. On communication, they recommended regular updates through PWD groups in faculties, email notifications, written notices, and inclusion of PWD-focused events or forums.

(vii) Conclusion

Overall, the PWD student representatives welcomed the proposed Engineering and Science Complex, recognizing its potential to enhance research, innovation, and inclusion at the University of Nairobi. However, they underscored the need for deliberate planning to address accessibility challenges during both the construction and operational phases. They emphasized that if implemented inclusively, the project could become a model for accessible university infrastructure in Kenya. The group expressed willingness to be contacted for future updates and consultations.

A-4.1 Focus Group Discussions Attendance Registers

Focus Group Discussion (FGD) Guide – PWD Students

Project: ESIA – Proposed Engineering and Science Complex at Chiromo Campus

Purpose: To gather collective experiences and perspectives from PWD students on accessibility, inclusion, and potential impacts of the project.

FGD Duration: 20 minutes

Group Size: 6–12 students

Introduction by Facilitator

"Good morning/afternoon. I am ____, part of the ESIA team for the proposed Engineering and Science Complex. We are here to learn about your experiences and perspectives as students with disabilities regarding the project. Your feedback will help ensure the campus is accessible, safe, and inclusive. Everything shared will remain confidential. Let's begin."

Obtain verbal consent from participants.

Discussion Themes & Questions

Background and Context

1. Please introduce yourselves (name, type of disability, year of study).

1. Brandon Mark.
2. Vincent Baraa Okual.
3. Otieno Achar.
4. Nicholas Makanda
5. Ramadhana Mwandia.

2. How long have you been at the campus, and how is your experience navigating facilities?

* Buildings – Gandhi (Lift is not working) Fourth Floor and using crutches is not friendly.
EDucation – NO lifts, no ramps
* Hostels like ramps
* Toilets: NO PWDs (NO gender - They share) – Should be accessible

Awareness and Perceptions

3. Are you aware of the proposed complex?

No, no

4. What is your opinion of this development from a student perspective?

- Create opportunity for research - addition to institution values and the researcher.
- Promote innovation and curiosity.
- Accomodate other innovators and researchers in different institutions

Accessibility Concerns

5. What challenges might you face during the construction phase (mobility, noise, dust, access to classrooms/labs)?

- Limitated mobility ie
- Route changes for blind students and personnel.
- Dust
- During special occasions like graduations and demos - stopping of construction advised

6. During operational phase, what accessibility or inclusion challenges do you anticipate?

- Ramp and stairs levels - accessibility
- Accessibility of paths ie for people using wheelchairs
- Good label of buildings and to accomodate PWD. Vision. Braces recommended. for Blind
- Good space allowance for PWD

Opportunities

7. Are there potential benefits for PWD students (academic, social, or employment opportunities)?

- Employment opportunities - supervisors
- Space for innovation -
- Due to accessibility of building for PWD - it will make ie easy for PWD to access and research/innovate

-

8. How can the project promote social inclusion on campus? ✓

- By making the building PWD friendly i.e accessible to PWD such as lifts, pathways spacious enough, Great labeling and provision of ramps and elevators
- employ workers aware of PWD and their concerns and needs

Expectations and Recommendations

9. What measures should the University or contractors implement to ensure accessibility for PWD students?

people who be working at the complex to have awareness and trained in PWD handling.

10. How should communication with PWD students be maintained during the project?

* PWD days and events →
* Groups at faculty
* Emails on updates
* Phone
* Written information not pictorials

11. Suggestions to minimize disruption and maximize benefits?

* Put up stalls = food and printing to allow access
* Corruption is still a problem.

Closing

"Thank you for your insights. Would you like to be contacted for updates or follow-up discussions?"

☑ Yes ☐ No

Key Informant Interview (KII) Guide – PWD Student Leader

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus

Purpose: To gather insights from the leader of PWD students on anticipated impacts, concerns, and opportunities within the campus.

Interview Duration: 15–20 minutes

Date: 22/08/2025

Time: _____

School / Group Name: UON MAIN CAMPUS

Name of Respondent: Ramadhana Iteri

Position: PWD Representative

Contact (if consented): 0757617888

Introduction by Interviewer

"Good morning/afternoon. My name is _____ and I am part of the team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex at Chiromo Campus, University of Nairobi. As the leader of PWD students, we value your perspective on how the project might affect your access to facilities, learning environment, and campus life. Your responses will be treated confidentially and used only for the ESIA. May we proceed?"

Consent Granted:

☑ Yes ☐ No

Thematic Areas & Questions

Background and Role

1. Can you describe your role as a leader and the activities or support your group provides to PWD students?

Representing PWD students - raising PWD students needs to the head Board office.
- Reports and making recommendations.

2. How long have you been a student at this campus?

3 years.

Awareness and Initial Reactions

3. Are you aware of the proposed Engineering and Science Complex?

Yes.

4. What is your initial reaction to the project as a student?

- Good project - innovation and creativity to all students in the institution.

Perceived Impacts ✓

5. What positive or negative impacts might the project have on PWD students during:

- students will be handed an opportunity to actualize their ideas through innovation and Research.
- curiosity and creativity will be promoted.
- institution will benefit student across the country.

Construction phase (mobility, noise, safety, study environment)

- Mobility - Through route changes especially for PWD
- noise
- Dust.

Operational phase (access to labs, lecture halls, inclusive participation)

- accessibility - Ramps and stairs
- space allocation for PWD.
- Good Cabling for people with vision problems

Environmental and Social Concerns

6. Are there specific accessibility or social inclusion concerns you anticipate?

- Accessibility of the complex facility - Ramp and stairs
- Accessibility paths for PWD (wheelchairs).
- Labeling ; buildings, elevator labeling to accomodate blind people.

7. How do you think these concerns can be managed or mitigated?

- Paths for people using wheelchairs
- Good labelling of building and
- Allowance for space for people with disability spaces, ramps and elevators.

Opportunities and Expectations

8. Do you foresee any opportunities for PWD students in terms of learning, employment, or engagement with the complex?

Promote innovation and creativity.
An opportunity to PWD to put knowledge to use.

9. Any expectations you have of the University or contractors in supporting accessibility and inclusion?

- eliminate any form of discrimination to PWD.
- Accessibiety of the building to every one including PWD.

Communication and Engagement

10. Would you like to be kept informed during the project?

☑ Yes ☐ No

11. Preferred communication channels:

☑ Email ☑ WhatsApp ☑ Meetings ☑ Notices

Recommendations

12. Suggestions to minimize disruption and enhance benefits for PWD students?

- Trained PWD workers, engineers
- Guides for PWD and workers - To be trained and aware of PWDs.

13. Any priorities the University should consider for inclusive campus access and participation?

Accessibility - Gate, toilets, Ramps.
lack of toilets of gender based.
Information sharing to PWDs.

Closing

"Thank you for your time. Would you be open to further contact if follow-up is needed?"

☑ Yes ☐ No

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 19/08/2025.
Time: 19/08/2025
Institution Name: Kolobot Gardens Ltd
Name of Respondent: Jackson Sare
Position: Accounts
Contact (if consented): 0721494813

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
Hotel and Serviced Apartments:
Meeting and Conference halls - 3

Q2: How long have you operated in this area?
Response:
Constructed 1974 - Apartments

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Engineering and Science Complex at Chiromo Campus?
☐ Yes ☑ No

Q4: What is your initial reaction to the project?
Response:
Development to the Education Institution is good.

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?
  Response:
  - Noise affects the clients

- **Operational phase** (e.g., increased activity, safety/security concerns)?
  Response:
  No interference during operations

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?
Response:
Noise

Q7: How do you think these can be best managed or mitigated?
Response:
If noise; be within working hours 8-5;
by noise barriers.

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?
Response:
Foreign guests Accomodation and liaise with UNES.

Q9: Any expectations you have of the University or the contractors?
Response:
- Time of construction restrain (8am - 5pm)

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☐ Yes ☑ No

Q11: Preferred communication channels (tick all that apply):
☐ Email ☐ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

NA.

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response:
Noise Barriers

Q13: Any local priorities the University should be aware of?
Response:
~~NA~~: Conserve the River.

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☐ Yes, open to further contact
☑ No

Additional Notes (if any):

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 19/8/25
Time: 9 20 am
Institution Name: Olive Crescent International school.
Name of Respondent: _____
Position: School Administrator
Contact (if consented): 0716222333

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
As a school admin I am responsible of smooth daily operations by handling student record, admission and general office support.

Q2: How long have you operated in this area?
Response:
2 years.

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Engineering and Science Complex at Chiromo Campus?
☑ Yes ☐ No

Q4: What is your initial reaction to the project?
Response:
My first initial reaction was is there will be possible benefits for the school as a learning environment

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?
  Response:
  As of todate we have not faced any negative impacts.
- **Operational phase** (e.g., increased activity, safety/security concerns)?
  Response:
  Everything has been normal ever since.

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?
Response:
ND.

Q7: How do you think these can be best managed or mitigated?
Response:
N/A

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?
Response:
Yes

Q9: Any expectations you have of the University or the contractors?
Response:

To the University we expect them to foster collaboration with our school in the near future.

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☐ Yes ☑ No

Q11: Preferred communication channels (tick all that apply):
☐ Email ☐ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

N/A

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response:

Q13: Any local priorities the University should be aware of?
Response:

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 11/08/2025
Time: _____
Institution Name: UNES HQ
Name of Respondent: SAM OCHIENG-
Position: CMC / PA-
Contact (if consented): sam.Ochieng@uonbi.ac.ke-

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
. Commercial arm of the University of Nairobi. -. Tasked to manage the business initiative of the University: Consultancy, Hospitality, Bookshop and Medical Services, and any other Commercial initiative :- ~~Corporate~~ Communication and Corporate Services

Q2: How long have you operated in this area?
Response:
29 Years.

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Engineering and Science Complex at Chiromo Campus?
☑ Yes ☐ No

Q4: What is your initial reaction to the project?
Response:
Positive. A lot of outputs: Patents, MoU; Research that will affect
It will be one of a kind.

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?
  Response:
  Noise.

- **Operational phase** (e.g., increased activity, safety/security concerns)?
  Response:
  Increased activity → Engagement with external partners
  Reactive to Artiki in Chiromo.

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?
Response: (System)
Sewer lines may not serve population load: Kirichwa may be polluted and cause foul smell.

Q7: How do you think these can be best managed or mitigated?
Response:
Correct planning: (An overhaul of the sewer system).
Sustainability in construction.

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?
Response:
Yes, Consultancy, Hospitality and better engagement.

Q9: Any expectations you have of the University or the contractors?
Response:
Create awareness: Prepare the stakeholders on the impact
Comply with regulatory authorities: NEMA, KPLC.

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☐ Local Notice Boards ☑ Community Meetings ☐ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response: Awareness, Regulatory Compliance

Q13: Any local priorities the University should be aware of?
Response: Neighbourhood Concerns

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

UNES@uonbi.ac.ke

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 11/08/2025
Time: _____
Institution Name: _____
Name of Respondent: Gulam Hussein
Position: _____
Contact (if consented): SNOORDHAIC4AHOO.CO.UK

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
Home

Q2: How long have you ~~operated~~ lived in this area?
Response:
Since 1963

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Engineering and Science Complex at Chiromo Campus?
☑ Yes ☐ No Survey -

Q4: What is your initial reaction to the project?
Response:
Good - University is growing
Bad - Biodiversity loss

Perceived Impacts

Q5: What positive or negative impacts might this project have on your ~~institution~~ during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?
  Response:
  - Pollution - Traffic Congestion
  - Security Breech
- **Operational phase** (e.g., increased activity, safety/security concerns)?
  Response:
  NO

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?
Response:
For every tree fell, plant at least 2.

Q7: How do you think these can be best managed or mitigated?
Response:
Plant trees

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?
Response:
NO

Q9: Any expectations you have of the University or the contractors?
Response:

→ Put a barrier (security) before reaching main gate
– Reroute the trucks use the other gate
– Repair Fences, Overhead cables, water pipes, roads

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☐ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response:
- Use the alternative route. - Move the gate down

Q13: Any local priorities the University should be aware of?
Response:

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 06/08/2025
Time: 13:21 P.M
Institution Name: METROPOLITAN ESTATE
Name of Respondent: PATRICK N. KIMOTHO
Position: Manager Metropolitan Estate.
Contact (if consented): 0722 553085

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
Residential area. Hostels, offices, private home owners, business owners (6) spa 4, saloon.) · Guest House. Patrick Manages the estate in coordination with the committee (estate.).

Q2: How long have you operated in this area?
Response:
Over 25 years.

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Science and Engineering Complex at Chiromo Campus?

☐ Yes ☑ No

Q4: What is your initial reaction to the project?

Response:

welcomes the idea especially due to projects benefit to the learners and the society.
welcomes the idea fully so does the estate community. Feels there will be more business

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?

  Response: -

  i) Traffic congestion. - There is proposed waiting area nearby. currently being used by uber drivers.
  ii) Noise iii) Insecurity - control of workers - checking of debris.

- **Operational phase** (e.g., increased activity, safety/security concerns)?

  Response: - Traffic congestion.

  - Need Appreciation facilities within the area.
  - Increased demand of resources like water and electricity.
  - Security concerns - Road size depending on number of people accessing the facility.

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?

Response: - ~~Dama~~ Erosion ~~repair of~~ road ~~neare of~~ damage.

- Increased traffic along the road. → by trucks. → River pollution.
- Increased demand for resources i.e water

Q7: How do you think these can be best managed or mitigated?

Response: - Repair the access road incase of damage.

- Expand road accessing the university through Chiromo.
- Have a guard to control traffic / consider timing when traffic is low during ~~new~~ construction material delivery. - Allocate waiting area at tracks.

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?

Response:

Yes. More people visiting hence more revenues and recognition beyond Kenyan boarders.

Q9: Any expectations you have of the University or the contractors?

Response:

Yes. Ensure safety and security during and after construction.

