ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

OF THE PROPOSED

NIGERIA INTERNAL SECURITY PROJECT PHASE II – PRISON SECURITY VIDEO SURVEILLANCE SOLUTION

BY

MINISTRY OF INTERIOR

PROJECT CONTRACTOR:

中国路桥工程有限责任公司
CHINA ROAD & BRIDGE CORPORATION

AUGUST, 2025

Environmental Impact Assessment (EIA)

of the Proposed

Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution

by

Ministry of Interior

PROJECT CONTRACTOR: China Road and Bridge Corporation

PREPARED BY: HECOL NIGERIA LIMITED

August, 2025

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LIST OF ACRONYMS AND ABBREVIATIONS

‰	-	Parts per Thousand
µg	-	Micro gram
µg/g	-	Micro gram per gram
µg/m^3	-	Micro gram per meter cube
µS/cm	-	Micro Siemens per Centimeter
^{0}C	-	Degree Celsius
^{0}F	-	Degree Fahrenheit
3G	-	3rd Generation
A/m	-	Ampere per meter
AAS	-	Atomic Absorption Spectrophotometer
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ASTM	-	American Society for Testing Materials
AUC	-	Authentication Centre
Ave.	-	Average
BAT	-	Best Available Technology
BOD_5	-	5-day Biological Oxygen Demand
BCDA	-	Border Communities Development Agency
BSC	-	Base Station Controller
BSS	-	Base Station Subsystem
BTS	-	Base Transceiver Station
cm	-	Centimeter
CO	-	Carbon Monoxide
CO_2	-	Carbon dioxide
COD	-	Chemical Oxygen Demand
CS	-	Charging System
CSR	-	Corporate Social Responsibility
dB	-	Decibel
DCD	-	Development Control Department
DCP	-	Dry Chemical Powder
DO	-	Dissolved Oxygen
DPR	-	Department of Petroleum Resources
EA	-	Environmental Assessment
EAR	-	Environmental Audit Report
EHS	-	Environmental, Health and Safety
EIA	-	Environmental Impact Assessment
ELF	-	Extremely low frequency
EMF	-	Electromagnetic fields
EMP	-	Environmental Management Plan
EMS	-	Environmental Management System
ERP	-	Emergency Response Plan
ESA	-	Environmentally Sensitive Areas
ESI	-	Environmental Sensitivity Index
et. al	-	et. alli (and others)
E-Waste	-	Electronic Waste
FCT	-	Federal Capital Territory
Fe	-	Iron
FEED	-	Front End Engineering Design
FEPA	-	Federal Environmental Protection Agency
FMEnv	-	Federal Ministry of Environment
g	-	Gram
g/m^2	-	Gram per meter square
g/m^3	-	Gram Per Meter Cube
GHG	-	Green House Gases
GHK	-	General Housekeeping
GIS	-	Geographic Information System

GPS	-	Global Positioning System
GSM	-	Global System for Mobile Communications
H_2	-	Hydrogen
HDB	-	Hydrocarbon Degrading Bacteria
HES	-	Health, Environment and Safety
HIA	-	Health Impact Assessment
HLR	-	Home Location Register
HSA	-	Highly Sensitive Area
HSE	-	Health, Safety and Environment
HUB	-	Hydrocarbon Utilizing Bacteria
HUF	-	Hydrocarbon Utilizing Fungi
ICNIRP	-	International Commission on Non- Ionizing Radiation Protection
ICT	-	Information and Communication Technology
IEC	-	International Electric Code
IEE	-	Initial Environmental Examination
IF	-	Intermediate Frequency
IFC	-	International Finance Corporation
IMT	-	the International Mobile Telecommunications
ITCZ	-	Inter Tropical Convergence Zone
ITD	-	Inter Tropical Discontinuity
Kcal	-	Kilocalorie
kg	-	Kilogram
kg/cm^2	-	Kilogram per Centimeter Square
km^2	-	Kilometer square
Kr	-	Krypton
KVA	-	Kilovolt Ampere
l/d	-	Litre/day
LCA	-	Life Cycle Analysis
LCI	-	Life Cycle Inventory
LGA	-	Local Government Area
Long.	-	Longitude
LPS	-	Lightning Protection System
LSA	-	Low Sensitive Area
m	-	Meter
m/s	-	Meter per Seconds
m^2/d	-	Meter Square per Day
Max.	-	Maximum
mg	-	Milligram
mg/l	-	Milligram per Litre
MGW	-	Media Gateway
Min	-	Minimum
Min	-	Minimum
ml	-	Millilitre
mm	-	Millimeter
mS/cm	-	Meter Seimens per Centimeter
MSC	-	Mobile Switching Centre
₦	-	Naira
N.D	-	Not Detected
NAAQS	-	Nigerian Ambient Air Quality Standards
NCC	-	Nigerian Communications Commission
ND	-	Not Detected
NEC	-	National Electric Code
NEPA	-	National Electric Power Authority
NESREA	-	National Environmental Standards and Regulations Enforcement Agency
NGO	-	Non – Governmental Organizations
NH_3	-	Ammonia
NIMET	-	Nigerian Meteorological Agency

NIR	-	Non-Ionizing Radiation
NO_x	-	Nitrogen Oxides
NPC	-	National Population Commission
NSS	-	Network and Switching Subsystem
O_2	-	Oxygen
OAR	-	Operations Assurance Review
OE	-	Operational Excellence
ONC	-	Optical Network Control
OSHA	-	Occupational Safety and Health Administration
OSS	-	Operations Support system
PAH	-	Polycyclic Aromatic Hydrocarbons
Pb	-	Lead
pH	-	Potential of Hydrogen (Hydrogen ion Concentration)
PHCN	-	Power Holding Company of Nigeria
PLCS	-	Programmable Logic Controllers
PM	-	Particulate Matter
PPE	-	Personal Protective Equipment
ppm	-	Parts per Million
QC	-	Quality Control
QHSE	-	Quality, Health, Safety and Environment
RCA	-	Regulatory Compliance Audit
RF	-	Radio Frequency
RH	-	Relative Humidity
SEP	-	Stakeholder Engagement Plan
SEPA	-	State Environmental Protection Agency
SHE	-	Safety, Health and Environment
SHES	-	Security, Health, Environment and Safety
SLA	-	Service Level Agreement
SMEnv	-	State Ministry of Environment
SMS	-	Short Message Service
SOP	-	Standard Operating Procedures
SPM	-	Suspended Particulate Matter
Sqm	-	Square meter
TC	-	Tropical Continental
TDS	-	Total Dissolved Solids
TH	-	Total Hydrocarbon
THB	-	Total Heterotrophic Bacteria
THC	-	Total Hydrocarbon Contents
THF	-	Total Heterotrophic Fungi
THP	-	Tower Hold Point
TLC	-	Total Loss Control
TM	-	Tropical Maritime
TOC	-	Total Organic Carbon
ToR	-	Terms of Reference
TRX	-	Transceiver
TSP	-	Total Suspended Particulate
TSS	-	Total Suspended Solids
UES	-	Uniform Effluents Standards
UNEP	-	United Nations Environment Programme
UPS	-	Uninterrupted Power Supply
USEPA	-	United State Environmental Protection Agency
UTM	-	Universal Traverse Marcator
VOC	-	Volatile Organic Compounds
WHO	-	World Health Organization
WMP	-	Waste Management Plan
Yrs	-	Years
Zn	-	Zinc

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EXECUTIVE SUMMARY

E.S- 1 INTRODUCTION

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is a flagship initiative of the Federal Ministry of Interior aimed at strengthening correctional facility security through advanced technologies such as intelligent sensing, big data analytics, artificial intelligence, and integrated video surveillance systems. The project will cover more than 100 correctional centres across over 25 states, including key facilities such as Kuje in Abuja, Calabar in Cross River, Kirikiri in Lagos, Jos in Plateau, Kano Central, and Gembu in Taraba. Supported by secure cloud infrastructure, high-capacity storage servers, intelligent video management, mobile patrol integration, and dedicated data centres with independent power supply, the system is designed for uninterrupted 24/7 operation. The Federal Government has commissioned China Road and Bridge Corporation (CRBC) as the Engineering, Procurement, and Construction contractor, while Hecol Nigeria Limited will conduct the Environmental Impact Assessment (EIA) in line with regulatory requirements.

Project proponent

The Federal Ministry of Interior is the proponent of the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, mandated to safeguard internal security and critical infrastructure through its agencies (NIS, NSCDC, FFS, and NCoS). The Ministry has appointed China Road and Bridge Corporation (CRBC) as the engineering, procurement, and construction contractor. Hecol Nigeria Limited, an accredited consultancy, has been engaged to conduct the Environmental Impact Assessment (EIA). The study is being carried out in compliance with FMEnv and NESREA regulatory requirements.

Legal and Administrative Framework

EIA studies are carried out within the framework of both local and international environmental guidelines and regulations. Various guidelines and regulations on conducting EIA studies have been stipulated by international organisations such as the World Bank (IBRD), various local organisations such as the Federal Ministry of Environment (FMEnv), the EIA Act CAP E12 LFN 2004, National Environmental Standards and Regulations Enforcement Agency (NESREA), Nigerian Communication Commission (NCC), 2003 and States Environmental Legislation

E.S-2 PROJECT JUSTIFICATION

Need and Benefit of the Project

Nigeria's correctional facilities face persistent challenges of overcrowding, obsolete infrastructure, and weak security systems, leaving them vulnerable to jailbreaks, violent attacks, and contraband smuggling. Recent incidents across several states have exposed gaps in surveillance and monitoring, where outdated equipment and limited manpower failed to prevent coordinated escapes. The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution addresses these gaps by deploying intelligent, high-definition surveillance systems, AI-driven video analytics, secure data storage, and real-time monitoring platforms across strategic correctional facilities.

This intervention aligns with national security assessments, UNODC guidance, and AU standards, strengthening situational awareness, operational control, and inter-agency coordination. Key benefits include enhanced surveillance capacity, reduced jailbreaks, rapid emergency response, and greater transparency in prison operations. The project will also create economic opportunities, improve custodial human rights protection, and reduce reliance on excessive manpower. Overall, it will modernize prison management, safeguard host communities, and reinforce Nigeria's justice reform and national security objectives.

E.S 3- PROJECT DESCRIPTION

Project Location

The project will be implemented across correctional facilities in all six geopolitical zones of Nigeria, covering 29 states and the FCT, Abuja. Sites were selected through vulnerability assessments targeting major, high-security, and medium-security prisons with recurring risks. All installations will be networked into regional command centres and linked to a central command-and-control facility in Abuja for real-time nationwide monitoring and rapid response.

Project Description

The project involves nationwide deployment of advanced ICT infrastructure combining CCTV, wireless networks, trunking systems, national data centres, and solar power solutions. In the initiation phase, site surveys, vulnerability mapping, and requirements analysis are conducted to determine surveillance, network, data storage, and power needs in line with regulatory compliance. The planning phase features network topology design, AI-enabled CCTV architecture, and modular data centres with 2N+1 redundancy. A digital eLTE trunked radio system will provide secure broadband voice, video, and data communication for operations and emergencies. Solar farms will power all equipment, including the three national data centres in Abuja, Ibadan, and one other location.

Implementation includes civil works, tower erection, telecom rollout, camera installation, and solar-powered nodes. The system integrates AI optimization, smart storage, and predictive maintenance for reliable performance. Collectively, these components will deliver a resilient, energy-efficient, and future-proof surveillance solution across correctional facilities and national infrastructures.