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☑ Local Notice Boards ☐ Community Meetings ☑ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response: - Ensure repair of road incase of damage by construction trucks.
- Ensure traffic is controlled when trucks are coming and leaving.

Q13: Any local priorities the University should be aware of?
Response:
- University to frequently engage the community around in terms of safety and security concerns.
- Open market outside to be considered outside the morgue too - Restriction is proposed.

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 06/05/25
Time: 15:28
Institution Name: NAIROBI RESTAURANT
Name of Respondent: JOVIN OCHIENG
Position: THE CHEF
Contact (if consented): ochieng.chef@unes.uonbi.ac.ke
0730899785

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiroma Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
We are a hospitality department offering outside catering services and conference facilities. serving as the major university catering facility. I oversee day to day production operations

Q2: How long have you operated in this area?
Response:
The restaurant has been in the university since 2007. I have had the great opportunity of working with the team since 2024.

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Science and Engineering Complex at Chiromo Campus?

☑ Yes ☐ No

Q4: What is your initial reaction to the project?

Response:

The idea is welcomed especially because of business point of view and great addition to the university. ✓

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?

  Response:

  noise, dust

- **Operational phase** (e.g., increased activity, safety/security concerns)?

  Response:

  - Increased activity - especially in revenue generation.
  - recently risk - Ensure regular workers and vetting of people coming and leaving.

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?

Response: - ~~Ensure any~~
- Destruction of existing wildlife, since the area has variety wildlife.

Q7: How do you think these can be best managed or mitigated?

Response: -
- ensure restoration of the environment.

Construction to take care of existing wildlife, birds and animals spaces.

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?

Response:

Increased business in catering services to the workers and incoming students and researchers.

Q9: Any expectations you have of the University or the contractors?

Response:

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☑ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response: Ensure updating and of people around on the project and putting up of signs and posters to avoid accidents.

Q13: Any local priorities the University should be aware of?
Response:
Need of connection between chiromo and Confucious centre. The making of an under Memorandum of Understanding between Azziki for Catering services

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):
- Request of partnership between Riziki and the construction workers and the building occupants to supply food services. It will create more jobs and opportunities to young graduates and the university.

Key Informant Interview (KII) Guide

Project: Environmental and Social Impact Assessment (ESIA) – Proposed Engineering and Science Complex at Chiromo Campus
Purpose: To gather insights on potential social, economic, and environmental concerns or opportunities from neighbouring institutions.
Interview Duration: 10–15 minutes
Date: 06/08/2025
Time: _____
Institution Name: Cleanshelf Phase tu
Name of Respondent: Solomon
Position: Manager
Contact (if consented): _____

Introduction by Interviewer

"Good morning/afternoon. My name is....I'm part of a team conducting the Environmental and Social Impact Assessment (ESIA) for the proposed Engineering and Science Complex to be constructed within the Chiromo Campus of the University of Nairobi. As one of the key institutions in the vicinity, we'd appreciate your perspective on any anticipated impacts, concerns, or opportunities the project may bring. This interview will take about 10 to 15 minutes. Your responses will be treated confidentially and only used to inform the ESIA. May we proceed?"

☑ Consent Granted
☐ Consent Not Granted

Thematic Areas & Response Fields

Background and Role

Q1: Can you briefly describe the nature of your operations and your role within this institution?
Response:
Supermarket and Retail - Manager

Q2: How long have you operated in this area?
Response:
4 Months.

Awareness and Initial Reactions

Q3: Are you aware of the proposed construction of the Science and Engineering Complex at Chiromo Campus?

☐ Yes ☑ No

Q4: What is your initial reaction to the project?

Response: Good, Influx of students means good business.

Perceived Impacts

Q5: What positive or negative impacts might this project have on your institution during:

- **Construction phase** (e.g., noise, dust, vibration, traffic congestion)?
  Response: NA.
- **Operational phase** (e.g., increased activity, safety/security concerns)?
  Response: Influx of students is good for business.

Environmental and Social Concerns

Q6: Are there any specific environmental or social concerns you anticipate?

Response: None.

Q7: How do you think these can be best managed or mitigated?

Response: NA

Opportunities and Expectations

Q8: Do you foresee any opportunities for your institution or the surrounding community?

Response: More Students - longer Semesters.

Q9: Any expectations you have of the University or the contractors?

Response:

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☐ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response: ✓

Q13: Any local priorities the University should be aware of?
Response: As a business, we do not have any priorities

Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

Communication and Engagement

Q10: Would you prefer to be kept updated during the project?
☑ Yes ☐ No

Q11: Preferred communication channels (tick all that apply):
☑ Email ☐ Local Notice Boards ☐ Community Meetings ☐ WhatsApp ☐ Other:

Recommendations

Q12: Suggestions to minimize disruption and enhance local benefits?
Response: ✓

Q13: Any local priorities the University should be aware of?
Response: As a business, we do not have any priorities

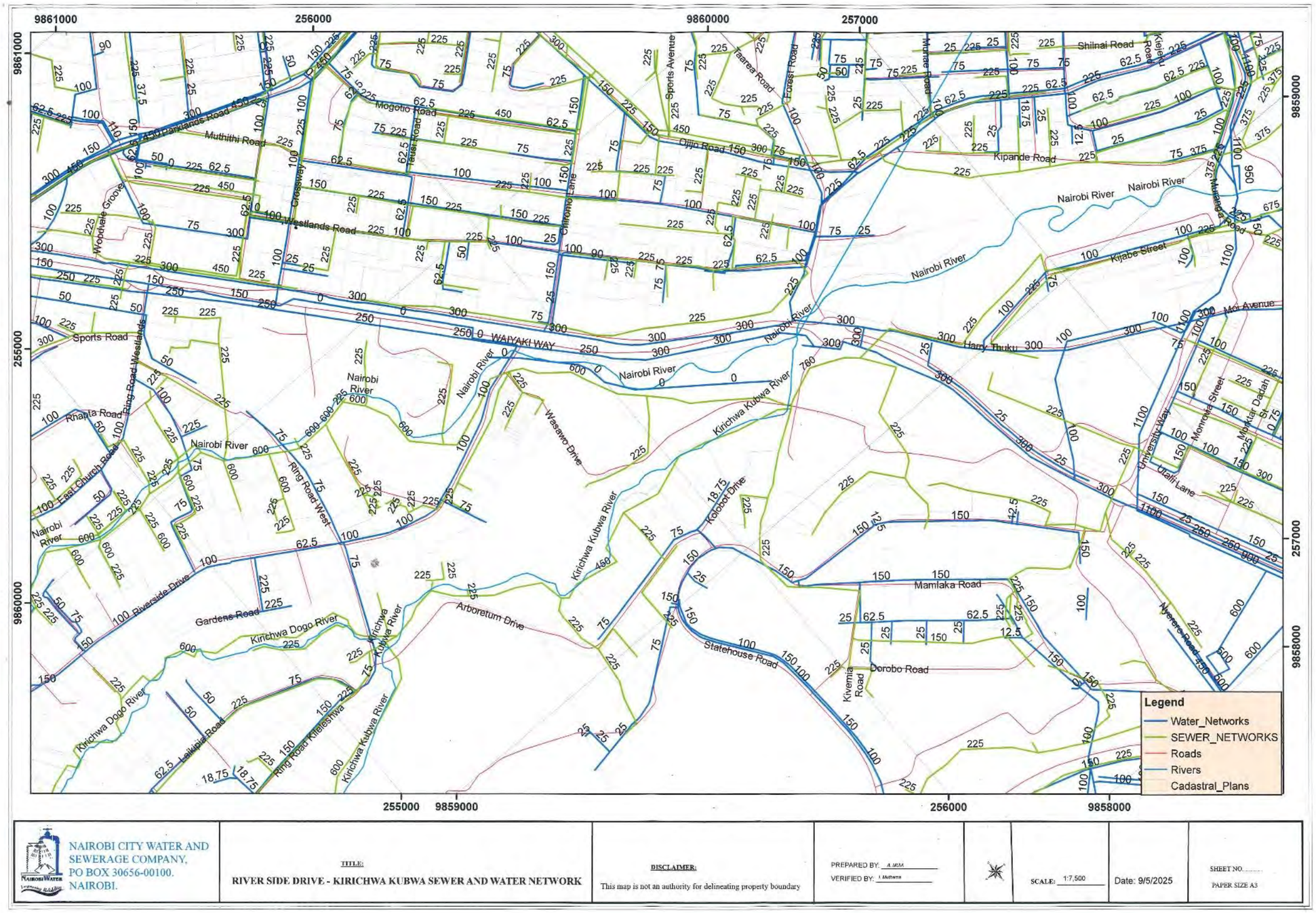
Closing

"Thank you very much for your time and for sharing your insights. Your views will be carefully considered in the ESIA process. Should there be any follow-up questions or opportunities for stakeholder engagement, would you be open to further contact?"

☑ Yes, open to further contact
☐ No

Additional Notes (if any):