E.S 4- DESCRIPTION OF THE EXISTING ENVIRONMENT

Field Sampling and Observations

Field Sampling and observations was carried out to cover the wet season. This was aimed at determining the ecological characteristics and variations of the area during the season. The sampling was carried out from 7th to 22nd, August, 2025. This sampling period covers the one seasonal regime approved for the study. Visual observations were made and documented in the field notebook. Photographs of important features were taken with a digital camera. The environmental components observed include

Climate and Meteorology

The climatic regime of Nigeria, and by extension the project area covering the six geopolitical zones, is controlled by two major air masses: the Southwest Monsoon winds originating from the Atlantic Ocean and the Northeast Trade winds (Harmattan) from the Sahara Desert. These air masses interact seasonally to produce the country's distinct wet and dry seasons, which vary in intensity and duration across regions. Given the wide geographical coverage of the Proposed Prison Security Video Surveillance Solution Project, climate and meteorological patterns were analyzed using 30-year (1994–2024) climatological data obtained from the Nigerian Meteorological Agency (NiMet) and global climatic records.

Air Quality and Noise

Air quality assessments across 150 sites showed CO, CO_2, and O_2 levels within safe standards, while SO_2, NO_2, PM_{10}, and $PM_{2.5}$ occasionally exceeded WHO guidelines in traffic-dense and market-adjacent prisons. Hydrogen sulphide was generally low but locally exceeded thresholds near sewage and waste areas. Noise levels in urban and semi-urban prisons surpassed WHO limits though remained within FMEnv standards, mainly due to traffic, markets, and generator use. Overall, localized air and noise exceedances highlight health and wellbeing concerns for inmates, staff, and nearby communities.

Geology and Hydrogeology

The project area spans Nigeria's major geological formations, including the Precambrian Basement Complex and Sedimentary Basins, which influence soils, landforms, and groundwater. Basement Complex terrains in the North-Central, North-West, and South-West comprise granites, gneisses, and schists, while the Jos Plateau features Younger Granites. Sedimentary Basins such as the Chad, Benue, Niger Delta, Anambra, and Dahomey host sandstones, shales, limestones, and hydrocarbons, providing both mineral and fertile soil resources.

Groundwater Quality

Groundwater across prison facilities and host communities showed generally acceptable physico-chemical quality, with pH, EC, TDS, and most major ions within FMEnv and WHO limits, though some sites had elevated turbidity, BOD, and COD indicating organic contamination. Trace metals such as iron, lead, mercury, aluminium, and chromium exceeded guideline values in several locations, posing risks of toxicity and long-term health concerns.

Surface Water Quality

Surface water across project areas showed generally acceptable pH, EC, TDS, and major ion levels, but high TSS, turbidity, BOD, and COD indicated significant organic loading and poor clarity from runoff and effluents. Trace metals such as iron, lead, mercury, aluminium, and chromium frequently exceeded FMEnv/WHO standards, raising concerns about long-term safety. Nutrient enrichment was evident in elevated nitrates and ammonia, suggesting sewage and agricultural influences. Microbiological results confirmed widespread contamination with coliforms, E. coli, and enterococci, highlighting serious public health risks from faecal pollution.

Soil Studies

Baseline soils were slightly acidic, sandy loam in texture, and of moderate fertility, with organic matter and nutrients generally within acceptable ranges but phosphorus and nitrogen showing limitations for productivity. Trace metals were largely within FMEnv/WHO limits, indicating no significant contamination. Microbial activity was robust, though the presence of coliforms and E. coli in some samples confirmed localized faecal contamination risks.

Hydrobiology

Baseline hydrobiological studies across Oyo, Kwara, Kebbi, Cross River, and Taraba revealed moderately diverse and functional aquatic ecosystems. Phytoplankton communities were dominated by green algae and diatoms, indicating generally good water quality with only slight nutrient enrichment, while zooplankton (rotifers, cladocerans, copepods) reflected balanced predator-prey dynamics. Benthic macroinvertebrates such as mayflies, chironomids, and molluscs showed mixed conditions largely healthy but with localized organic enrichment from runoff and domestic inputs.

Socio-Economic Conditions

The socio-economic study covered host communities within 1–2 km of prison facilities across Nigeria's six geopolitical zones, revealing large youthful populations, extended households, and livelihoods dominated by farming, petty trade, and informal services. Urban and peri-urban prison corridors integrate into vibrant commercial economies, while rural sites remain agrarian with weak infrastructure and limited social services. Education and healthcare access are uneven, with rural areas facing overcrowding, poor facilities, and reliance on traditional healers. Housing ranges from permanent urban structures to semi-permanent rural dwellings, with overcrowding and land tenure disputes common. Stakeholder consultations showed broad community support for the surveillance project due to expected security, employment, and ICT benefits, though concerns were raised about land acquisition, construction impacts, and inclusion.

E.S- 5 POTENTIAL AND ASSOCIATED IMPACT

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution will generate both positive and adverse environmental and socio-economic impacts across correctional facilities in Nigeria's six geopolitical zones. The project's major positive impact is improved national security, with 24/7 intelligent surveillance reducing jailbreaks, violent attacks, contraband smuggling, and internal security breaches while boosting inter-agency coordination. Safer correctional environments will enhance justice system integrity, protect inmates and staff, restore public confidence, and stimulate socio-economic stability in host communities. Communities will also benefit from temporary job creation during construction and operational phases, alongside opportunities for ICT skill transfer and local content participation.

Adverse impacts are expected mainly during installation, including land take for towers and equipment housing, vegetation clearing in peri-urban/rural sites, soil disturbance, and localized noise emissions. Impacts on air quality may arise from dust, generator fumes, and machinery operations, while risks of improper waste management and soil contamination exist. Socio-economic impacts may include displacement of roadside petty businesses, temporary access restrictions, and community concerns over land rights near correctional facilities. Vulnerable groups, particularly women, youth, and households dependent on informal prison-adjacent trade, may face livelihood disruptions if land-use conflicts are not properly managed.

E.S-6. MITIGATION MEASURES

Mitigation measures for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution are designed to minimize adverse environmental and socio-economic impacts while enhancing long-term project benefits. Land acquisition and livelihood disruptions near correctional facilities will be addressed through fair compensation, transparent valuation, and promotion of local content policies. Construction-related impacts such as dust, noise, and waste will be managed through dust suppression, regulated working hours, noise control, and proper waste segregation and disposal. Soil and water protection will be ensured through erosion control, spill prevention, and safe handling of construction materials.

Vegetation clearance around prison host communities will be minimized through selective site clearing, avoidance of sensitive areas, and post-construction re-vegetation. Community health and safety will be safeguarded by enforcing strict HSE standards, providing closed camps for workers, and managing traffic and access disruptions during installation. Vulnerable groups, including women, youths, and informal traders around correctional facilities, will be supported through livelihood restoration programs, micro-credit schemes, and targeted social investments.

E.S-7. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution provides a structured framework for preventing, mitigating, and monitoring environmental and social impacts across all phases of the project. It defines institutional roles, compliance obligations, and performance indicators in line with FMEnv, NESREA, and international best practices. Specific action plans address air quality management, noise and vibration control, waste handling, soil and water protection, and vegetation restoration within correctional facility environments.

The EMP prioritizes occupational health and safety through strict adherence to HSE standards, compulsory use of PPE, routine training, and emergency preparedness for workers. Community health and safety will be protected via access control around prisons, traffic and

logistics management, sensitization campaigns, and strict security protocols during equipment installation. Socio-economic concerns, including land acquisition, restricted access, and livelihood disruptions, will be managed through fair compensation, livelihood support, and inclusive Corporate Social Responsibility (CSR) programs targeting vulnerable groups such as women and youths. Implementation will be coordinated by the Federal Ministry of Interior in partnership with Hecol Nigeria Limited, with oversight from regulatory agencies. Monitoring will involve regular environmental audits, stakeholder engagement, and adaptive management to ensure compliance and continuous improvement.

E.S-8 DECOMMISSIONING AND ABANDONEMENT

The Decommissioning and Abandonment (D&A) plan for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution outlines procedures to ensure safe dismantling and environmentally responsible closure of surveillance infrastructure at the end of its operational life or if installations are relocated. The plan prioritizes environmental restoration, community safety, and compliance with FMEnv, NESREA, and international standards. Key activities will include phased dismantling of towers, CCTV units, solar installations, power systems, and associated ICT equipment, with all materials recycled, repurposed, or disposed of in line with best practices.

Protective measures will be applied to safeguard soil and water resources, including spill prevention, erosion control, and proper waste handling during dismantling. Re-vegetation and land rehabilitation programs will be undertaken to restore cleared areas and minimize long-term ecological impacts. Communities will be actively engaged to determine preferred reuse of decommissioned sites, such as conversion into social amenities, agricultural land, or other community assets.

E.S- 9. CONCLUSIONS AND RECOMMENDATION

The Environmental Impact Assessment (EIA) concludes that the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is both environmentally sustainable and socially beneficial. Identified impacts such as land take for installations, vegetation clearance, construction-related disturbances, and localized livelihood disruptions are site-specific and can be effectively mitigated through appropriate safeguards and management measures.

The project will significantly strengthen correctional facility security, reduce jailbreaks and contraband smuggling, enhance community safety, and support socio-economic development through job creation, ICT skill transfer, and infrastructure improvements. Approval of the project is therefore recommended, subject to the strict implementation of the Environmental Management Plan (EMP), full compliance with FMEnv and NESREA regulatory requirements, and continuous stakeholder consultation to ensure inclusiveness, transparency, and long-term community support.

ACKNOWLEDGEMENT

The Federal Ministry of Interior appreciates the Federal Ministry of Environment for its guidance during the preparation of this EIA report for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution. Special thanks go to China Road and Bridge Corporation (CRBC), the project contractor, and Hecol Nigeria Limited, the accredited Consultant, for their commitment and professionalism. The Ministry also acknowledges the cooperation of host communities and stakeholders across the project states whose support was invaluable to the success of this study.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is a strategic initiative of the Federal Ministry of Interior under the second phase of the National Security Projects. The project is aimed at strengthening correctional facility security and enhancing internal security through the deployment of advanced technologies, including intelligent sensing, big data analytics, artificial intelligence (AI), and integrated video surveillance systems.

The project will cover correctional facilities across Nigeria's geopolitical zones, including selected prisons in the Federal Capital Territory, South East, South South, South West, North Central, North East, and North West. Key facilities include the Kuje Correctional Centre in Abuja, Calabar Prison in Cross River, Kirikiri Maximum Prison in Lagos, Jos Prison in Plateau, Kano Central Prison in Kano, and Gembu Prison in Taraba, among others. In total, more than 100 correctional centers in over 25 states will be equipped with modern surveillance infrastructure, underscoring the nationwide scope of the initiative.

The prison surveillance component, which forms the focus of this Environmental Impact Assessment (EIA) report, involves the installation of state-of-the-art video surveillance systems across selected correctional facilities nationwide. The system will be supported by secure cloud infrastructure, intelligent video management platforms, high-capacity storage servers, mobile patrol integration, dedicated data centres, and independent power supply systems to ensure uninterrupted operation.

To implement the project, the Federal Government has commissioned China Road and Bridge Corporation (CRBC) as the Engineering, Procurement, and Construction (EPC) contractor, while Hecol Nigeria Limited, an accredited environmental consultancy, has been engaged to undertake the EIA study in line with the provisions of the EIA Act CAP E12 LFN 2004 and the regulatory requirements of the Federal Ministry of Environment (FMEnv).

The EIA process will assess the potential environmental, socio-economic, and cultural impacts, both beneficial and adverse, associated with the project's implementation. It will also recommend appropriate mitigation measures to prevent, reduce, or offset negative impacts while enhancing the positive contributions of the project.

This initiative underscores the Federal Government's commitment to modernizing prison infrastructure, improving internal security systems, and doing so in a manner that is environmentally sustainable, socially responsible, and fully compliant with applicable regulatory standards.

1.2 Project proponent

The proponent of the Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution is the Federal Ministry of Interior, Government of the Federal Republic of Nigeria. The Ministry is responsible for internal security and protection of critical infrastructure

through its agencies, including the Nigeria Immigration Service (NIS), Nigeria Security and Civil Defence Corps (NSCDC), Federal Fire Service (FFS), and the Nigerian Correctional Service (NCoS).