Appendix 5: Nairobi Sewer Lines



Appendix 6: Project Photos

A-6.1 Kick -off Workshop Photos












A-6.2 Site Visit Photos

















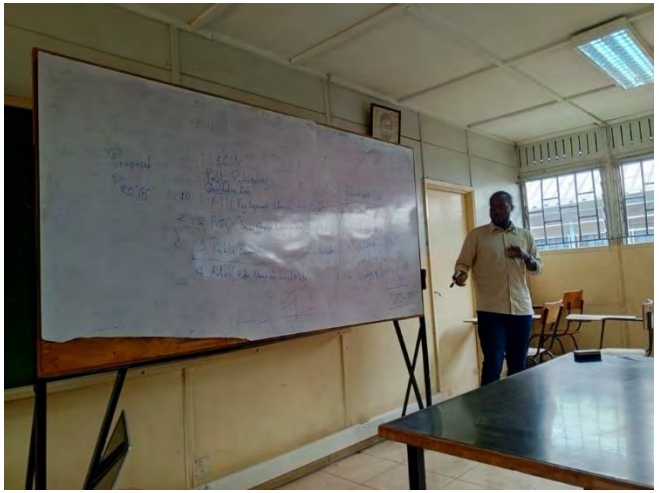





A-6.3 Enumerators Training















A-6.4 Stakeholder Engagement











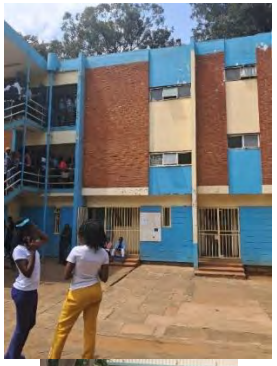




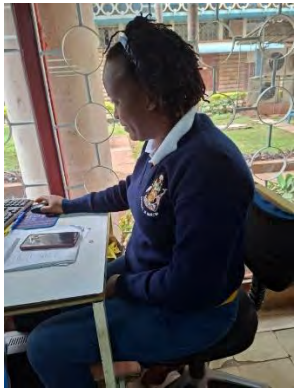






Long Lasting


A-6.5 Air Quality Measurements





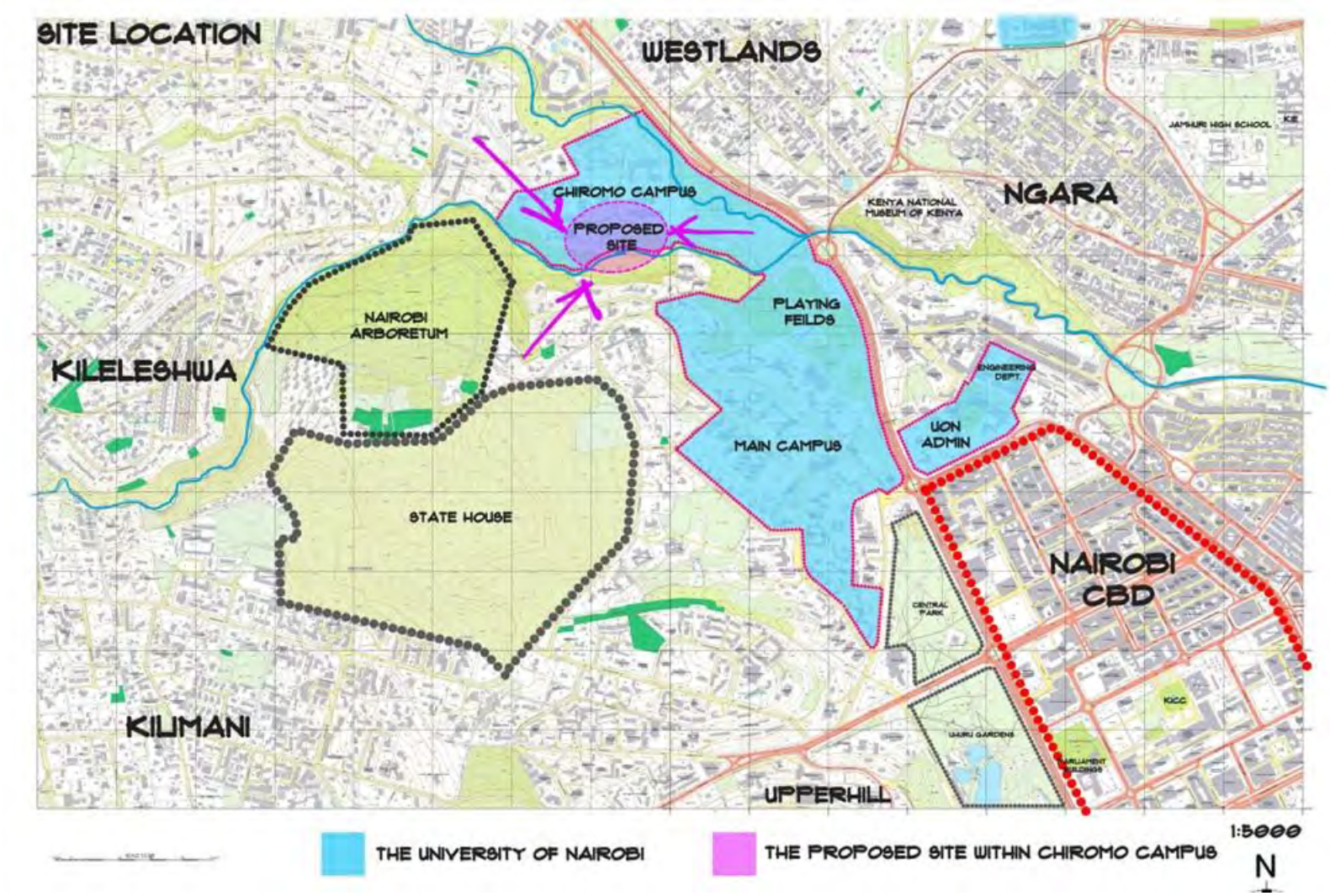
A-6.5 Ecology Study



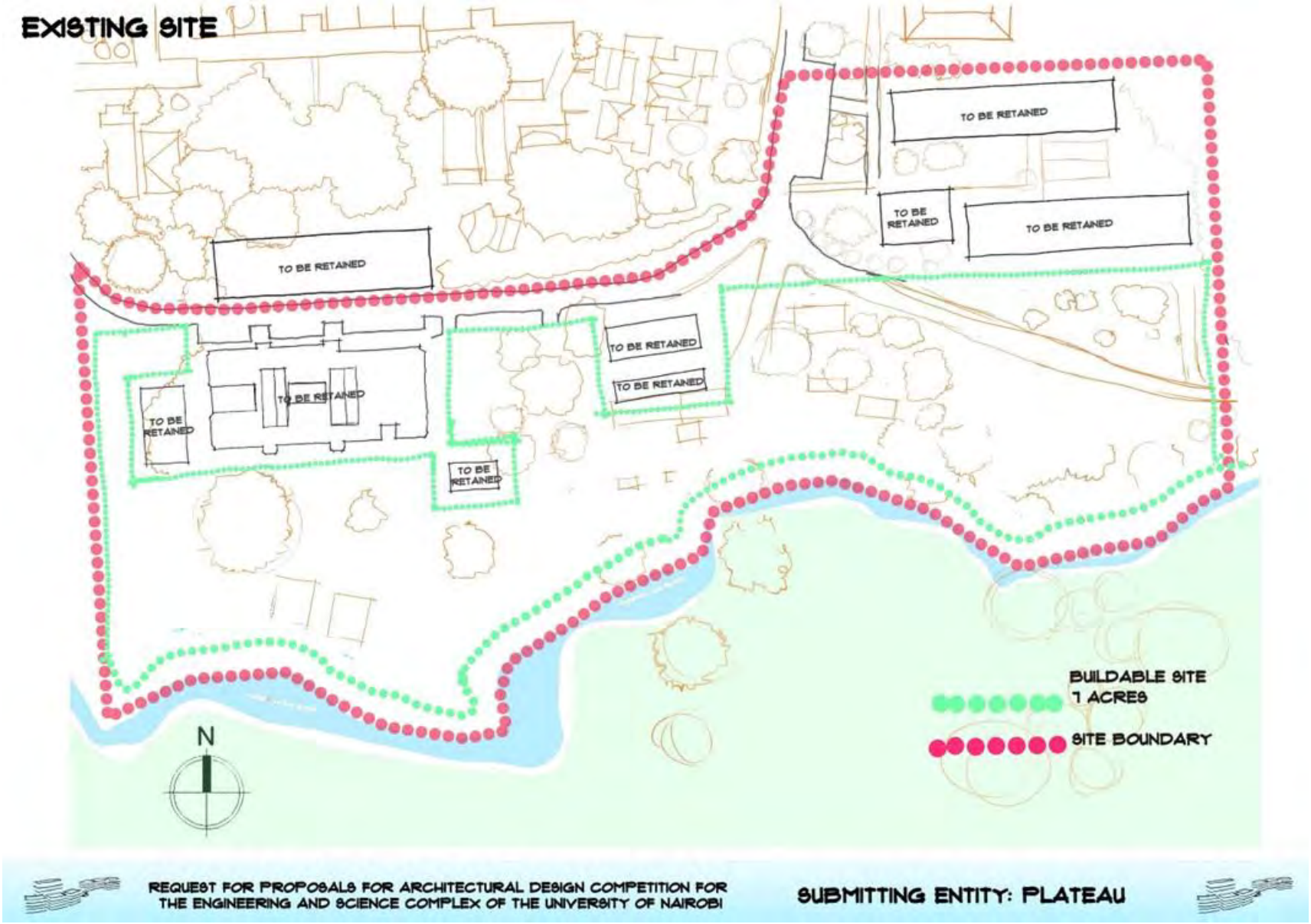


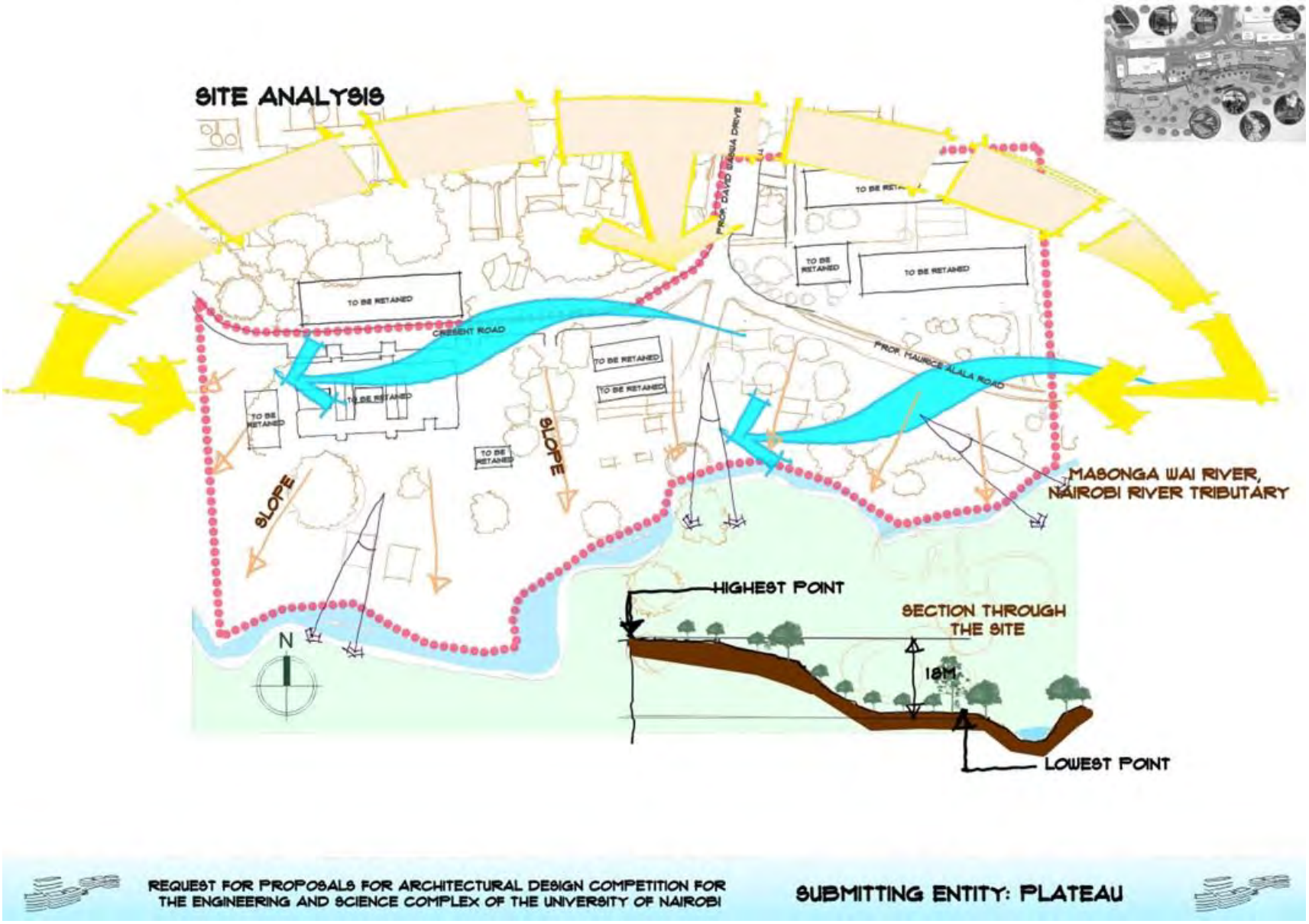


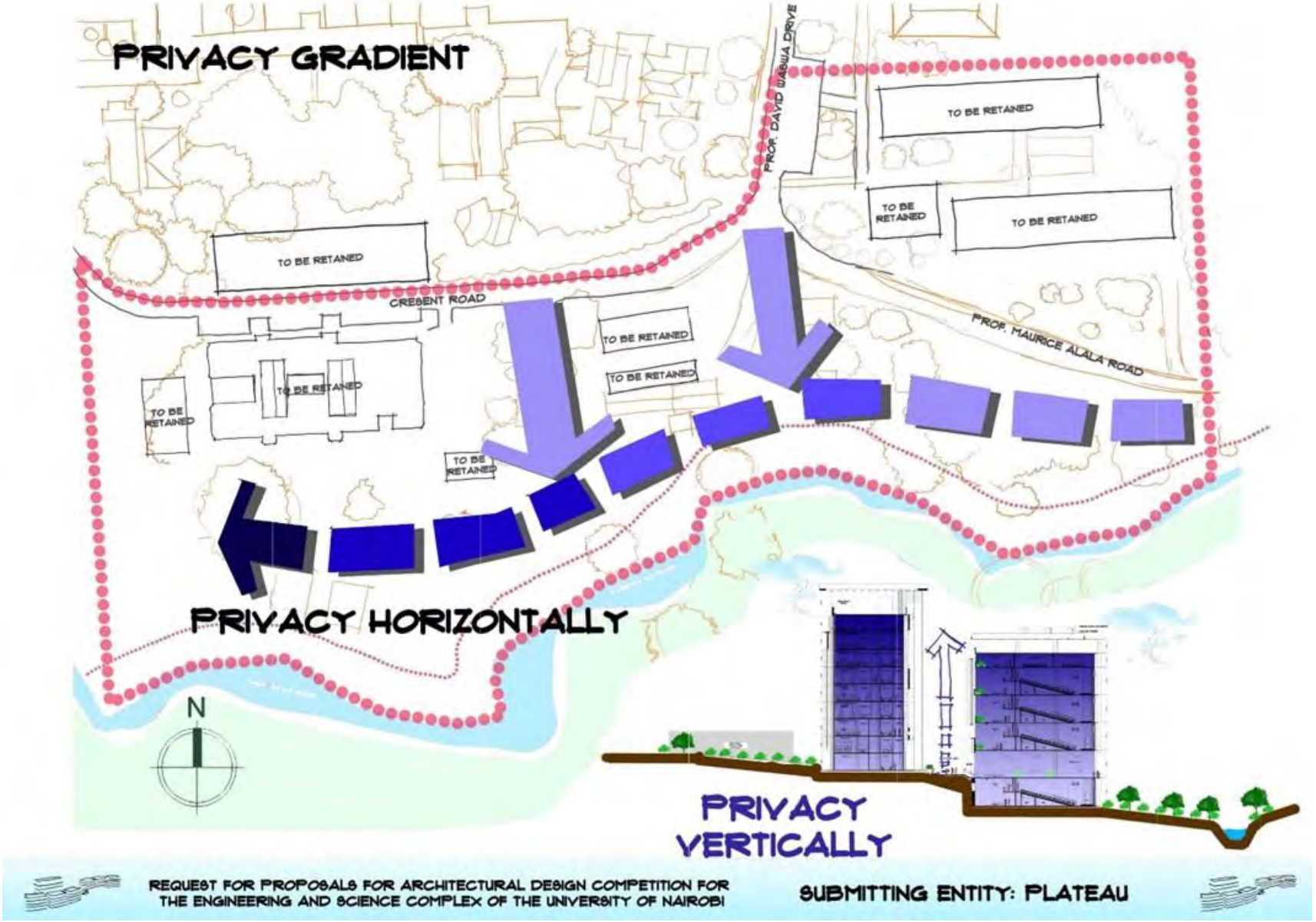

Appendix 7: Proposed Project Drawings.