The Ministry has commissioned China Road and Bridge Corporation (CRBC) as the engineering, procurement, and construction contractor, and engaged Hecol Nigeria Limited, an accredited environmental consultancy, to conduct the Environmental Impact Assessment (EIA) in line with Federal Ministry of Environment (FMEnv) and National Environmental Standards and Regulatory Enforcement Agency (NESREA) requirements.

1.3 Objectives of the EIA Study

The main objective of this Environmental Impact Assessment (EIA) study is to support informed decision-making and ensure that the design, construction, and operation of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution are environmentally sound, socially responsible, and sustainable. The EIA will provide a framework for integrating environmental safeguards into project planning, execution, and decommissioning, in line with national regulations and international best practices.

Specifically, the objectives of the EIA are to:

- Establish the baseline environmental and socio-economic conditions within the project areas and identify sensitive environmental components.
- Identify and assess potential environmental, social, health, and economic impacts associated with the project's location, construction, operation, and eventual decommissioning.
- Recommend feasible mitigation measures to avoid, minimize, or offset adverse impacts and enhance project benefits.
- Develop an Environmental and Social Management Plan (ESMP) covering the project life cycle, including monitoring, auditing, and contingency planning.
- Identify relevant environmental regulations, standards, and guidelines applicable to the project and ensure compliance.
- Facilitate consultation and cooperation with regulatory authorities, stakeholders, and the public.
- Provide a comprehensive EIA report presenting clear, evidence-based findings on the project's potential impacts.
- Support the Ministry of Interior in obtaining all necessary environmental permits and approvals from competent authorities.

1.4 EIA Terms of Reference

As statutorily required, a Terms of Reference (ToR) was prepared for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, and submitted to the Federal Ministry of Environment (FMEnv), Abuja, for review and approval. The approved ToR provides the framework for achieving the overall objectives of the EIA study.

The key elements of the ToR are as follows:

- Outline the general scope of the EIA study, including overall data requirements on the proposed Prison Security Video Surveillance Solution and the affected environment.

- Define the procedures and protocols for identifying and assessing associated and potential environmental and socio-economic impacts, and for developing an effective Environmental and Social Management Plan (ESMP) for the project.
- Establish a framework for stakeholder engagement, integrating the views of a multidisciplinary EIA team, regulatory agencies, host communities, and other relevant stakeholders.
- Identify and review the applicable legal, regulatory, and administrative requirements relevant to the proposed project.
- Develop a decommissioning and site restoration plan to guide environmental rehabilitation upon project completion or closure.

1.5 Scope of the EIA

The scope of this Environmental Impact Assessment (EIA) covers the following:

- Review of applicable national and international laws, regulations, standards, and codes relevant to the proposed Prison Security Video Surveillance Solution project.
- Description of all actions and activities to be undertaken during the planning, construction, operation, and decommissioning phases of the project.
- Review of existing literature on the project area and its area of influence, identification of data gaps, and execution of field surveys and laboratory analyses to complement available data.
- Analysis of collected data and detailed description of baseline environmental and socio-economic conditions in the study area, with emphasis on sensitive environmental components and receptors.
- Identification and evaluation of potential adverse environmental and social impacts of the project on nearby communities, including effects on cultural heritage, social infrastructure, and lifestyle values.
- Assessment of potential health hazards associated with the various phases of the project and evaluation of local population exposure to these hazards.
- Recommendation of appropriate, cost-effective mitigation measures and development of an Environmental and Social Management Plan (ESMP) for the project.
- Preparation of the EIA report in accordance with national and international guidelines and standards for EIA.
- Facilitation of the process for obtaining the necessary approvals and EIA Certificate from the Federal Ministry of Environment (FMEnv).

1.6 Legal and Administrative Framework

This section of the report provides the relevant Nigerian legislation and policy context as well as international legislations, good industry practices, standards and guidance that are applicable to the proposed project in general and EIA study in particular.

1.6.1 National Policy Guidelines and Regulations

- **Federal Ministry of Environment (FMEnv)**

In Nigeria the Federal Ministry of Environment is the nation's primary authority for the regulation and enforcement of environmental laws. The federal Government of Nigeria through the Act No, 58 of 1998 established the then Federal Environmental Protection Agency (FEPA) to protect, restore and preserve the ecosystem of the federal republic of Nigeria. In 1999, the FMEnv was created to oversee the functions of the defunct FEPA. The Act establishing the Ministry places on it the responsibility of ensuring that all development and industry activity operations and emission are within the limits prescribed in the national Guidelines and Standards, and comply with the relevant regulations for environmental pollution management in Nigeria as may be released by the ministry.

In furtherance of her mandate to ensure the overall protection of the environment and conservation of natural resources, the FMEnv developed laws/guidelines on various sectors of national economy. The specific policies, acts, guidelines enforced by FMEnv that are applicable to protect the project include:

- **National Policy on the Environment (1999)**

Environmental management in Nigeria is based on the National Policy on the environment (1989), was revised in 1999. The goal of this policy is to achieve sustainable development and secure for all Nigerians a quality environment which is adequate for their health and wellbeing. National Guidelines and Standards for Environmental Pollution Control in Nigeria (1991). This is the basic instrument for monitoring and controlling industrial and urban pollution.

- **EIA Act CAP EI2 LFN 2004**

EIA Act CAP E12 LFN 2004 was the primary instrument for governing EIA in Nigeria. It was promulgated in order to enable the prior consideration of an EIA on specified public or private projects. The Act sets out the procedure to be followed and methods to be used in undertaking and EIA. Sections 2(2) of the Act requires that where the extent, nature or location of the proposed project or activity is such that it is likely to significantly affect the environment, an EIA must be undertaking in accordance with the provisions of the Act.

- **National Environmental Impact Assessment Procedures and Sectoral Guidelines**

In response to the promulgation of EIA Act, FMEnv developed a National EIA procedure in 1995. The procedure provides steps to be followed from the stage of project conception to commissioning in order to ensure that the project is implemented with maximum consideration for the environment. The FMEnv EIA process flow chart is shown in Figure 1.2.

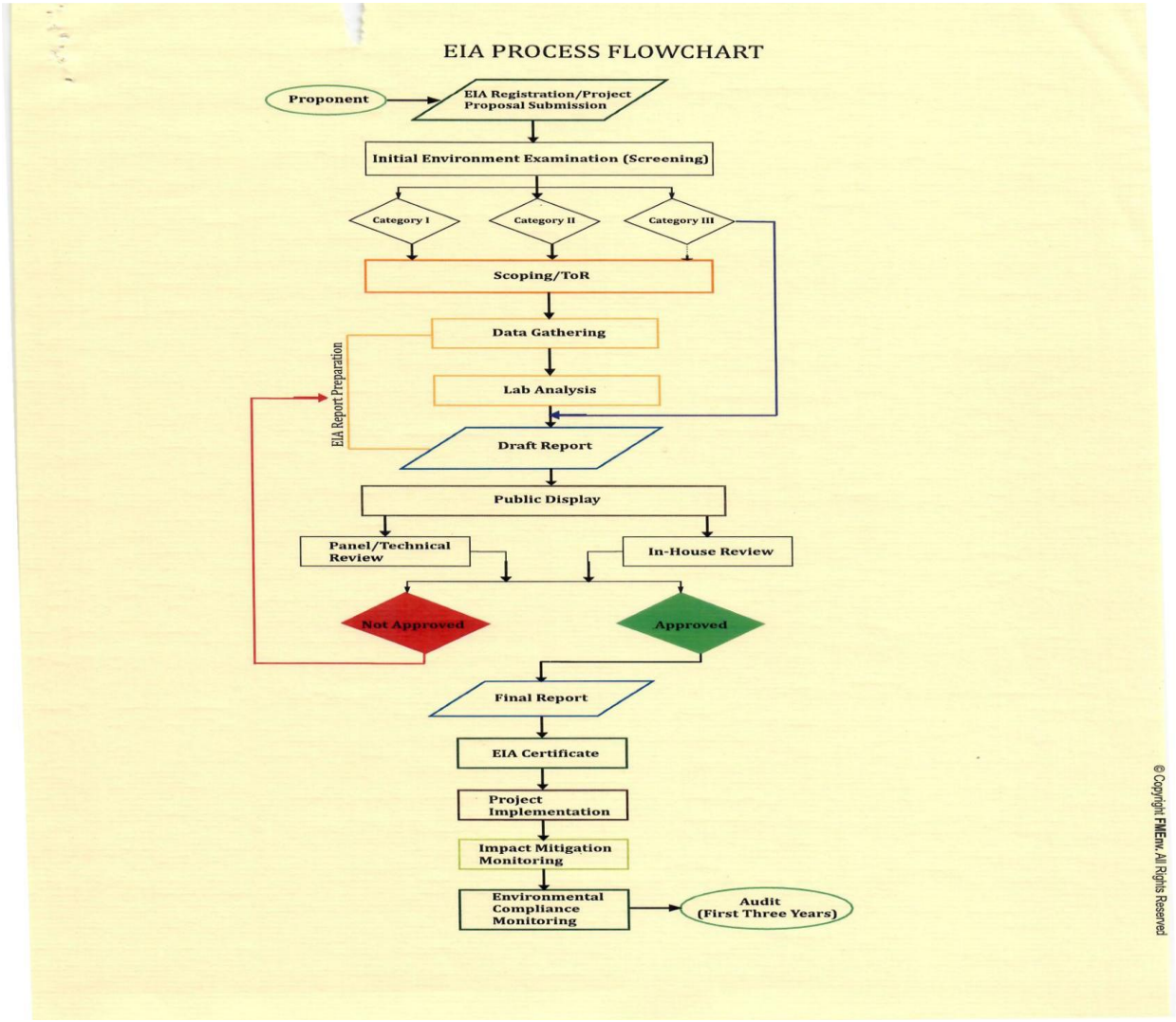

Figure 1.1: FMEnv EIA Process Flowchart
Source: *Federal Ministry of Environment*

- **Nigerian Communication Commission (NCC), 2003**

The Nigerian Communication Commission (NCC) is the nation's regulatory authority for telecommunication industry. The Nigerian Communications Act 2003 was signed into law to strengthen the capacity of NCC to properly carry out its regulatory activities.

- **National Environmental Standards and Regulation Enforcement Agency, 2007**

The National Environmental Standards and Regulations Enforcement Agency (NESREA) were established in 2007 by Federal Government of Nigeria as a parastatal of the Federal Ministry of Environment. The Agency is charged with the responsibility of enforcing all environmental laws, guidelines, policies, standards and regulations in Nigeria. It also has the responsibility to enforce compliance with provisions of international agreements, protocols, conventions and treaties on the environment. The vision of the agency is to ensure a cleaner and healthier environment for all Nigerians, while the mission is to inspire personal and collective responsibility in building an environmentally conscious society for the achievement of sustainable development in Nigeria.

- **National Environmental (Standards for Telecommunications and Broadcast Facilities) Regulations, 2011**: Provides environmental guidelines for the location, design, and operation of telecommunication and broadcast infrastructure (applicable to surveillance and data transmission equipment).
- **National Environmental (Noise Standards and Control) Regulations, 2009** – Regulates permissible noise levels during construction and operation.
- **National Environmental (Control of Hazardous Substances and Chemicals) Regulations, 2011** – Governs the handling, storage, and disposal of hazardous substances used during the project.
- **National Environmental (Sanitation and Waste Control) Regulations, 2009** – Provides standards for waste segregation, storage, and disposal during all project phases.

- **Nigerian Correctional Service Act, 2019**

The Nigerian Correctional Service Act, 2019 repealed the old Prisons Act and established the Nigerian Correctional Service (NCoS) as the body responsible for the management and security of correctional facilities across the country. It mandates the provision of adequate infrastructure to ensure the safety of inmates, staff, and the public, while also preventing jailbreaks and maintaining order within custodial centres. This makes the installation of video surveillance systems a legally supported tool for strengthening security and operational efficiency in prisons.