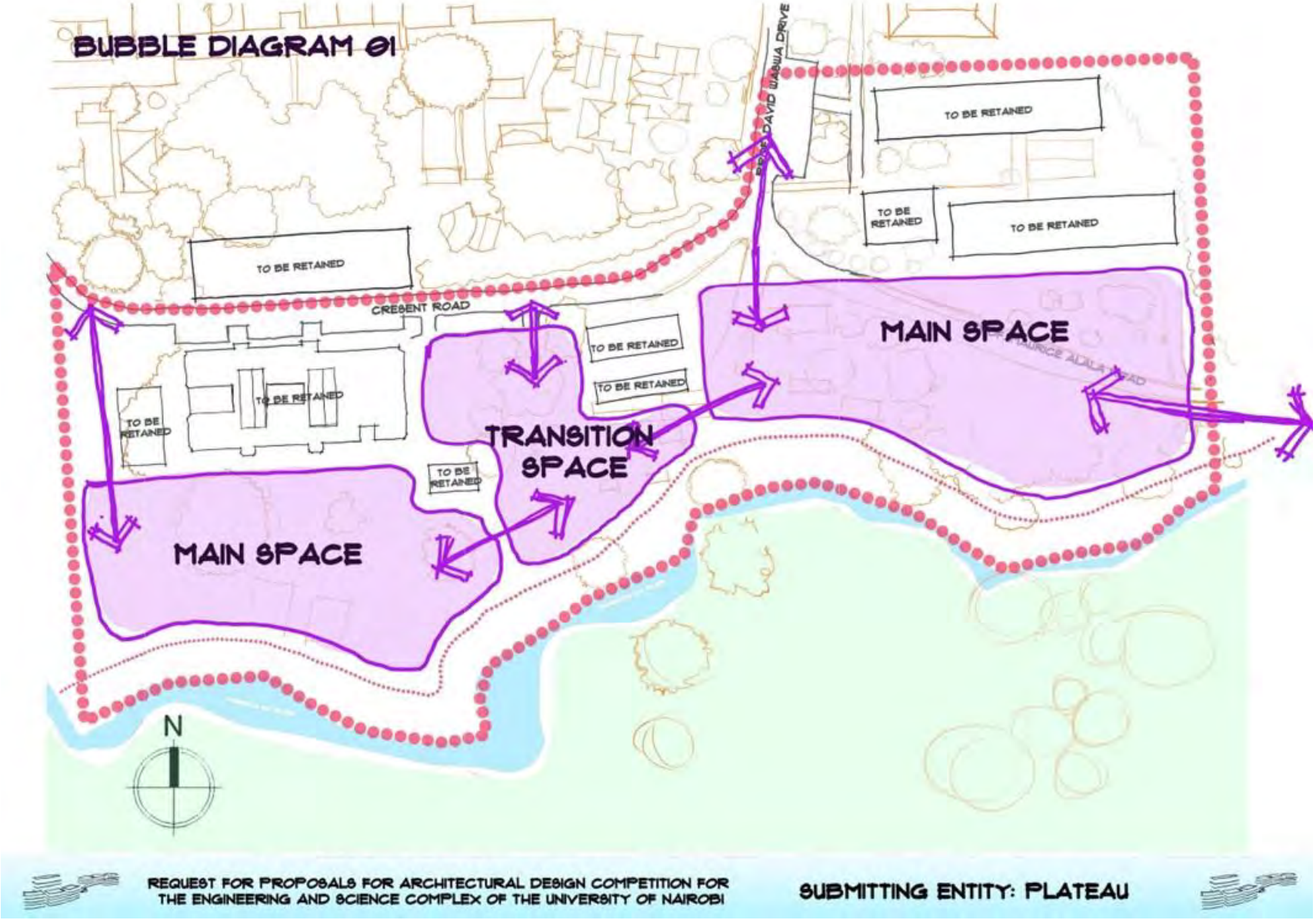


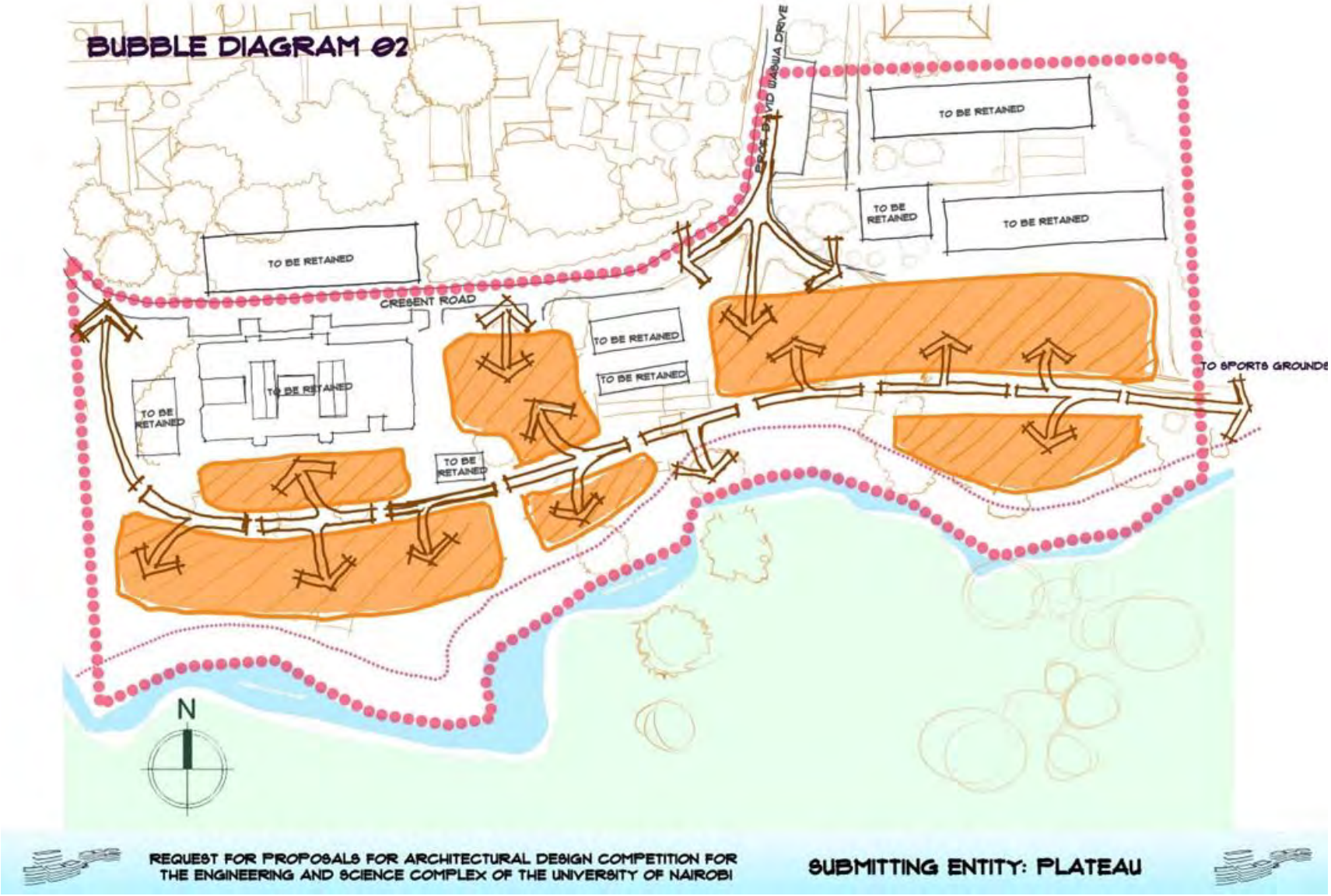

SITE LOCATION
1:1000
CHIROMO MESS HALL
CHIROMO HOSTELS
RIVER SIDE DRIVE
CHIROMO FUNERAL HOME
NAIROBI EXPRESS WAY
QUETU HOSTELS
SCIENCE AND PHYSICS LABS
MILLENIUM HALL #1
MILLENIUM HALL #2
PROF. DAVID MAKAU DR
HUNGAI ROAD
CHIROMO CAMPUS LIBRARY
SURGICAL SKILLS CENTER
COLLEGE OF HEALTH SCIENCES
DEPT. OF BIOCHEMISTRY
COMPUTING AND INFORMATICS
AFYANGE GARDEN
AIRZIKI RESTAURANT
SCIENCE CRESENT
MASONGA WAU RIVER
N
SITE IMAGES
ACCESS POINTS
PROPOSED SITE
A
PROF. ALALA ROAD TOWARDS THE SPORTS GROUNDS
B
VIEW FROM WITHIN THE SITE
C
VIEW OF EXISTING BUILDINGS ON SITE
D
VIEW OF EXISTING BUILDINGS ON SITE
E
VIEW OF ENTRANCE POINT TO THE SITE
ORIENTATION
PRIVACY GRADIENT
PRIVACY HORIZONTALLY
PRIVACY VERTICALLY
BUBBLE DIAGRAM #1
VEHICULAR MOVEMENT
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

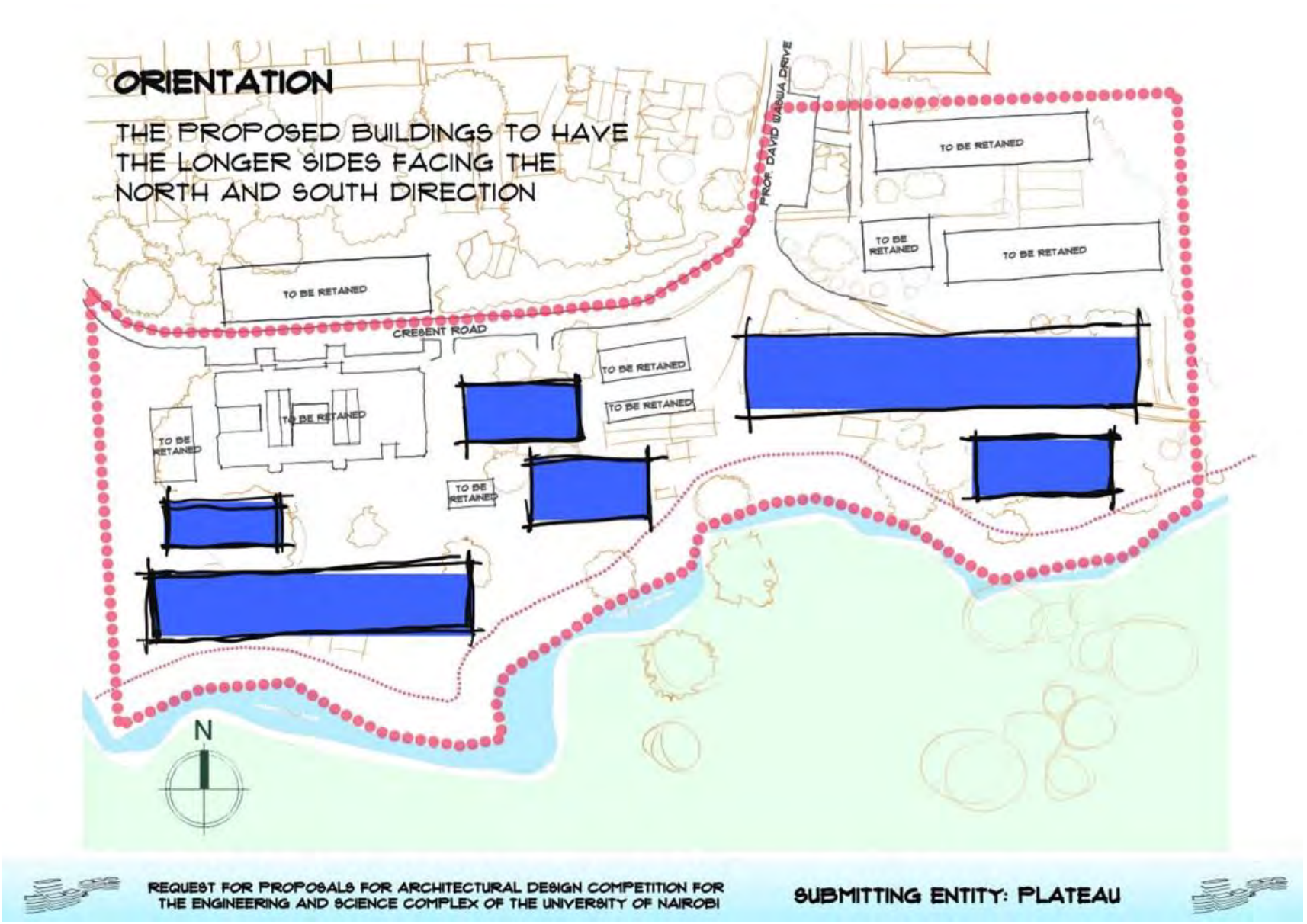

EXISTING SITE
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
BUILDABLE SITE
7 ACRES
SITE BOUNDARY
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

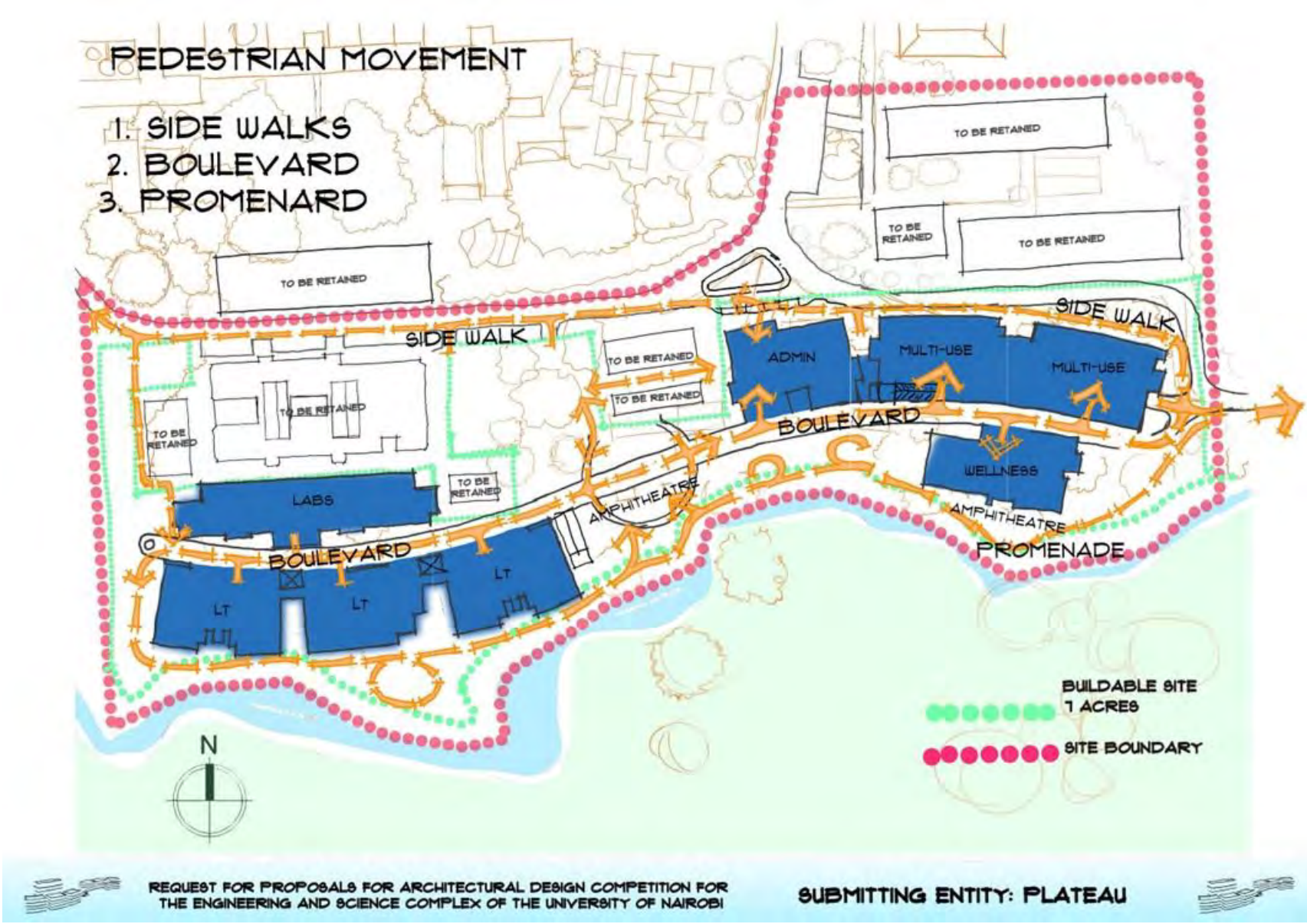

SITE ANALYSIS
PROF DAVID SIRMA DRIVE
CRESCENT ROAD
PROF MAURICE ALALA ROAD
TO BE RETAINED
SLOPE
SLOPE
MASONGA WAI RIVER,
NAIROBI RIVER TRIBUTARY
HIGHEST POINT
SECTION THROUGH
THE SITE
18M
LOWEST POINT
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR
THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