The Act also regulates access, inspection, and security arrangements in correctional facilities, which means that any surveillance installations must comply with these requirements and align with custodial protocols. At the same time, it emphasizes the dignity and welfare of inmates, requiring that such systems be deployed in a way that respects human rights and privacy, especially in sensitive areas such as medical or legal consultation spaces.

- **Cybercrimes (Prohibition, Prevention, etc.) Act, 2015**

Provides the legal framework for the prevention, detection, prosecution, and punishment of cybercrimes in Nigeria. It governs data protection, cyber-security, and the integrity of digital information, ensuring that surveillance data, transmission systems, and storage facilities under the project are secure, protected from unauthorized access, and compliant with national cyber-security standards.

- **Nigeria Data Protection Act, 2023**

The Act establishes the Nigeria Data Protection Commission (NDPC) as the principal regulatory authority responsible for overseeing and enforcing data protection obligations across both public and private institutions. It sets out clear principles for the lawful processing of personal data, which directly applies to the continuous video monitoring and storage systems that will form a central component of the prison surveillance project.

Under the Act, personal data including images and video recordings that identify individuals is subject to strict conditions of processing, storage, and retention. The surveillance system must therefore operate within the framework of consent, legitimate interest, or legal obligation, ensuring that data is not processed arbitrarily but for specific, lawful purposes related to security

and correctional management. The Act also requires data controllers to implement strong security and technical safeguards to protect against unauthorized access, breaches, or misuse of recorded video content.

Furthermore, the Act regulates data retention, ensuring that surveillance footage is stored only for as long as necessary, and governs cross-border data transfers, which may become relevant if the project relies on cloud-based storage or international technology vendors.

- **Freedom of Information (FOI) Act, 2011**

The Freedom of Information (FOI) Act, 2011 is designed to promote transparency, accountability, and citizen participation in governance, and it applies to all public institutions, including the Federal Ministry of Interior and the Nigerian Correctional Service, which are directly involved in this project.

In the context of the prison security video surveillance solution, the FOI Act ensures that stakeholders, civil society groups, and affected communities have the right to request information on the project's objectives, design, environmental and social impacts, and mitigation measures. This strengthens public trust and enhances the credibility of the EIA process by making non-sensitive documents accessible to the public. However, the Act also recognizes exemptions in cases where disclosure may compromise national security, public safety, or the privacy of individuals.

- **Land Use Act Cap L5 LFN 2004**

The Land Use Act Cap L5 LFN 2004 is the legal framework for land acquisition and resettlement in Nigeria. The following are selected relevant sections: Section 1: Subject to the provisions of this Act, all land comprised in the territory of each State in the Federation are hereby vested in the Governor of that State and such land shall be held in trust and administered for the use and common benefit of all Nigerians in accordance with the provisions of this Act.

Section 2: (a) All land in urban areas shall be under the control and management of the Governor of each State; and (b) all other land, subject to this Act, shall be under the control and management of the Local Government within the area of jurisdiction in which the land is situated. The Act gives the government the right to acquire land by revoking both statutory and customary rights of occupancy for the overriding public interest. In doing so, the Act specifies that the State or Local Government should pay compensation to the current holder or occupier with equal value.

- **The Nigerian Urban and Regional Planning Act CAP N138, LFN 2004**

The Nigerian Urban and Regional Planning Act CAP N138, LFN 2004 established a Development Control Department (DCD) charge with the responsibility for matters relating to development control and implementation of physical development plans at Federal, State and Local Government levels within their respective jurisdiction.

- Approval of the relevant DCD shall be required for any land development
- A developer shall submit a development plan for the approval of the DCD of local Government, State or Federal Government.

- A developer (whether private or government) shall apply for a development permit in such manner using such forms and providing such information including plans, designs, drawings and any other information, as may be prescribed,
- A developer shall at the time of submitting his application for development submit to an appropriate Control Department a detailed Environmental Impact Statement (EIS) for an application.

- **Criminal Code Act, Cap C38 LFN 2004**

The Nigerian Criminal Code makes it an offensive punishment with up to six months imprisonment for any person who violates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling, or carry on business in the neighbourhood, passing along a public way; or does any act which is and which he knows or has reason to believe to be, likely to spread that infection of any disease dangerous to life whether human or animal.

- **Penal Code Act, CAP P53, LFN 2004**

The Penal Code Act, applicable in the northern states of Nigeria, incorporates principles of Islamic law (Sharia) alongside common law, serving as the legal framework for criminal justice in the region. In relation to environmental and public health, the Penal Code addresses violations that affect the well-being of communities and the natural environment.

Of particular relevance to environmental protection, Section 247 of the Penal Code makes it a punishable offense to pollute the atmosphere or engage in any act likely to spread diseases dangerous to human or animal life. Such offenses are subject to imprisonment, reinforcing the government's commitment to safeguarding public health and maintaining environmental standards.

- **Endangered Species Act, CAP E9, LFN 2004**

This Act focuses on the protection and management of Nigeria’s wildlife and some of their species in danger of extinction as a result of overexploitation. These sections are noteworthy:

- Section 1 prohibits, except under a valid license, the hunting, capture or trade in animal species, either presently or likely being in danger of extinction.
- Section 5 defines the liability of any offender under this Act.
- Section 7 provides for regulations to be made necessary for environmental prevention and control as regards the purposes of this Act.

- **Factories Act, Cap. F1, LFN 2004**

The Factories Act is the primary law regulating health, safety and welfare of worker in factories in the country. The Acts seeks to make adequate provisions for the health and safety of workers and generally bring safety legislation in line with requirements of modern industrial setting.

- **National Health Act of 2014**

The Nigerian National Health Act of 2014 provides a legal framework for regulating, developing, and managing the national health system by setting standards for healthcare services, defining responsibilities for all levels of government and private entities, and establishing the Basic Health

Care Provision Fund (BHCPF) to ensure essential services. Key provisions include the right to emergency treatment, the regulation of health establishments, standards for human resources, and the establishment of a national health information system.

- **Labour Act Cap L1 LFN, 2004.**

The Labour Act (1990) is the primary law protecting the employment rights of individual workers. The Labour Act makes general provisions for the protection of wages, contracts of employment as well as terms and conditions of employment. It also makes provisions for recruitment and identifies special classes of workers.

- **Harmful Wastes (Special Criminal Provisions) Act (Cap H1, LFN 2004)**

The Harmful Wastes (Special Criminal Provisions) Act (Cap H1, LFN 2004) was originally enacted in response to concerns about toxic waste dumping in the country and remains the strongest legislative instrument for criminalizing the movement and disposal of hazardous substances.

In relation to the prison security surveillance project, the Act becomes applicable due to the use of electrical and electronic equipment, including cameras, servers, monitors, batteries, and backup power units. These components, once damaged or obsolete, can generate hazardous waste such as lead-acid batteries, heavy metals, and other toxic e-waste materials that may pose risks to human health and the environment if improperly disposed of. The Act makes it a criminal offence for any person or organization to engage in the importation or unlawful disposal of such wastes, with severe penalties including imprisonment and fines.

- **Nigeria Electricity Regulatory Commission, Regulation for Mini-Grid, 2016**

The Mini-Grid Regulation is specifically designed to accelerate electrification in areas without any existing distribution grid and areas with existing but poorly electrified or non-functional distribution, especially but not limited to rural areas.

- **National Renewable Energy and Energy Efficiency Policy, 2015**

The National Renewable Energy and Energy Efficiency Policy (NREEEP) outline the global thrust of policies and measures for the promotion of renewable energy and energy efficiency. The policy encourages the development of national renewable energy action plan and a national energy efficiency action plan.

- **States Environmental Legislation**

This project spans multiple states across Nigeria, and the respective State Environmental Protection Agencies (SEPAs) are mandated to develop and enforce procedures aimed at minimizing the impacts of physical development on the ecosystem. They are also responsible for ensuring an environment that is safe, healthy, and conducive to the well-being of residents.

In relation to this project, the key functions of the SEPAs include:

- Liaising with the Federal Ministry of Environment (FMEnv) to implement the National Policy on Environment.

- Cooperating with FMEnv and other national agencies in carrying out environmental functions, including public environmental education and awareness.
- Overseeing general environmental matters within their respective states.
- Monitoring the implementation of Environmental Impact Assessments (EIAs) and other environmental studies for development projects within their jurisdiction.

1.6.2 International Guidelines and Conventions

- **International Guidelines**

World Bank Guidelines on Environmental Assessment

The World Bank requires an Environmental Assessment on a proposed activity/ facility (i.e. project) from a borrower as a pre-requisite before granting any financial assistance in the form of loans. The EIA report usually forms part of the overall feasibility study or project preparation. The bank has categorization projects based on their EA requirements, which is very similar to that of FMEnv.

- *The Intentional Finance Corporation (IFC) Environment, Health and Safety Guidelines for Telecommunications*

The IFC and World Bank Group have developed a set of Sectoral Environmental Health and Safety (EHS) Guidelines which provides guidance to users on common EHS issues potentially application to all industry sectors including Telecommunication.

- *China Export and Import (EXIM) Bank Guidelines on Environmental and Social Policies on Oversea Investment*

Adopting the policies of the International Finance Corporation (IFC) the EXIM bank put up environmental and social policies for proposed projects that it intends to finance or execute overseas. These policies are effectively tailored towards identifying and mitigation not only unanticipated environmental and social harm, but also some investment risk that can undermine the long-term financial success of a project.

- *Equator Principle*

The Equator Principles are a voluntary set of guidelines developed by leading financial institutions for managing environmental and social issues in project finance lending. The guidelines are based on the environmental and social standards of the IFC, and apply globally to development projects with a capital cost of US dollars (US$) 10 million or more in all industry sectors. These principles are intended to serve as a common baseline and framework for the implementation of participating institutions' individual, internal environmental and social procedures and standards for project financing activities across all industry sectors globally. Additional detail can be found on their website *www.equator-principles.com*.

The first set of Equator Principles was launched in 2003 and was ultimately adopted by over 40 financial institutions during a three-year implementation period. A subsequent updating process took place in 2006 leading to a newly revised set of Equator Principles that were released in July 2006. The new, revised set of Equator Principles is fully consistent with recently revised IFC Performance Standards (see below).

The Equator Principles aim is to ensure that prior to agreeing to provide financing, (a) a project has been subject to an appropriate level of environmental and social assessment in accordance with the requirements of the IFC Performance Standards (2006) and (b) that the project will implement appropriate measures for the management of environmental, social and health issues during construction, operation and decommissioning phases. By adopting the principles, financial institutions undertake to review carefully proposals for which their customers request project financing. They commit not to provide loans to projects where the borrower will not, or is unable to, comply with the requirements of the IFC Performance Standards.

- **International Conventions**

The Nigerian government is an important player in the international support the protection of the environment. As such, the country is a signatory to some international laws and conventions, which are targeted towards conservation and protection of the environment in order to ensure sustainable development. Some international conventions and regulations that are related to the present study and the protection of environment in Nigeria include:

- *African Convention on Conservation of Nature and Natural Resources*

The African Convention on Conservation of Nature and Natural Resources was adopted in Algiers, Algeria on September 15, 1968 and entered into force on June 16, 1969. The convention stipulates that the contracting States shall undertake to adopt the measures necessary to ensure conservation, utilization and development of soil, water, flora and fauna resources in accordance with scientific principles and with due regard to the best interested of the people.

- *Convention Concerning the Protection of the World Cultural and Natural Heritage*

The convention was adopted in Paris, France on October, 17, 1972; the Convention set aside areas of cultural and natural heritage for protection. It places obligations to each State Party to recognize that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generation of the cultural and natural heritage situation on its territory, belongs primarily to the State.

- *Conservation on the Conservation of Migratory Species of Wild Animals*

This convention also known as Bonn Convention was adopted in 1979 and entered into force in 1983. It stipulates actions for the conservation and management of migratory species including habitat conservation.