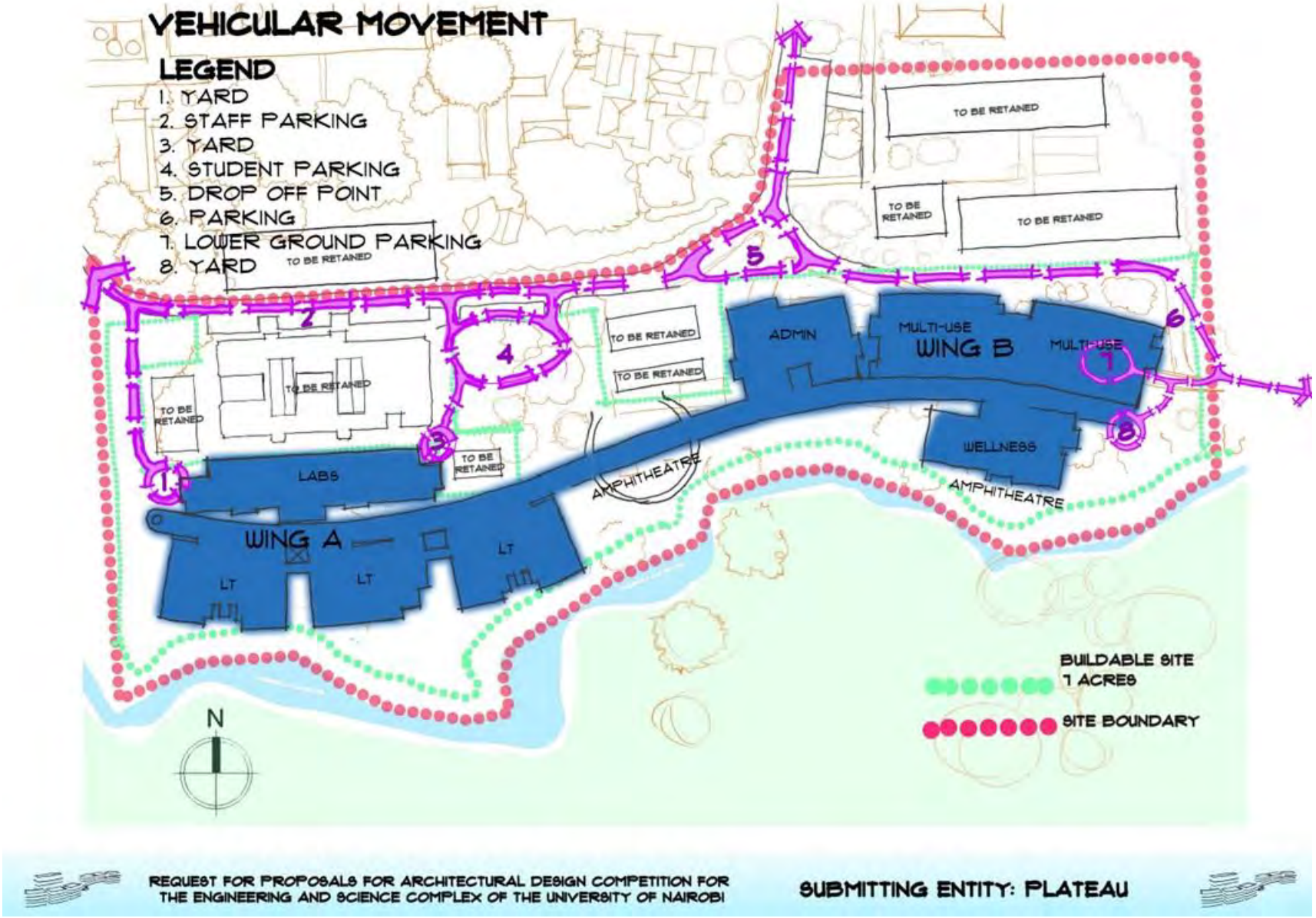

PRIVACY GRADIENT
PROF. DAVID WABWA DRIVE
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
CRESENT ROAD
PROF. MAURICE ALALA ROAD
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
PRIVACY HORIZONTALLY
N
PRIVACY VERTICALLY
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU


BUBBLE DIAGRAM 01
DAVID WANJUA DRIVE
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
CRESENT ROAD
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
MAIN SPACE
TRANSITION SPACE
MAIN SPACE
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU


BUBBLE DIAGRAM 02
TO BE RETAINED
CRESENT ROAD
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO SPORTS GROUNDS
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

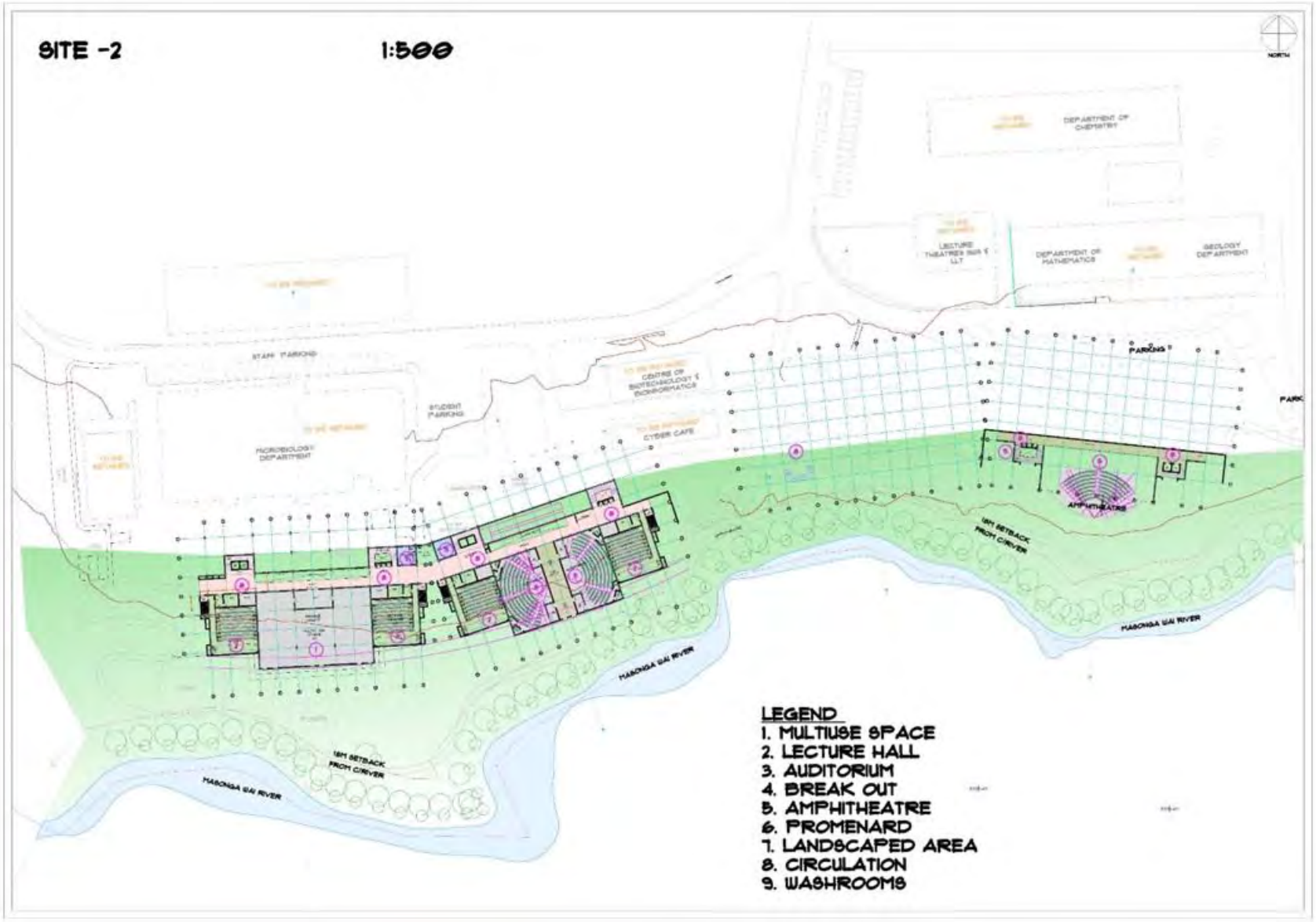

ORIENTATION
THE PROPOSED BUILDINGS TO HAVE THE LONGER SIDES FACING THE NORTH AND SOUTH DIRECTION
PROF. DAVID WABWA DRIVE
CRESENT ROAD
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
TO BE RETAINED
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

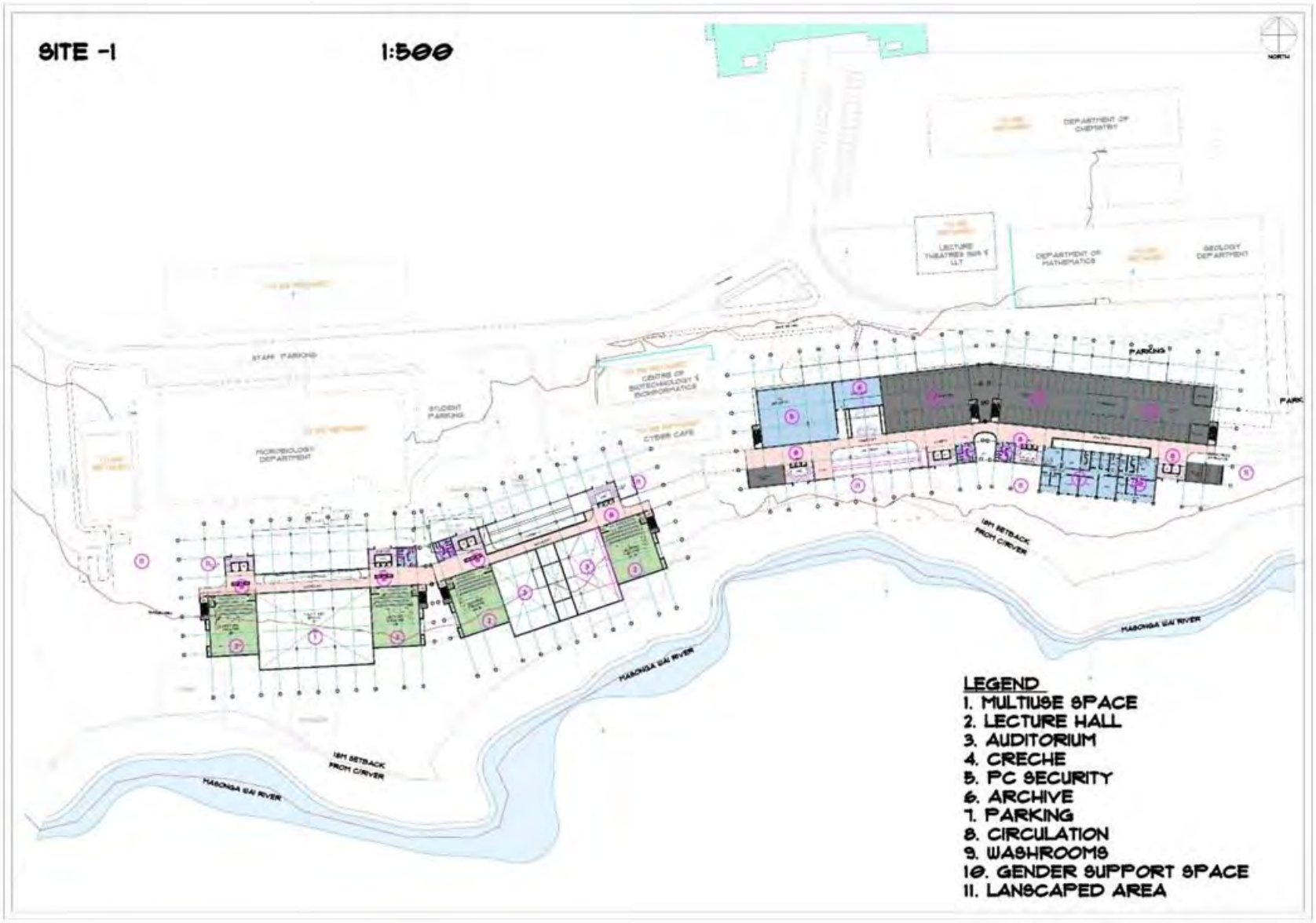

PEDESTRIAN MOVEMENT
1. SIDE WALKS
2. BOULEVARD
3. PROMENARD
TO BE RETAINED
SIDE WALK
ADMIN
MULTI-USE
MULTI-USE
BOULEVARD
WELLNESS
LABS
AMPHITHEATRE
AMPHITHEATRE
PROMENADE
LT
LT
LT
N
BUILDABLE SITE
7 ACRES
SITE BOUNDARY
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

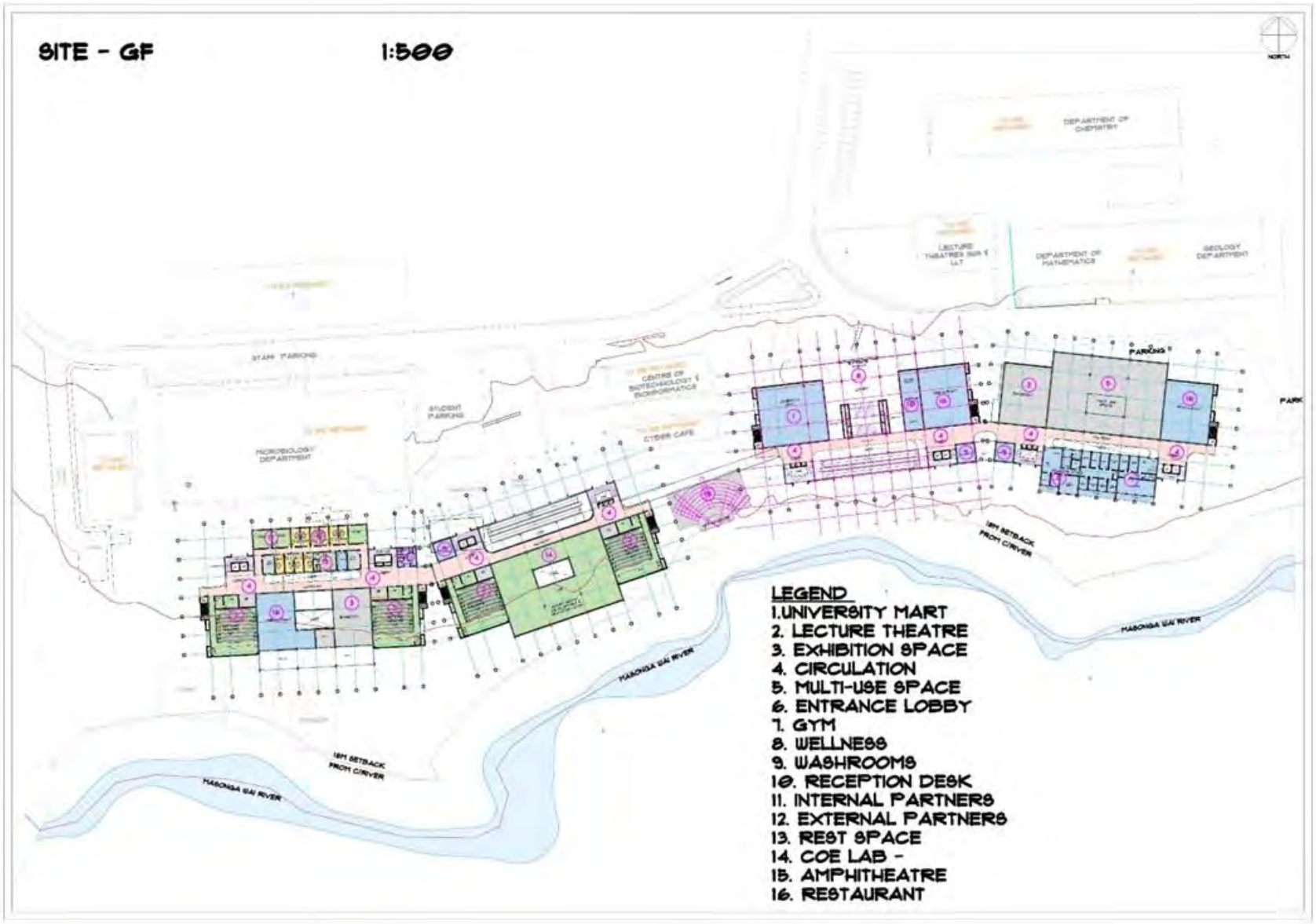

VEHICULAR MOVEMENT
LEGEND
1. YARD
2. STAFF PARKING
3. YARD
4. STUDENT PARKING
5. DROP OFF POINT
6. PARKING
7. LOWER GROUND PARKING
8. YARD
TO BE RETAINED
ADMIN
MULTI-USE
WING B
MULTI-USE
WELLNESS
LABS
WING A
LT
AMPHITHEATRE
AMPHITHEATRE
BUILDABLE SITE
1 ACRES
SITE BOUNDARY
N
REQUEST FOR PROPOSALS FOR ARCHITECTURAL DESIGN COMPETITION FOR THE ENGINEERING AND SCIENCE COMPLEX OF THE UNIVERSITY OF NAIROBI
SUBMITTING ENTITY: PLATEAU

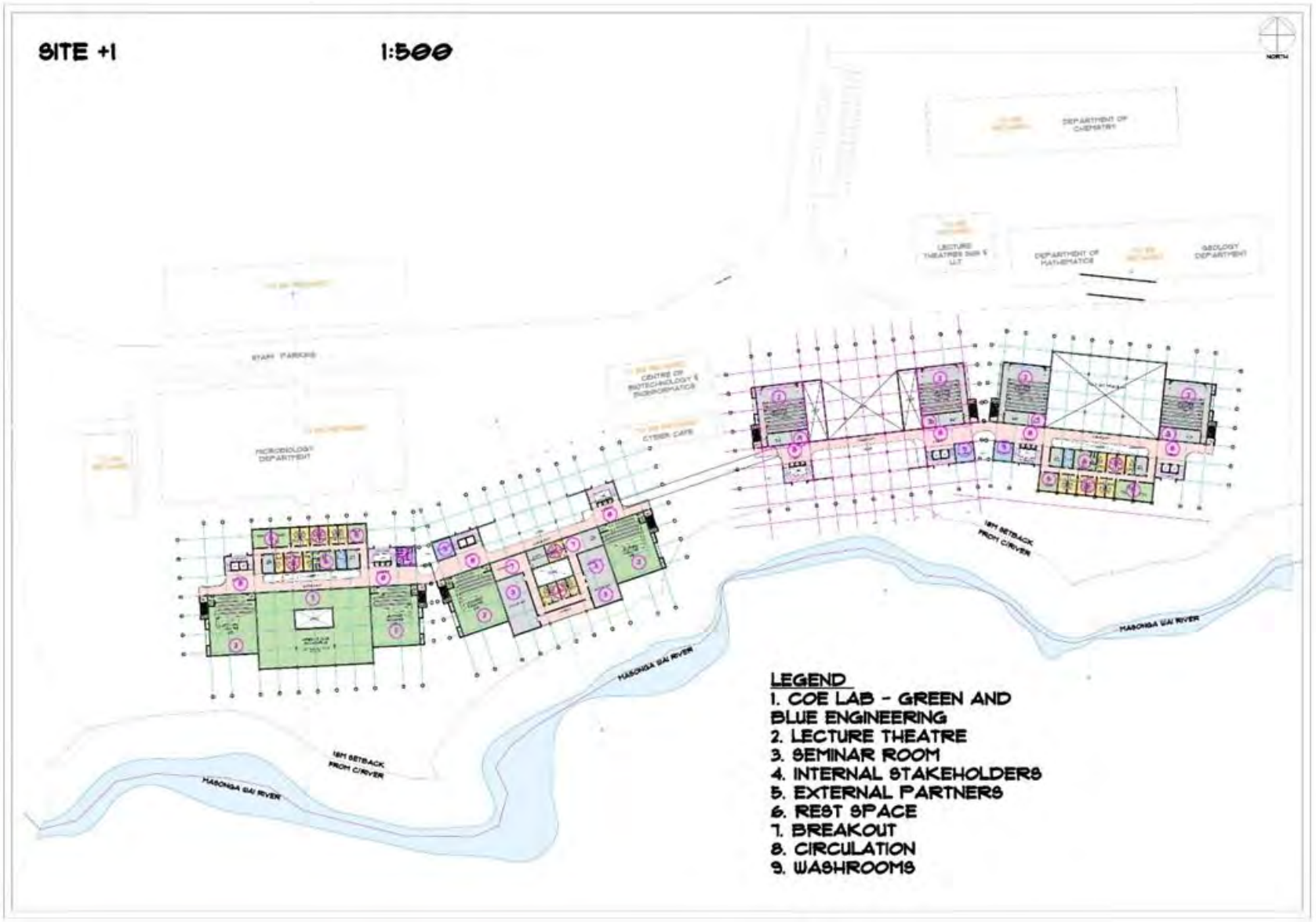

SITE - EXISTING/ DEMOLITION
1:500
NORTH
18M SETBACK FROM CRIVER
MASONGA SAI RIVER
MASONGA SAI RIVER
18M SETBACK FROM CRIVER
MASONGA SAI RIVER
TO BE DEMOLISHED
TO BE RETAINED


SITE - SITE PLAN 1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SUB 1 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
STUDENT PARKING
MICROBIOLOGY DEPARTMENT
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
CAMPUS SQUARE
AMPHITHEATRE
WESTERN WING YANG B
WESTERN WING YANG A
EASTERN WING YN A
EASTERN WING YN B
PROMENARD
PARKING
MASONGA WAI RIVER
LEGEND
1. EASTERN WING
2. WESTERN WING
3. DROP OFF AREA
4. MAIN ENTRANCE
5. PARKING ENTRANCE
6. CAMPUS SQUARE
7. AMPHITHEATRE
8. PROMENADE
9. PARKING AREA
10. LANDSCAPED AREA
11. STUDENT ASSOCIATION SPACE

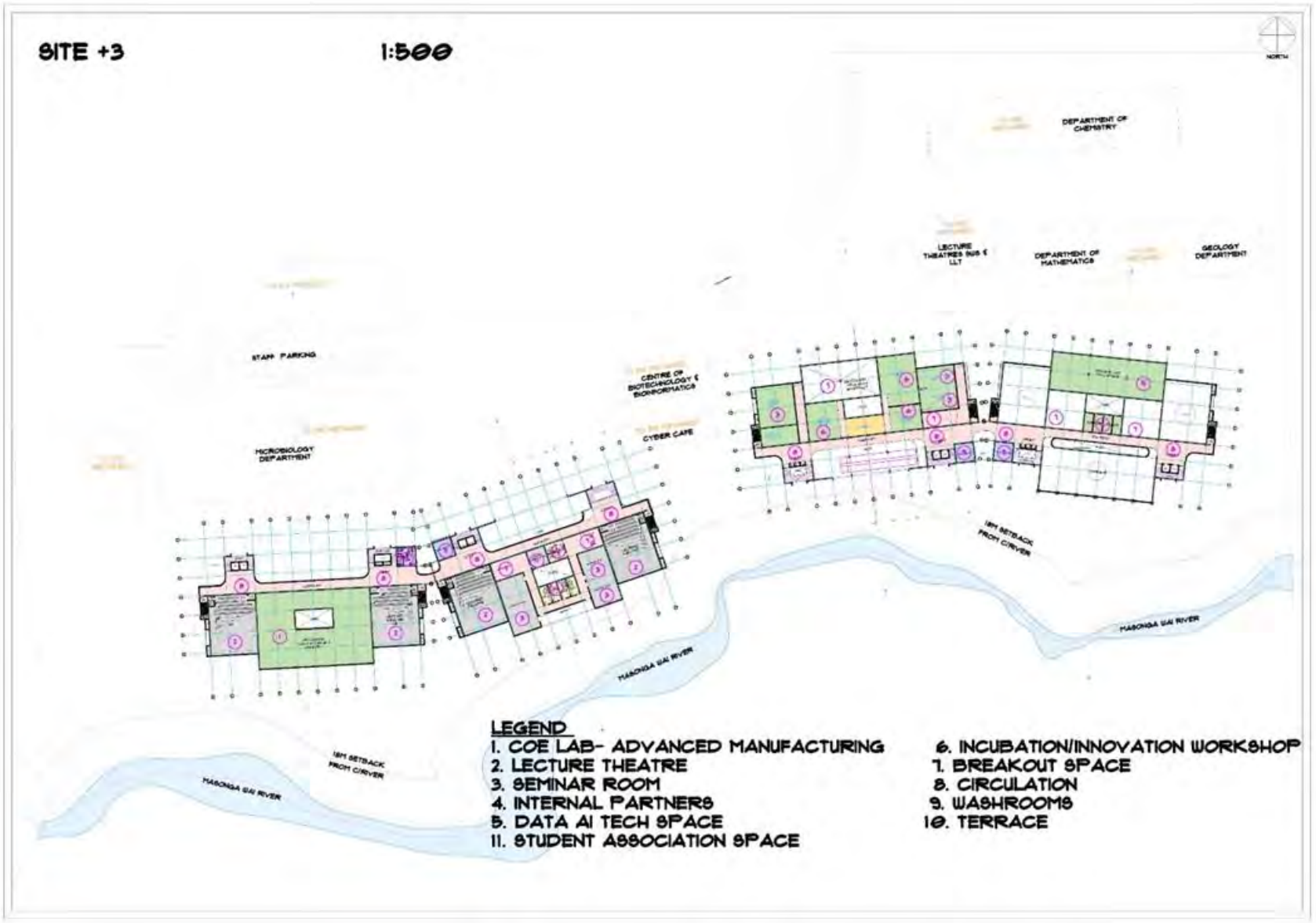

SITE -2
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES NUR 1 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
STUDENT PARKING
MICROBIOLOGY DEPARTMENT
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
PARKING
PARK
AMPHITHEATRE
18M SETBACK FROM CRIVER
MASONGA GAI RIVER
LEGEND
1. MULTIUSE SPACE
2. LECTURE HALL
3. AUDITORIUM
4. BREAK OUT
5. AMPHITHEATRE
6. PROMENARD
7. LANDSCAPED AREA
8. CIRCULATION
9. WASHROOMS