- *Vienna Convention for the Protection of the Ozone Layer*

The Vienna Convention was adopted in 1985 and entered into force on September 22, 1988. It places general obligation obligations on countries to make appropriate measures to protect the environment against adverse effects resulting from human activities which tend to modify the ozone layer.

- *The Montreal Protocol on Substances that Deplete the Ozone Layer*

The protocol was adopted on September, 16, 1987 as an international treaty to eliminate ozone depleting chemicals production and consumption.

- *Basel Convention on the Control of Trans-bou7ndary Movement of Hazardous Waste and their Disposal*

The Conservation was adopted on March 22, 1989 and entered into force on May, 1989. It forces attention on the hazard of the generation and disposal of hazardous waste. The Convention defines the waste to be regulated and controlled, warned on their trans0boundary movements in other to prevent human and their environmental health against their adverse effects.

- *United Nations Convention on Biological Diversity*

The Convention was adopted in 1994. The objectives of the Convention include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

- *United Nations Framework Convention on Climate Change*

The Convention on Climate Change was adopted in 1992 during the Rio Earth Summit in Rio De Janerio, Brasil and entered into 19945; to limit Greenhouse Gas (GHG) emissions which cause global warming.

1.6.3 Contractor's Environment, Health and Safety (EHS) Policy

The contractor (China Road and Bridge Corporation) recognises that leading in technology must go hand-in-hand with promoting environmental protection, health, and safety. An Environment, Health and Safety (EHS) Management System, based on international standards, will be implemented to ensure a safe and healthy working environment, protect the public, and safeguard the environment.

Key EHS objectives include:

- Raising awareness of EHS in all project phases.
- Identifying and managing environmental risks and occupational hazards.
- Integrating EHS requirements into procurement and promoting EHS awareness across the supply chain.
- Reducing energy use, optimizing resource efficiency, and supporting sustainable development.
- Conducting regular audits and reviews to ensure continual improvement.

Workplace Safety

All activities will be planned and executed to avoid injury, protect worker health, and prevent adverse effects on host communities. Project Managers and Supervisors will ensure compliance with the EHS Policy, with work suspended if essential safety systems are not in place. Employees and contractors must use appropriate Personal Protective Equipment (PPE) such as coveralls, safety shoes, hard hats, gloves, and rain gear, with regular inspection and replacement of defective PPE.

Emergency Preparedness

The contractor will maintain contingency plans for emergencies including fires, explosions, hazardous exposure, radiation incidents, civil unrest, and medical emergencies.

Green Product and Sustainability Commitment

The contractor is committed to eco-friendly design, procurement, and operations, aiming for environmental conservation, product quality enhancement, and efficient resource use. Compliance will be maintained with relevant international and Nigerian standards including ISO 14001, OHSAS 18001.

1.7 Structure of the EIA Report

The report format and outline of the EIA study is in line with the Federal Ministry of Environment's EIA Guidelines. Accordingly, the structure of the report is as follows:

- **Executive Summary**: A non-technical summary of the EIA report
- **Chapter One:** Provides introduction to the project; objectives and scope of work of the EIA; legal and administrative framework as well as information on the project proponent.
- **Chapter Two:** Provides the rationale for the proposed project and analysis of various alternative scenarios.
- **Chapter Three:** Describes the project location, project activities development phases and schedule.
- **Chapter Four:** Describes the current baseline environment (biophysical. chemical, socio-economic and health) characteristics of the project site and its influence.
- **Chapter Five**: Identifies and presents the associated and potential environmental impacts of the proposed project.
- **Chapter Six:** Highlights the recommended mitigation measures for ameliorating any significant adverse environmental impacts and enhancing beneficial impacts.
- **Chapter Seven:** Defines the environmental management plan that will be adopted by the company throughout the project lifecycle.
- **Chapter Eight**: Sets out procedures and remediation plans that will be followed in the event of decommissioning the project.
- **Chapter Nine**: Conclusion and recommendation
- **References**
- **Appendices**

CHAPTER TWO

PROJECT JUSTIFICATION

2.1 Need for the Project

Nigeria's correctional facilities are a vital component of the national security system, entrusted with the safe custody, rehabilitation, and reintegration of inmates. However, they face persistent challenges of overcrowding, obsolete infrastructure, and weak security systems. Reports from the Ministry of Interior and the Nigerian Correctional Service (NCoS, 2023) confirm that many facilities remain vulnerable to jailbreaks, violent attacks, smuggling of contraband, and internal security breaches, all of which undermine public safety and erode public trust in the justice system. Recent incidents across several states have further exposed gaps in surveillance and monitoring, where limited manpower and outdated equipment failed to prevent coordinated escapes and assaults.

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution seeks to close these gaps by deploying intelligent, high-definition surveillance systems across strategic correctional facilities nationwide. The system will include networked cameras, command-and-control centres, secure data storage platforms, and AI-driven video analytics capable of detecting suspicious activity, tracking movements, and generating real-time alerts. This will significantly enhance the capacity of prison authorities to monitor inmates and staff, prevent unauthorized access, and coordinate rapid response to security incidents.

The need for this intervention is further reinforced by national security assessments and international correctional standards. The United Nations Office on Drugs and Crime (UNODC, 2022) emphasizes the role of modern surveillance in correctional reform, while the African Union (AU, 2023) has warned that prison security failures fuel regional instability through the escape of high-risk offenders and the spread of illicit arms. By strengthening situational awareness and operational control, the project will help reduce jailbreaks, safeguard correctional officers and inmates, and protect host communities.

Beyond its immediate security benefits, the project also supports Nigeria's justice sector reform agenda and commitment to the rule of law. It will modernize custodial management, improve inter-agency coordination between the NCoS, Nigeria Police Force, and other security agencies, and ensure compliance with international human rights and correctional standards. The solution is also expected to improve emergency response times to under 10 minutes, enhance transparency in prison operations, and uphold the integrity of judicial outcomes.

2.2 Benefits of the Project

The benefits include:

- Enhanced Surveillance Capacity: Deployment of high-definition surveillance systems to provide reliable, secure, and continuous monitoring of correctional facilities and high-risk zones.

- Intelligent Security Operations: Integration of AI-driven video analytics, secure data storage, and real-time monitoring platforms to detect threats, track inmate movements, and enable rapid intervention.
- Improved Operational Reliability: Strengthened ability of prison authorities to respond effectively under conditions of heightened security demand.
- Inter-Agency Coordination: Better collaboration between NCoS, the Nigeria Police Force, NSCDC, and other agencies during emergencies and joint security operations.
- Reduced Security Breaches: Significant decrease in jailbreaks, violent attacks, contraband smuggling, and internal disturbances.
- Human Rights Protection: Safer custodial conditions that protect the rights of inmates and reduce their exposure to violence.
- Transparency and Accountability: Greater public confidence in prison management through improved oversight and monitoring.
- Economic Opportunities: Direct and indirect job creation through design, installation, operation, and long-term system maintenance.
- Cost Efficiency: Reduced reliance on excessive manpower and improved resource allocation through technology-driven monitoring systems.
- Rapid Emergency Response: Faster interventions (within minutes) in cases of attempted jailbreaks or violent incidents.
- Community Safety: Prevention of escapes by high-risk offenders, thereby reducing threats to nearby populations.
- Strengthened public safety, political stability, and social cohesion through reliable prison security.

2.3 Value of the Project

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution represents a strategic investment by the Federal Government of Nigeria in strengthening the country's internal security infrastructure, with particular focus on custodial facilities. This project has been prioritized under the Ministry of Interior's strategic initiatives to modernize correctional management and enhance the operational capacity of the Nigerian Correctional Service (NCoS) in line with national security objectives and international correctional standards.

The contract value for this phase reflects the scope of deploying intelligent high-definition surveillance systems across designated correctional facilities nationwide. This includes the installation of networked cameras, command-and-control centres, secure cloud-based data storage, intelligent video analytics, and reliable power supply systems to ensure round-the-clock operational functionality. The investment also covers engineering, procurement, and construction works, as well as integration of advanced surveillance technologies that comply with both national regulatory requirements and global best practices in correctional security.

This value is justified by the project's potential to drastically reduce the risks and socio-economic consequences of prison security failures such as jailbreaks, violent attacks, and the smuggling of contraband, which have historically undermined public safety and national stability.

2.4 Envisaged Sustainability

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution will be executed in line with Best Available Technology (BAT) and internationally recognized standards to ensure that its technical, economic, environmental, and social benefits are sustained throughout its life cycle. The project is designed not only to address immediate correctional security needs but also to remain viable and effective in the long term.

2.4.1 Economic Sustainability

The project will generate significant economic benefits at both national and institutional levels. During the installation and commissioning phases, it will create direct and indirect employment opportunities for skilled and semi-skilled labour, including engineers, technicians, IT specialists, and support staff. In the long run, improved prison security will reduce the economic and social costs associated with jailbreaks, violent disturbances, and contraband smuggling. By lowering the frequency of costly security breaches and reducing the need for repeated emergency interventions, the project will enable the Nigerian Correctional Service and the Ministry of Interior to achieve long-term cost savings and redirect resources toward rehabilitation and reintegration programmes.

2.4.2 Technical Sustainability

The surveillance system will incorporate advanced, proven technologies that comply with both Nigerian and international engineering and correctional security standards. It will include intelligent video analytics, secure real-time data transmission, and cloud-based storage designed for scalability and durability. Built-in redundancies and reliable power systems will ensure continuous operation even under challenging conditions. Continuous capacity building through training and retraining of correctional officers, ICT staff, and maintenance teams will guarantee optimal system performance. Strict adherence to Environment, Health, and Safety (EHS) guidelines during installation and operations will further ensure the system's reliability and safety.

2.4.3 Environmental Sustainability

Implementation of the project will be guided by the requirements of the Federal Ministry of Environment (FMEnv), relevant state environmental agencies, and international environmental standards. Potential environmental impacts during installation such as noise, waste generation, and energy use will be mitigated through proper site management, waste segregation, recycling of electronic components, and strict enforcement of the Environmental Management Plan (EMP). Hazardous materials, such as batteries and electronic components, will be handled and disposed of in compliance with the Harmful Wastes (Special Criminal Provisions) Act and NESREA regulations. This will minimize ecological disturbance and ensure sustainable environmental practices throughout the project's life span.

2.4.4 Social Sustainability

The project will enhance social sustainability by reducing jailbreaks, violent incidents, and contraband smuggling, thereby improving safety within correctional facilities and surrounding communities. Preventing the unlawful escape of high-risk inmates, it will reduce threats to public

safety and promote stronger community trust in national security institutions. Furthermore, a secure and stable correctional system will create an enabling environment for justice sector reforms, human rights protection, and socio-economic stability. The project's contribution aligns with the Sustainable Development Goals (SDGs), particularly SDG 16 on Peace, Justice, and Strong Institutions, by reinforcing rule of law, promoting transparency, and strengthening national security.

2.5 Project Options

2.5.1 No Project Option

The no-project option implies that the proposed Prison Security Video Surveillance Solution will not be implemented, and therefore no Environmental Impact Assessment (EIA) study would be necessary. While this option would eliminate potential environmental disturbances from construction and operation, it is socially, economically, and institutionally unviable. Failure to implement the project would leave Nigeria's correctional facilities vulnerable to persistent security challenges, including jailbreaks, riots, smuggling of contraband items, radicalisation of inmates, and inadequate monitoring of high-risk offenders.

Additionally, the absence of this project would hinder the Federal Government's ongoing efforts to modernise prison infrastructure, strengthen internal security, enhance inter-agency coordination, and improve human rights compliance in custodial centres.

2.5.2 Delayed Project Option

The delayed project option implies postponing the implementation of the surveillance system until a later date, possibly due to political instability, community resistance, budgetary constraints, or competing national priorities. However, none of these conditions currently apply, as both the political and economic environments remain favourable, while the rising incidence of prison breaks and internal security breaches underscores the urgent need for advanced prison surveillance systems.

A delay in project execution would expose the correctional system to heightened risks, further erode public confidence in the custodial system, and increase the likelihood of recidivism and organised crime. Moreover, postponement could lead to higher project costs due to inflationary pressures, exchange rate fluctuations, and technological obsolescence. It would also render ongoing planning and preparatory efforts ineffective, resulting in wasted financial and institutional resources.

2.5.3 Go-Ahead Project Option

The go-ahead option entails proceeding with the project as planned, deploying Best Available Technology (BAT) and ensuring strict adherence to national environmental regulations, international security standards, and human rights compliance protocols. This option aligns with the Federal Government's strategic security objectives, particularly the need to strengthen the safety and resilience of correctional facilities. Implementing this option, the project will deliver significant security, socio-economic, and institutional benefits. The go-ahead option is therefore the most practical and beneficial choice, as it not only supports internal security reform but also

promotes long-term stability, safer correctional facilities, and enhanced public trust in Nigeria's justice system.

2.6 Project Alternatives

2.6.1 Alternative Site / Location

Given the nationwide security objectives of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, the project is specifically designed to target selected correctional facilities across the country. Alternative sites or locations were considered, but relocating the project away from designated high-priority prisons would significantly reduce its effectiveness in addressing prevailing custodial security challenges.

The selected prison facilities were identified based on security vulnerability assessments, past jailbreak incidents, inmate population density, intelligence reports from the Nigerian Correctional Service (NCoS), and recommendations from the Ministry of Interior. These criteria ensure that resources are directed to facilities where surveillance systems are most urgently required. Consequently, alternative locations were deemed unsuitable as they would not meet the project's purpose, urgency, and security mandate.

Different Scale Alternative

A smaller-scale deployment involving fewer correctional facilities was considered as a cost-saving measure. However, such a configuration would fail to provide adequate coverage of Nigeria's vast network of correctional centres, particularly those in high-risk urban and border-state regions. This would leave several vulnerable facilities without surveillance coverage, thereby undermining the project's core objectives of comprehensive inmate monitoring, prevention of jailbreaks, and inter-agency emergency response coordination.

As a result, the reduced-scale alternative was eliminated from further consideration due to its inability to address urgent and widespread prison security needs.

Different Technology or Configuration Alternative

Alternative surveillance configurations were reviewed, including:

- Exclusive use of mobile surveillance vans within prison premises.
- Drone-based monitoring for aerial observation.
- Satellite-based monitoring systems integrated with command centres.

While flexible, these options cannot guarantee the 24/7 real-time, high-definition monitoring and recording required for effective prison security management. Mobile and drone solutions would also raise operational costs over time due to high maintenance and staffing requirements, while satellite monitoring lacks the resolution and responsiveness needed for incident-level inmate tracking. Similarly, deploying fewer fixed surveillance points and relying more on human patrols would compromise the reliability and deterrence power of the system. For these reasons, such alternatives were rejected in favour of the proposed fixed-site, high-definition surveillance network integrated with intelligent video analytics, secure storage systems, and cloud-based command operations.

Wireless Network Alternative

A purely wireless surveillance network was considered as a possible cost-reduction strategy. However, such a configuration would not provide the data reliability, bandwidth, and resilience needed for continuous high-quality video streaming across all designated prison facilities. Many correctional centres, particularly in remote or underserved regions, have weak network infrastructure, which would compromise operational effectiveness.

Furthermore, deploying a wireless-only system would require extensive new infrastructure development, potentially leading to greater environmental disturbance, longer project timelines, and higher maintenance costs. As such, the wireless-only option was deemed not viable.

2.6.2 Design and Technology Alternative

The design of the Prison Security Video Surveillance Solution prioritises:

- Integration with existing national security and correctional infrastructure.
- Operational safety and reliability within correctional facilities.
- Compliance with national standards and relevant international codes for surveillance, network security, electrical systems, and lightning protection.
- Energy efficiency and redundancy, ensuring uninterrupted operations during power outages.

The selected technology incorporates advanced video analytics, intelligent alert systems, high-capacity storage servers, and secure encrypted data transmission, enabling long-term scalability and adaptability.

Considering the security objectives, the chosen design and technology configuration provides the highest level of operational effectiveness, cost efficiency, and long-term sustainability. No alternative design or technology was considered superior to the proposed configuration.

CHAPTER THREE

PROJECT DESCRIPTION

3.1 Introduction

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is a strategic security modernization initiative of the Federal Ministry of Interior, aimed at strengthening correctional facility management across Nigeria. This project is designed to deploy state-of-the-art surveillance infrastructure that will provide continuous monitoring of perimeters, entry and exit points, cells, corridors, and other sensitive areas within correctional centres. The system will enhance real-time detection and response to jailbreaks, riots, contraband smuggling, violent incidents, and external attacks, thereby reinforcing the safety of inmates, correctional officers, and host communities.

Under this phase, 150 correctional facilities nationwide have been identified for the installation of surveillance infrastructure. Each facility will be equipped with dedicated power systems, high-definition cameras, fibre-optic transmission links, intelligent video management platforms, and IVS 1800 storage systems with a minimum 30-day retention capacity. The surveillance solution will be integrated with secure cloud infrastructure, mobile patrol units, and dedicated data centres to ensure uninterrupted operations and centralized monitoring.

The project complements existing security measures within Nigeria's correctional institutions and represents a major step in modernizing custodial infrastructure. It aligns with the Federal Government's broader objective of enhancing internal security, strengthening justice sector reforms, and ensuring compliance with both national regulations and international correctional standards.

3.2 Project Location

The Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution will be implemented across correctional facilities nationwide, covering all six geopolitical zones of Nigeria. The project sites were selected based on detailed vulnerability assessments conducted by the Federal Ministry of Interior in collaboration with the Nigerian Correctional Service (NCoS), the Nigeria Security and Civil Defence Corps (NSCDC), and the Nigeria Police Force (NPF).

Surveillance infrastructure will be deployed at:

- Major correctional centres housing large inmate populations.
- High-security prisons identified as particularly vulnerable to jailbreaks, riots, or external attacks.
- Medium- and minimum-security facilities with recurring security challenges such as contraband smuggling and violent disturbances.

Each surveillance site will be integrated into a secure IP-based network, linking local installations to regional command centres in each geopolitical zone. These will in turn connect to a central command-and-control facility at the Ministry of Interior Headquarters, Abuja, ensuring real-time nationwide monitoring and rapid incident response.

The project will cover prisons across 29 host states and the FCT Abuja, representing all six geopolitical zones:

- North-Central: FCT (Abuja), Benue, Kogi, Kwara, Nasarawa, Niger, Plateau.
- North-East: Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe.
- North-West: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, Zamfara.
- South-East: Abia, Anambra, Ebonyi, Enugu, Imo.
- South-South: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Rivers.
- South-West: Ekiti, Lagos, Ogun, Ondo, Osun, Oyo.

This distribution provides full geopolitical representation, enhances situational awareness, and strengthens the resilience of Nigeria's correctional system against emerging security threats.

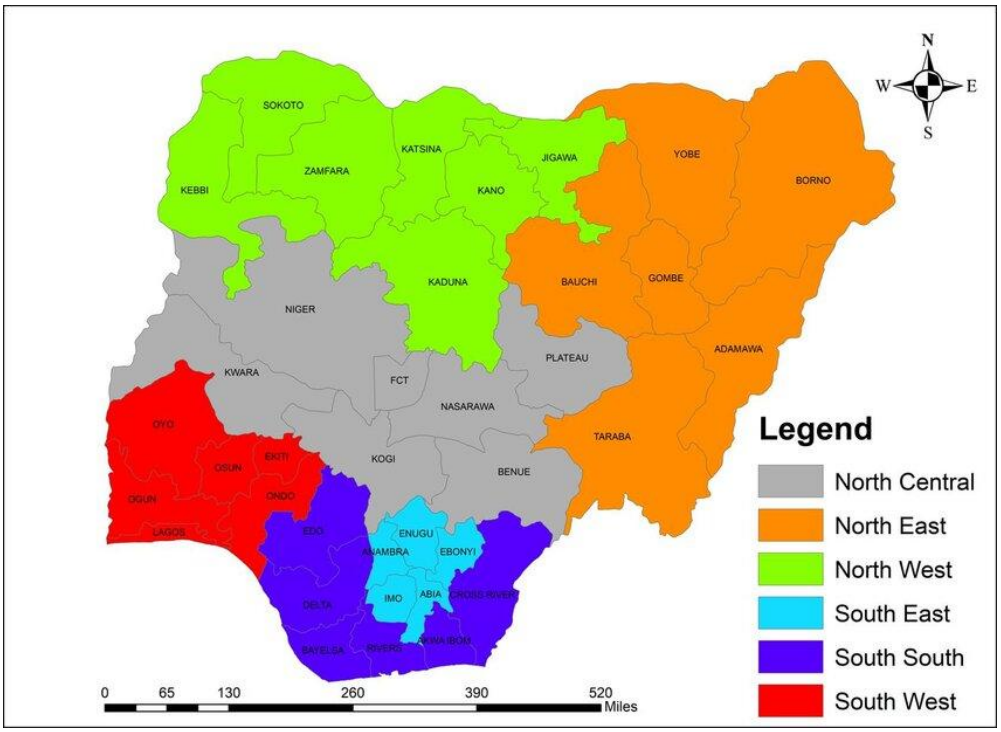

Figure 3.1: Map of Nigeria showing Boundaries of Six Geopolitical Zones

Figure 3.2: Prison Security Video Surveillance Solution

Table 3.1: Correctional Center Locations

State	No.	Prison
Abuja	1	Federal Prison (Medium Security), Kuje, CZ
	2	Federal Prison (Medium Security), Dukpa Farm Center, Abuja
Abia State, South Eastern Nigeria	3	Federal Prison (Medium Security), Aba
	4	Federal Prison (Medium Security) Arochukwu
	5	Federal Prison (Medium Security), Aguata, Anambra State
	6	Federal Prison (Medium Security), Awka, Anambra State
	7	Federal Maximum-Security Prison, Nnewi Anambra State
	8	Federal Prison (Medium Security), Nnewi, Anambra State
	9	Federal Prison (Medium Security), Onitsha, Anambra State
Akwa Ibom State, Southern Nigeria	10	Federal Prison (Medium Security), Abak, Akwa Ibom State
	11	Federal Prison (Medium Security) Ikot Abasi, Akw Ibom State
	12	Federal Prison (Medium Security) Ikot- Ekpene, Akw Ibom State
	13	Federal Prison (Medium Security) Uyo, Akwa Ibom State
Bauchi State, Northern Nigeria	14	Alkaleri Satellite Prison, Bauchi State
	15	Federal Prison (Medium Security) Azare, Bauchi State
	16	Federal Prison (Medium Security), Bauchi, Bauchi State
	17	Burra Satellite Prison, Bauchi, Bauchi State
	18	Darazo Satellite Prison, Bauchi, Bauchi State
	19	Gamawa Satellite Prison, Bauchi, Bauchi State
	20	Katagun Satellite Prison, Bauchi, Bauchi State
	21	Federal Prison (Medium Security), Misau, Bauchi State
	22	Federal Maximum-Security Prison Jama'are, Bauchi State
	23	Federal Prison (Medium Security), Ningi, Bauchi State
	24	Shira Satellite Prison, Bauchi, Bauchi State
	25	Tafawa Balewa Satellite Prison, Bauchi, Bauchi State