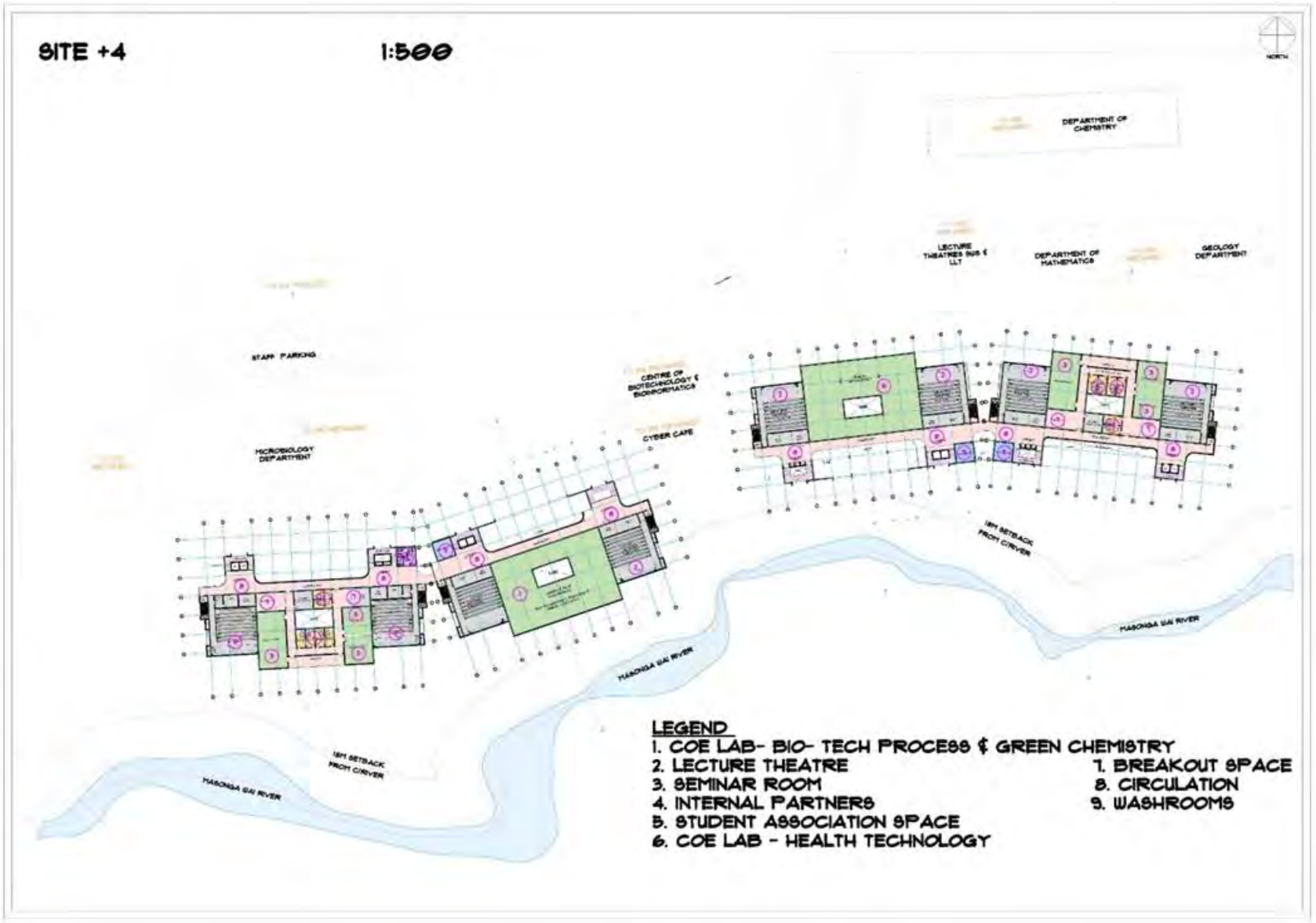

SITE -1
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
STUDENT PARKING
MICROBIOLOGY DEPARTMENT
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
PARKING
PARK
18M SETBACK FROM CRIVER
MASONGA WAI RIVER
LEGEND
1. MULTIUSE SPACE
2. LECTURE HALL
3. AUDITORIUM
4. CRECHE
5. PC SECURITY
6. ARCHIVE
7. PARKING
8. CIRCULATION
9. WASHROOMS
10. GENDER SUPPORT SPACE
11. LANSCAPED AREA

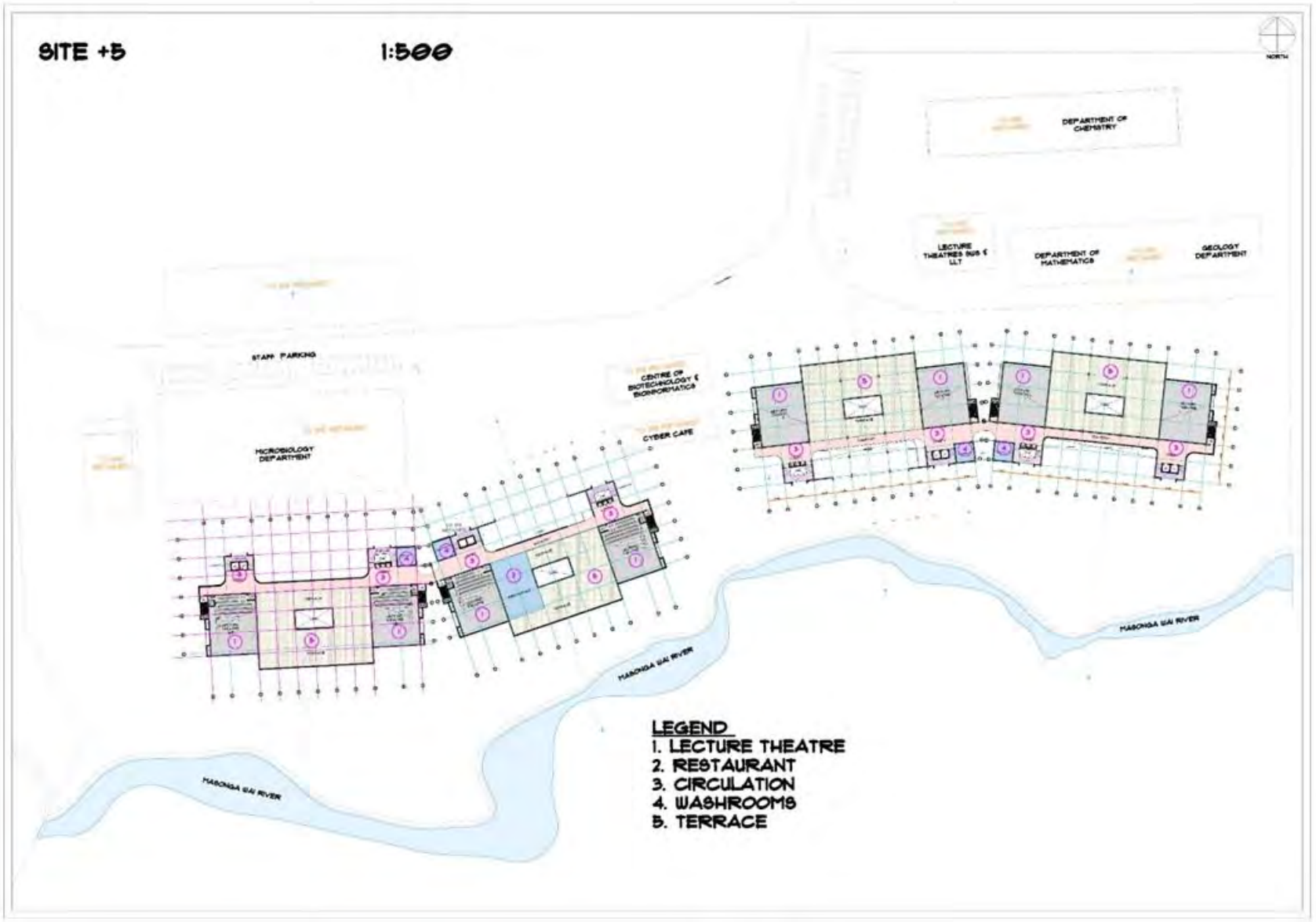

SITE - GF
1:500
LEGEND
1.UNIVERSITY MART
2. LECTURE THEATRE
3. EXHIBITION SPACE
4. CIRCULATION
5. MULTI-USE SPACE
6. ENTRANCE LOBBY
7. GYM
8. WELLNESS
9. WASHROOMS
10. RECEPTION DESK
11. INTERNAL PARTNERS
12. EXTERNAL PARTNERS
13. REST SPACE
14. COE LAB -
15. AMPHITHEATRE
16. RESTAURANT
MASONGA WAI RIVER
18M SETBACK FROM CRIVER


SITE +1
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SWK 5 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
MICROBIOLOGY DEPARTMENT
CYBER CAFE
18M SETBACK FROM CRIVER
MASONGA SAI RIVER
LEGEND
1. COE LAB - GREEN AND BLUE ENGINEERING
2. LECTURE THEATRE
3. SEMINAR ROOM
4. INTERNAL STAKEHOLDERS
5. EXTERNAL PARTNERS
6. REST SPACE
7. BREAKOUT
8. CIRCULATION
9. WASHROOMS


SITE +2
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SUB & LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
MICROBIOLOGY DEPARTMENT
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
18M SETBACK FROM CRIVER
MAKONGA GAI RIVER
LEGEND
1. COE - ENERGY & RENEWABLE ENERGY
2. LECTURE THEATRE
3. SEMINAR ROOM
4. EXTERNAL PARTNERS
5. TERRACE
6. STUDENTS ASSOCIATION
7. BREAKOUT
8. CIRCULATION
9. WASHROOM
10. COE - INNOVATION LAB
11. INTERNAL PARTNERS
12. REST SPACE


SITE +3
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SUB 1 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
MICROBIOLOGY DEPARTMENT
18M SETBACK FROM CENTER
MASONGA SAI RIVER
LEGEND
1. COE LAB- ADVANCED MANUFACTURING
2. LECTURE THEATRE
3. SEMINAR ROOM
4. INTERNAL PARTNERS
5. DATA AI TECH SPACE
11. STUDENT ASSOCIATION SPACE
6. INCUBATION/INNOVATION WORKSHOP
7. BREAKOUT SPACE
8. CIRCULATION
9. WASHROOMS
10. TERRACE


SITE +4
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SUB 1 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
MICROBIOLOGY DEPARTMENT
18M SETBACK FROM CENTER
MASONGA SAI RIVER
LEGEND
1. COE LAB- BIO- TECH PROCESS & GREEN CHEMISTRY
2. LECTURE THEATRE
3. SEMINAR ROOM
4. INTERNAL PARTNERS
5. STUDENT ASSOCIATION SPACE
6. COE LAB - HEALTH TECHNOLOGY
7. BREAKOUT SPACE
8. CIRCULATION
9. WASHROOMS


SITE +5
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES NUB & LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
MICROBIOLOGY DEPARTMENT
MAKONGA SAI RIVER
MAKONGA SAI RIVER
MAKONGA SAI RIVER
LEGEND
1. LECTURE THEATRE
2. RESTAURANT
3. CIRCULATION
4. WASHROOMS
5. TERRACE


ROOF LEVEL +6
1:500
NORTH
DEPARTMENT OF CHEMISTRY
LECTURE THEATRES SUB 1 LLT
DEPARTMENT OF MATHEMATICS
GEOLOGY DEPARTMENT
STAFF PARKING
CENTRE OF BIOTECHNOLOGY & BIOINFORMATICS
CYBER CAFE
MICROBIOLOGY DEPARTMENT
ROOF
MASONGA WAI RIVER
MASONGA WAI RIVER
MASONGA WAI RIVER

PROJECT RENDERS





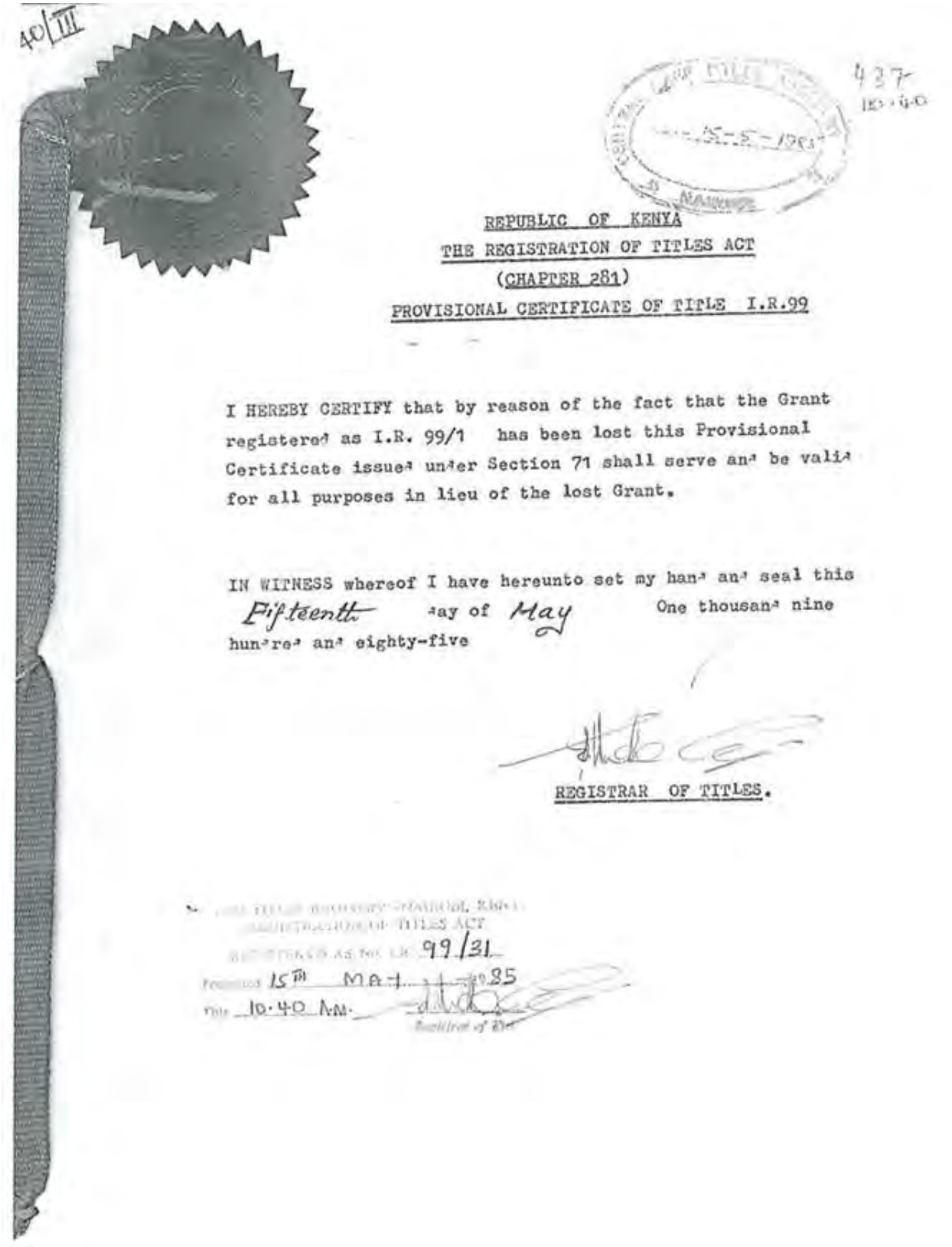








Appendix 8: Proof of Ownership



40/III

437

REPUBLIC OF KENYA

THE REGISTRATION OF TITLES ACT

(CHAPTER 281)

PROVISIONAL CERTIFICATE OF TITLE I.R.99

I HEREBY CERTIFY that by reason of the fact that the Grant registered as I.R. 99/1 has been lost this Provisional Certificate issued under Section 71 shall serve and be valid for all purposes in lieu of the lost Grant.

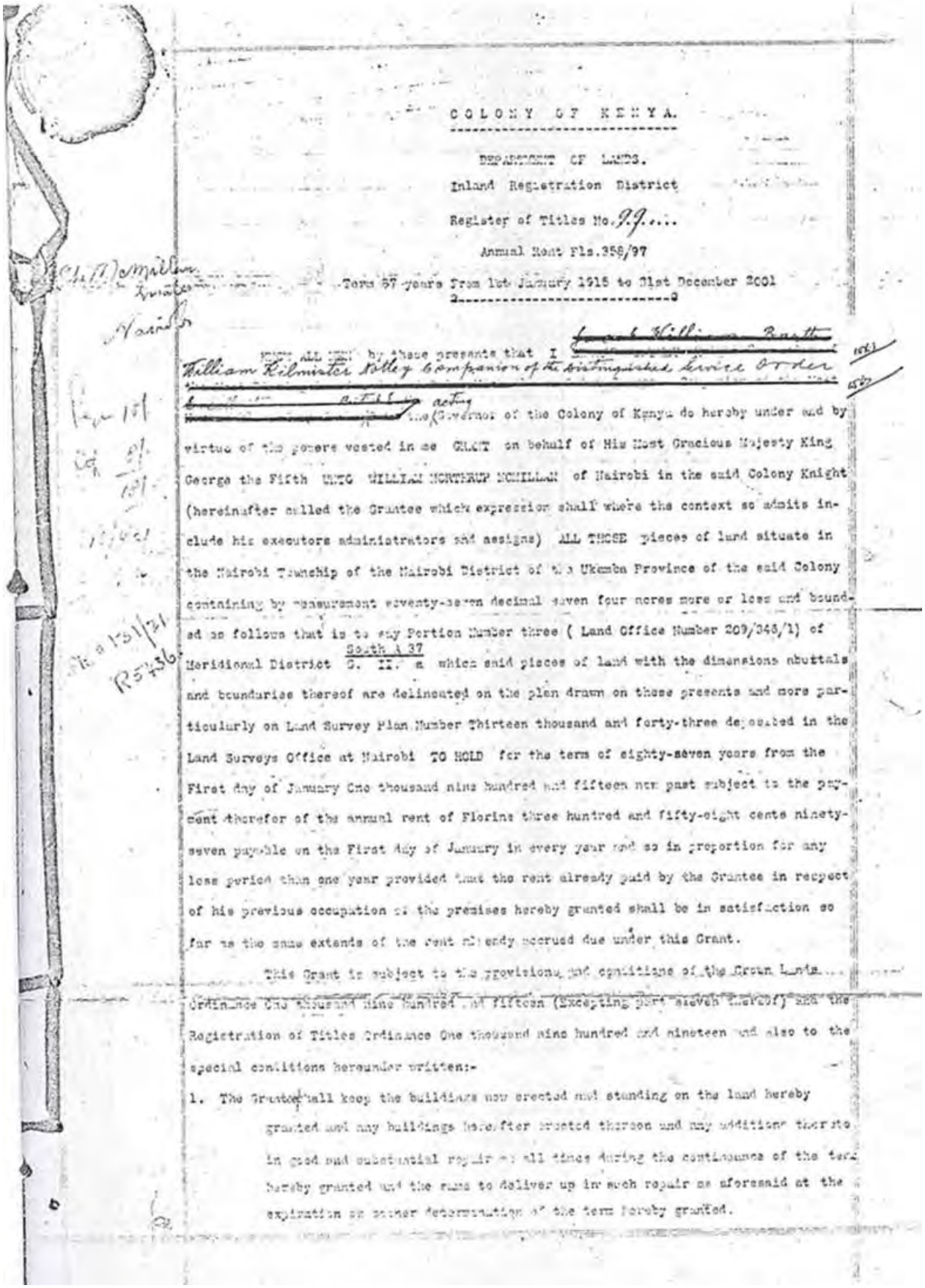
IN WITNESS whereof I have hereunto set my hand and seal this Fifteenth day of May One thousand nine hundred and eighty-five

REGISTRAR OF TITLES.

99/31

15TH MAY 1985

10.40 AM.



COLONY OF KENYA.

DEPARTMENT OF LANDS.

Inland Registration District

Register of Titles No. 99....

Annual Rent Fls.358/97

Term 87 years from 1st January 1915 to 31st December 2001

KNOW ALL MEN by these presents that I [illegible] William Kilmister Kelly Companion of the Distinguished Service Order [illegible] acting the Governor of the Colony of Kenya do hereby under and by virtue of the powers vested in me GRANT on behalf of His Most Gracious Majesty King George the Fifth UNTO WILLIAM NORTHRUP MACMILLAN of Nairobi in the said Colony Knight (hereinafter called the Grantee which expression shall where the context so admits include his executors administrators and assigns) ALL THOSE pieces of land situate in the Nairobi Township of the Nairobi District of the Ukamba Province of the said Colony containing by measurement seventy-seven decimal seven four acres more or less and bounded as follows that is to say Portion Number three (Land Office Number 209/348/1) of Meridional District South A 37 S. II. A which said pieces of land with the dimensions abuttals and boundaries thereof are delineated on the plan drawn on these presents and more particularly on Land Survey Plan Number Thirteen thousand and forty-three deposited in the Land Surveys Office at Nairobi TO HOLD for the term of eighty-seven years from the First day of January One thousand nine hundred and fifteen now past subject to the payment therefor of the annual rent of Florins three hundred and fifty-eight cents ninety-seven payable on the First day of January in every year and so in proportion for any less period than one year provided that the rent already paid by the Grantee in respect of his previous occupation of the premises hereby granted shall be in satisfaction so far as the same extends of the rent already accrued due under this Grant.

This Grant is subject to the provisions and conditions of the Crown Lands Ordinance One thousand nine hundred and fifteen (Excepting part eleven thereof) and the Registration of Titles Ordinance One thousand nine hundred and nineteen and also to the special conditions hereunder written:-

1. The Grantee shall keep the buildings now erected and standing on the land hereby granted and any buildings hereafter erected thereon and any additions thereto in good and substantial repair at all times during the continuance of the term hereby granted and the same to deliver up in such repair as aforesaid at the expiration or other determination of the term hereby granted.

681
14.50

KENYA REVENUE ONE POUND

KNOW ALL MEN BY THESE PRESENTS that at the request of the within named UNIVERSITY OF NAIROBI (hereinafter called the Grantee the President of the Republic of Kenya hereby grants unto the grantee all that the within written piece of land for a further termof ninety four (94) years from the First day of January Two thousand and two in addition to the within written term subject however in addition to such charges Acts and Special conditions as are specified or implied in the within-written Grant and also to continue paying in advance of the First day of January in each year of the annual rent of shillings five hundred sixty nine cents fif (Shs.569/55) .

IN WITNESS whereof the Commissioner of Lands by order of the President has set his hand and Common Seal of the Grantee has been affixed hereunto this 17th day of November one thousand nine hundred and eighty eight.

SIGNED by JAMES RAYMOND NJENGA)
the Commissioner of Lands in)
the presence of:-)

REGISTRAR OF TITLES

SEALED WITH THE COMMON SEAL OF)
THE GRANTEE in the presence)
of:-)

VICE CHANCELLOR

DEPUTY VICE CHANCELLOR

DRAWN BY
T.N. Muiruri
Registrar of Titles
NAIROBI

LAND TITLES REGISTRY--NAIROBI
REGISTRATION OF TITLES ACT
REGISTERED AS No. I.R. 99/32.
30TH JANUARY 1989

ZIMAKI CONSULT

Symbion House, Ground floor,
Dagoretti Road, Karen
P. O. Box 8589, 00100 Nairobi
Tel: +254 20 8008648
Cell: +254 733 121877
Email: info@zimakiconsult.co.ke
Website: www.zimakiconsult.co.ke
Pin No. P051550873I

• QUANTITY SURVEYING • PROJECT MANAGEMENT • CONSTRUCTION MANAGEMENT • CONTRACT ADVISORY • DEVELOPMENT STRATEGY

Proposed University of Nairobi Engineering and Science Collge at Chiromo Campus, Nairobi

GRAND SUMMARY

Item	Description	Amount (Ksh)
1	Main Works (Builder's Work+ MEP Associated)	1,713,905,878.27
2	Provisional Sums	228,246,500.00
3	Electrical Installations & Associated Services	112,629,400.00
4	Mechanical Installations & Associated Services	141,960,000.00
	Sub Total 1	**2,196,741,778.27**
	Contractor's Preliminaries @3.5%	76,885,962.24
	Sub Total 2	**2,273,627,740.51**
	Contingencies Allowance @ 3.5%	79,576,970.92
	GRAND TOTAL (VAT Exclusive)	**2,353,204,711.43**

Quantity Surveyor Firm: Zimaki Consult Limited

Quantity Surveyor: Bertrand Ngaywa

Reg No: Q501: PCQS/498/26-27

Signature:

Date: 16/07/2026

ZIMAKI CONSULT LIMITED
P. O. Box 8589 - 00100,
Email: info@zimakiconsult.co.ke
www.zimakiconsult.co.ke
Tel: 0733 121 877

Proponent: Prof. George Abong-Project Manager

Signed:

Date: 17/07/2026

Directors: Micheal K. Nduli, B.A (Blg. Econs.), MBA(Global Business Mngt), MRICS, MAAK, (QS), CIQSK,RQS | Bertrand L. Ngaywa, B.A (Blg. Econs.), Pg Diploma (Project Planning & Mngt), MAAK, (QS), CIQSK,RQS

Appendix 10: Proposed Solid Waste Management Strategy

Solid Waste Management

The proposed project has already in place the capacity of qualified experts who will evaluate and incorporate solid waste management strategy that minimizes negative impact on the environment during the entire life cycle of the proposed building complex as detailed in the phases listed below.

Solid Waste Already On Site

The Consultant will carry out a survey of the proposed site and identify and classify any solid waste already at the site and that requires to be managed as part of the clearance of the proposed building site.

This classification will include the following solid waste categories;

- Hazardous
- Reusable
- Recyclable
- Solid waste requiring disposal transportation to municipal landfills or any other appropriate site.

Any hazardous solid waste identified will be handled, transported and disposed in accordance to protocols to be developed by the Consultant to ensure strict compliance with EMCA 1999 (revised 2015/2019).

The solid waste management strategy will incorporate waste minimization strategies (5Rs) that include minimization of generation of the amount of non-hazardous solid waste requiring disposal transportation.

Site Excavation and Construction

During this phase the Consultant will identify and classify the various forms of solid waste generated as follows;

- Hazardous
- Reusable
- Recyclable
- Solid waste requiring disposal transportation to municipal landfills or any other appropriate site in accordance to the EMCA 1999 (revised 2015/2019) legislative and regulatory requirements.

Appropriate handling, storage, reuse or disposal will be recommended for each category

Operational Phase of The Proposed Building Complex

The Consultant will identify and classify the various forms of solid waste expected to be generated during this phase as follows;

- Hazardous
- Reusable
- Recyclable
- Solid waste requiring disposal transportation to municipal landfills or any other appropriate site in accordance to the EMCA 1999 (revised 2015/2019) legislative and regulatory requirements.

Appropriate segregation at source, safe handling, segregated storage, reuse or transportation and disposal will be recommended for each category of solid waste.

All these considerations will be incorporated in the proposed project design.

Decommissioning Phase

At the end of the operational phase of the proposed buildings the potential solid waste that will be generated will be identified and recommended safe handling, segregated storage, reuse, recycling and disposal methods for all the above categories will be identified and listed to form part of the project write-up. This waste management strategy will include any envisaged renovation along the way.

The proposed building complex will be designed to comply with the solid waste generation and disposal requirements of Kenya's EMCA 1999 (revised 2015/2019) environmental legislation and regulations as well as the trends in global good practice.

The Consultant will develop an appropriate solid waste management guidelines and documentation to be used by the Estate Management office of the proposed complex and will train the initial solid waste handling staff as well as the relevant staff of Estate Management office as part of commissioning.

Solid Waste disposal contractors will be selected by the University Management considering the compliance to the set NEMA solid waste transportation and disposal licensing requirements.