	26	Tora Satellite Prison, Bauchi, Bauchi State
Bayelsa State, Southern Nigeria	27	Federal Prison (Medium Security), Okaka, Bayelsa State
Benue State, Northern Nigeria	28	Federal Prison (Medium Security), Gboko, Benue State
	29	Federal Maximum-Security Prison, Makurdi, Benue State
	30	Federal Prison (Medium Security), Otukpo, Benue State
Cross River State, Southern Nigeria	31	Federal Prison (Medium Security), Adim Farm, Cross River State
	32	Federal Prison (Medium Security), Calabar, Cross River State
	33	Federal Prison (Medium Security), Ikom, Cross River State
	34	Federal Prison (Medium Security), Obubra, Cross River State
	35	Federal Prison (Medium Security) Obudu, Cross River State
	36	Federal Prison (Medium Security) Ogoja, Cross River State
Delta State, Southern Nigeria	37	Federal Prison (Medium Security), Agbor, Delta State
	38	Federal Prison (Medium Security), Kwale, Delta State
	39	Federal Prison (Medium Security), Ogwuashi-Ukwu, Delta State
	40	Federal Prison (Medium Security), Sapele, Delta State
	41	Federal Prison (Medium Security), Okere, Warri, Delta State
Ebonyi State, South Eastern Nigeria	42	Federal Prison (Medium Security), Abakiliki, Ebonyi State
	43	Federal Prison (Medium Security), Afikpo, Ebonyi State
Enugu State, South Eastern Nigeria	44	Federal Prison (Medium Security), Auchi
	45	Federal Prison (Medium Security), Ibite-Olo Farm
	46	Federal Prison (Medium Security), Nsukka
Edo State, Southern Nigeria	47	Federal Prison (Medium Security), Auchi
	48	New Benin Prison, Edo State,
	49	Old Benin Prison,
	50	Federal Prison (Medium Security), Ogba Farm,
	51	Federal Prison (Medium Security), Ozalla Farm,
	52	Federal Prison (Medium Security), Ubiaja
Ekiti State, South-Western Nigeria	53	Federal Prison (Medium Security), Ado-Ekiti
List of Prisons Gombe State, Northern Nigeria	54	Bajora Satellite Prison, Gombe State
	55	Billiri Satellite Prison, Gombe State
	56	Cham Satellite Prison, Gombe State
	57	Federal Prison (Medium Security), Gombe State
	58	Federal Prison (Medium Security), Tula, Gombe State
Imo State, South Eastern Nigeria	59	Federal Prison (Medium Security), Okigwe
	60	Federal Prison (Medium Security), Orreh Farm
	61	Federal Prison (Medium Security), Owerri
Jigawa State, Northern Nigeria	62	Birnin Kudu Satellite Prison, Jigawa State
	63	Federal Prison (Medium Security), Birnin Kudu Farm, Jigawa State
	64	Dutse Satellite Prison, Jigawa State
	65	Garki-Satellite Prison, Jigawa State
	66	Federal Prison (Medium Security), Gumel, Jigawa State
	67	Gwaram Satellite Prison, Jigawa State
	68	Hadejia New Prison, Jigawa State
	69	Jahum Satellite Prison, Jigawa State
	70	Federal Prison (Medium Security), Kazaure, Jigawa State
	71	Kiyawa Satellite Prison, Jigawa State
	72	Ringim Satellite Prison, Jigawa State
Kano State, Northern Nigeria	73	Bichi Satellite Prison, Kano, Kano State
	74	Dawakin Tofa Satellite Prison, Kano, Kano State
	75	Federal Prison (Medium Security), Goron Dutse, Kano State
	76	Gwarzo New Satellite Prison, Kano State

	77	Kano Central Prison, Kano, Kano State
	78	Kiru Satellite Prison, Kano, Kano State
	79	Rano Satellite Prison, Kano, Kano State
	80	Sumaila Satellite Prison, Kano, Kano State
	81	Tudun Wada Satellite Prison, Kano State
Katsina State, Northern Nigeria	82	Old Daura Prison, Katsina, Katsina State
	83	Dutsinma Satellite Prison, Katsina State
	84	Ingawa Satellite Prison, Katsina, Katsina State
	85	Jibia Satellite Prison, Katsina, Katsina State
	86	Kankia Satellite Prison, Katsina, Katsina State
	87	Federal Prison (Medium Security), Katsina, Katsina State
	88	Malumfashi Satellite Prison, Katsina, Katsina State
	89	Mani Satellite Prison, Katsina, Katsina State
	90	New Maximum-Security Prison, Funtua, Katsina State
	91	Musawa Satellite Prison, Katsina, Katsina State
Kebbi State, Northern Nigeria	92	Federal Prison (Medium Security), Argungu, Kebbi State
	93	Bagundu Satellite Prison, Kebbi State
	94	Jega Satellite Prison, Kebbi State
	95	Kamba Satellite Prison, Kebbi State
	96	Kangiwa Satellite Prison, Kebbi State
	97	New Kebbi Prison, Kebbi State
	98	Old Kebbi Prison, Kebbi State
	99	Wara Satellite Prison, Kebbi State
	100	Federal Prison (Medium Security), Yelwa Yauri, Kebbi State
	101	Federal Prison (Medium Security), Zuru, Kebbi State
Kogi State, Nigeria	102	Federal Prison (Medium Security), Ankpa, Kogi State
	103	Federal Prison (Medium Security), Dekina, Kogi State
	104	Federal Prison (Medium Security) Idah, Kogi State
	105	Federal Prison (Medium Security), Kabba, Kogi State
	106	Federal Prison (Medium Security), Koton-Karfe, Kogi State
	107	Federal Prison (Medium Security), Okene Kogi State
Kwara State, Northern Nigeria	108	Federal Prison (Medium Security), Ilorin, Kwara State
	109	Federal Prison (Medium Security), Mandala (New Ilorin) Kwara State
	110	Federal Prison (Medium Security), Lafiagi, Kwara State
	111	Federal Maximum-Security Prison, Omu-Aran, Kwara State
Lagos State, South-Western Nigeria	112	Federal Prison (Medium Security), Badagry, Lagos State
	113	Federal Prison (Medium Security), Ikoyi, Lagos State
	114	Maximum Security Prison, KiriKiri, Lagos State
	115	Medium Security Prison, Kirikiri, Lagos State
Nasarawa State, Northern Nigeria	116	Federal Prison (Medium Security), Lafia, Nassarawa State
	117	Maximum Security Prison, Keffi, Nassarawa State
	118	Federal Prison (Medium Security), Nassarawa State
	119	Federal Prison (Medium Security), Keffi, Nassarawa State
	120	Federal Prison (Medium Security), Wamba, Nassarawa State
Ondo State, South-Western Nigeria	121	Federal Female Prison, Ondo State
	122	Maximum Security Prison, Akure, Ondo State
	123	Maximum Security Prison, Ondo State
	124	Federal Prison (Medium Security), Okitipupa, Ondo State
	125	Federal Prison (Medium Security),Owo, Ondo State
Oyo State, South-Western Nigeria	126	Federal Prison (Medium Security), Agodi, Oyo State
	127	Federal Prison (Medium Security), Ogbomosho Farm, Oyo State
Plateau State, Nigeria	128	Federal Prison (Medium Security), Jos, Plateau State
	129	Lakushi Farm Prison, Plateau State
	130	Lamingo Prison Camp, Plateau State

	131	Federal Prison (Medium Security), Pankshin, Plateau State
	132	Federal Prison (Medium Security), Shedam, Plateau State
	133	Federal Prison (Medium Security), Wase, Plateau State
Rivers State, Southern Nigeria	134	Federal Prison (Medium Security), Ahoada, Rivers State
	135	Federal Prison (Medium Security), Degema, Rivers State
	136	Elele Farm Prison, Rivers State
	137	Federal Prison (Medium Security), Port Hacourt
Sokoto State, Northern Nigeria	138	Gwadabawa Satellite Prison, Sokoto, Sokoto State
	139	Federal Prison (Medium Security), Sokoto, Sokoto State
	140	Tambuwal Satellite Prison, Sokoto, Sokoto State
	141	Wurno Satellite Prison, Sokoto, Sokoto State
Taraba State, Northern Nigeria	142	Baissa Satellite Prison, Taraba State
	143	Gassol Satellite Prison, Taraba State
	144	Federal Prison (Medium Security), Gembu, Taraba State
	145	Federal Prison (Medium Security), Jalingo, Taraba State
	146	Karin- Lamido Satellite Prison, Taraba State
	147	Lau Satellite Prison, Taraba State
	148	Federal Prison (Medium Security), Taraba State
	149	Takum Satellite Prison, Taraba State
	150	Zing Satellite Prison, Taraba State

3.3 Project Components and Technical details

The information below consists of comprehensive stage-by-stage process for deploying advanced ICT infrastructure and technology across Nigerian National infrastructure, incorporating CCTV, wireless networks, trunking systems, 3 National data centers and Solar power Solutions.

3.3.1 Project Initiation phase: Strategic Planning, Feasibility studies and analysis

1. Threat & Site Assessment
   a) Conduct sites survey, situational analysis and vulnerability mapping: Border smuggling routes (Seme/Illela), prison weak points (e.g., Kuje), vandalism hotspots (Niger Delta), school security gap and the Railway corridors.
   b) Analyze terrain challenges: Desert (Sahara borders), urban obstructions (govt buildings), challenges on the Railway corridors

2. Requirements Definition
   a) Intelligent video surveillance systems: This is to specify the camera types (thermal for borders, explosion-proof for oil facilities, AI-enabled for prisons and long-range cameras on the Railway corridors)
   b) Wireless Base Station: Determine bandwidth needs
      Trunking: Calculate radio channels needed for sites deployments.
   c) Data Center: Determine the project storage and compute needs (AI analytics)
   d) Solar mini grid solution: Conduct the need analysis and locations where the solar farms would be deployed

3. Regulatory Compliance

- Submit application for all related compliance certificates including EIA, NCAA, State, LG permits etc
- Align with NDPA (Nigeria Data Protection Act) and NSCDC security protocols

3.3.2 Project Planning Phase: System Design & Architecture

1. Network Topology Design

Plan the network connectivity along the Border, Railway, schools and Prisons including other National critical infrastructures. All the remote infrastructure would be backhauled back to the datacenter and ultimately be projected to the TV wall.

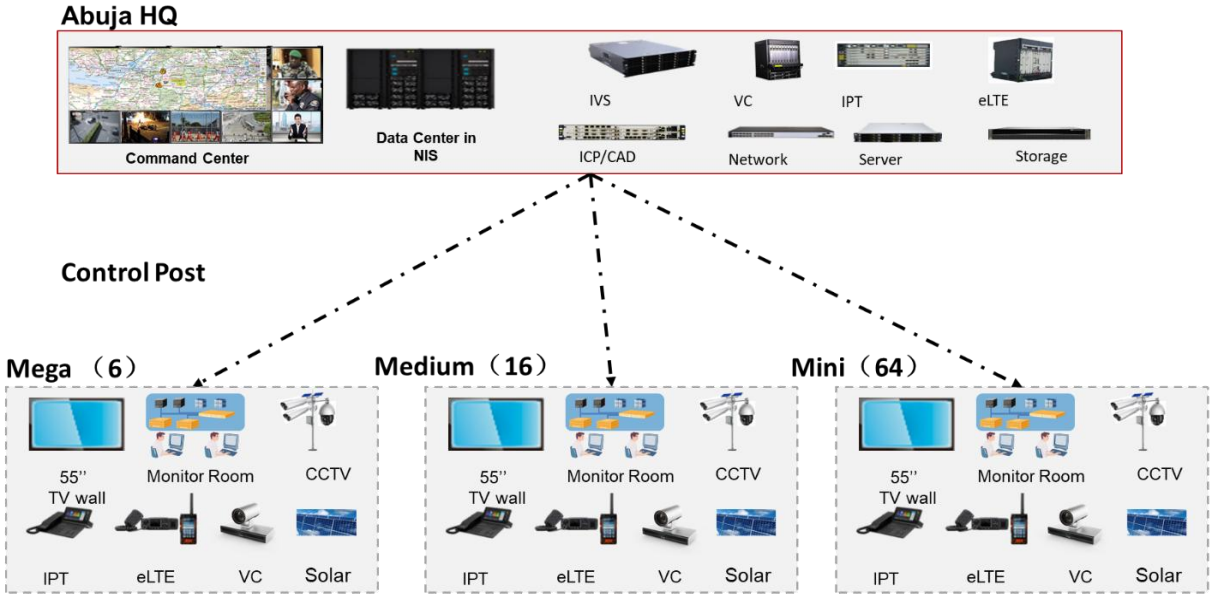

Figure 3.3: Network Topology Design

- Fiber Trucking: Fiber backbone route design along railway with redundant rings

2. CCTV Architecture

- Edge AI cameras design with on-device analytics

Figure 3.4: Edge AI cameras

3. Data Center Design: Huawei Fusion Module 2000 is applicable to indoor data center scenarios, which features simple design and high building adaptability. It meets the data center deployment requirements of various sectors such as enterprise, finance, governments and carriers. FusionModule2000 is a modular-design, highly integrated solution which comprises power supply, cooling, rack & structure, cabling, management system within a module, meeting the requirements for quick delivery and on-demand deployment.

- 2N+1 redundancy (power/cooling),

- Locations: Abuja (primary), Ibadan and another 1 location.

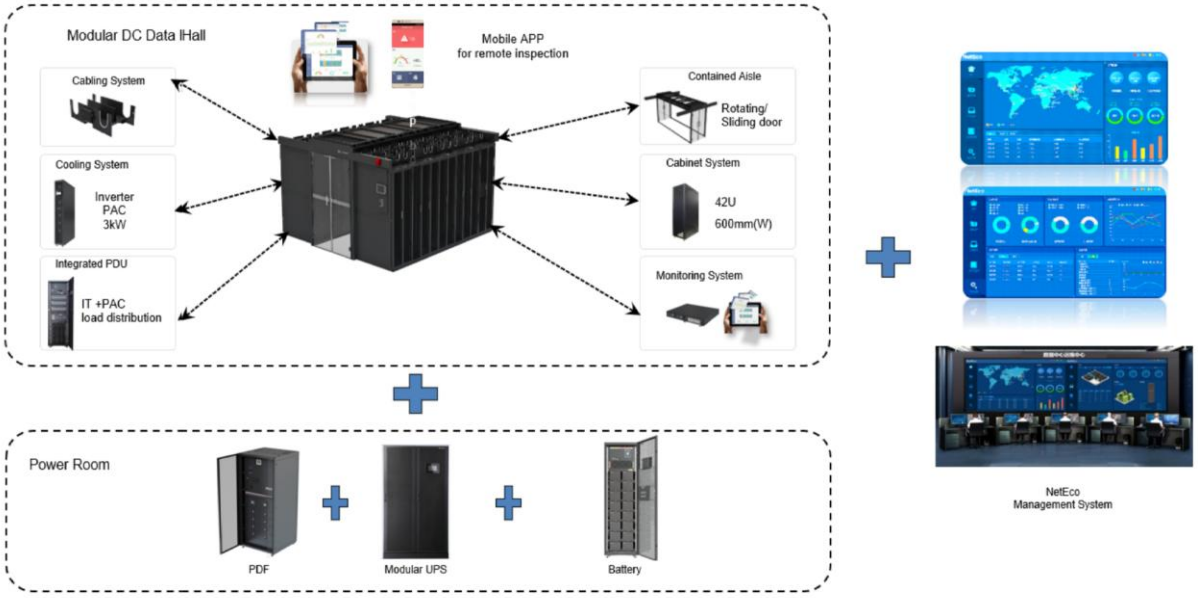

Figure 3.5: Data Center Design

4. Trunked Radio System

Digital eLTE system with base stations Huawei's eLTE (enhanced Long-Term Evolution) trunking systems are a suite of wireless broadband solutions designed for various industries, offering features like high-speed data, voice trunking, and video capabilities. They are particularly known for their use in public safety, transportation, and other sectors requiring reliable and secure communication.

As the world's first 100-megabyte professional broadband trunking solution based on LTE technology, the Huawei eLTE broadband trunking solution is designed to address the evolution of trunking technology, from voice to multimedia within private networks in vertical industries. This new technology meets the requirements for efficient operational communications in governments, railway systems, airports, ports, power grids, as well as oil and mining industries. With the capability to provide voice trunking, video dispatch, video surveillance and location services, the Huawei eLTE broadband trunking solution will help customers significantly improve operational efficiency and emergency response rates.

Developed to provide optimal communications services and connection during operations and emergency incidents, the Huawei eLTE broadband trunking system is able to operate under harsh environments. In the demonstration conducted by Jörg Huth, Director, Railway Solution Unit of Huawei Enterprise in Western Europe during the launch, the Huawei EP680 terminal, a terminal which provides voice trunking, as well as video dispatching service, was able to maintain high quality voice and video transmission while fully submerged in a simulated flood environment

Figure 3.6: Trunked Radio System I

Figure 3.7: Trunked Radio System II

5. Solar farm: All equipment would be powered using off grid Solar solutions including the 3 Data Centers

3.3.3 Sites implementation Phase: Infrastructure Deployment

1. Sites Civil work: Civil work including excavation of the Top soils, reinforcement placing, formwork and concrete works would be carried out. New Tower infrastructure or Poles would be erected to support a designed height for equipment installation.

Figure 3.8: Infrastructure Deployment

2. Wireless Network Rollout (Telecom and ICT Equipment installation)
   - Install Telecommunication and ICT equipment on the planned sites
   - Deploy solar-powered nodes for equipment on sites locations as designed

Figure 3.9: Wireless Network Rollout

3. CCTV Installation: Intelligence+ has become a key factor driving industrial upgrade in diverse sectors. Huawei keeps up with the trend by reshaping the security industry with software-defined cameras as the pioneer. Huawei state-of-the-art software-defined cameras support continuous evolution and development of algorithms and applications, enabling more rigorous AI-based intelligent analysis in a wider variety of security scenarios. The step-by-step series of activities are explained below:

- **Installation:**
  Huawei provides detailed instructions for installing cameras, including SD card insertion, cable routing, and angle adjustment.
- **Network Configuration:**
  Proper network configuration, including IP addressing and firewall settings, is crucial for connecting cameras to the video management system.
- **Software Updates:**
  It's important to keep the camera and management software updated to benefit from the latest features and security patches.
- **Security Considerations:**
  Huawei addresses security vulnerabilities in our video surveillance chips and devices, emphasizing the importance of keeping systems updated and properly configure

Self-powered solar CCTV would be installed at the Border line, Prisons, schools, Railway corridors

Figure 3.10: CCTV Installation

4. Data Center Build 3 (locations concurrently)

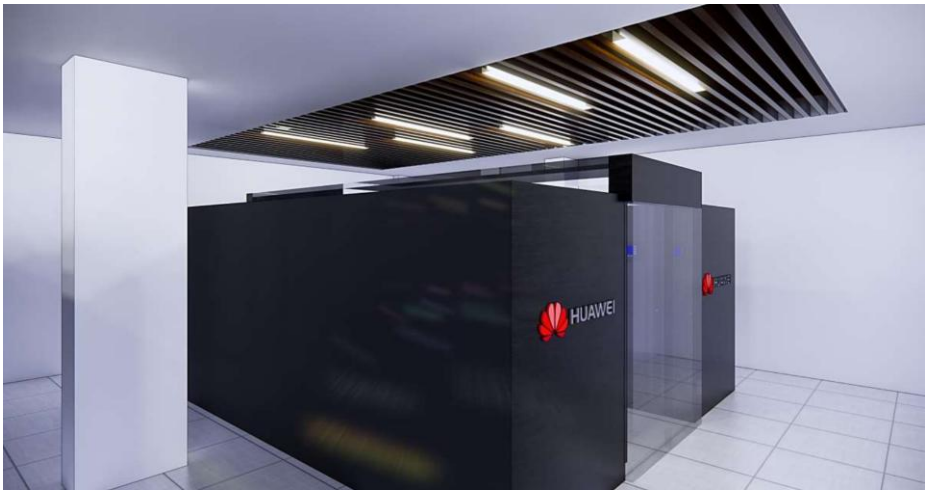

Figure 3.11: Data Center

The HUAWEI Fusion Module FM2000 is a high-density, integrated DC power supply solution primarily designed for telecommunications sites, data centers, and distributed energy systems (including solar hybrid applications). Here are its key components and features:

1. Intelligent Controller Unit (ICU)

Function: The "brain" of the FM2000, managing system operations.

Capabilities:

Real-time monitoring of input/output voltage/current, battery status, temperature.

Control of rectifier modules (on/off, current sharing).

Battery management (charging profiles, temperature compensation, low-voltage disconnect).

Alarm processing and reporting.
Communication interfaces (RS485, dry contacts, CAN bus, LAN/WAN via optional gateway).

2. Rectifier Modules

Function: Convert AC input (or DC from solar) to regulated -48V DC output.
Key Characteristics (Typical):
High Efficiency: Up to 96.5% (reducing energy loss and OPEX).
High Power Density: 3000W modules (e.g., R4850G2) are common, allowing large capacity in small footprint.
Wide Input Voltage Range: Typically, 85-300V AC (or 120-425V DC for solar input compatibility).
Hot-Swappable: Modules can be replaced without shutting down the system.
Plug-and-Play: Automatic recognition and configuration by the ICU.

3. Power Distribution Unit (PDU)

Function: Distributes the -48V DC output to connected loads and batteries.
Features: Multiple high-current output terminals (e.g., 63A, 100A, 250A).
Integrated fusing or circuit breakers for overload/short-circuit protection.
Dedicated battery connection terminals with disconnect/protection.

4. Battery Management System

Integrated with ICU: Manages lead-acid or lithium-ion battery strings.
Functions:
Smart charging (float/boost/equalization with temperature compensation).
Deep discharge protection (LVLD).
Battery health monitoring and capacity estimation.
Critical for backup during grid/solar outages.

5. Monitoring & Sensors

Built-in Sensors: Measure input AC/DC, output DC, battery voltage/current, temperature.
External Sensor Support: For battery temperature, ambient temperature, smoke detection, etc.

6. Communication Interfaces

Standard: RS485, dry contact alarms (critical/major/minor).

7. Structural Frame & Cooling

Compact Design: High power density in a 1-2U rack-mountable frame.
Intelligent Fan Cooling: Variable-speed fans controlled by the ICU based on load/temperature for efficiency and low noise.

5. Trunking Implementation

- Tower erection with 35m for the wireless and 18m height for the CCTV (border coverage)
- Rugged handheld terminals

6. Solar farm: Due to the Power gap and grid situation in Nigeria, equipment at the remote locations including the Data Centre would be powered using Solar power solution.

Figure 3.12: Solar farm

Key components of the Solution

AI Optimization: Smart I-V Curve Diagnosis 4.0 – Automatic, pinpoint fault detection (shading, defects, disconnects) – dramatically cuts O&M costs.

1. Ultra-High Efficiency: >99% conversion – maximizes every watt generated.
Built-in Safety: Integrated AFCI, no fuses, surge protection – prevents fires & enhances reliability.
Scalable: SUN2000 (Residential/C&I) to Utility-scale systems – fits any project size.

2. Smart String ESS (Game-Changing Storage):
DC-Coupled Architecture: >95% round-trip efficiency – minimizes energy loss vs. AC-coupled.
Pack-Level Optimization: Individual battery control (LUNA series) – extends lifespan & boosts performance.
Seamless Integration: Native compatibility with Huawei inverters – simplifies design & operation.

3. Fusion Solar (The Intelligent Brain):
Centralized AI Platform: Remote monitoring, analytics & optimization of entire fleets.
Predictive O&M: Automated fault reports, proactive maintenance – slashes operational expenses.
User Control: Real-time insights & management via App/Web – empowers owners/operators.

3.4 Manpower Requirements

The manpower requirements for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution will include technical, security, and support personnel across construction, installation, operations, and maintenance phases. Personnel will be drawn from engineering, ICT, security, and administrative fields to ensure seamless deployment, monitoring, and sustainability of the surveillance infrastructure in correctional facilities nationwide.

Table 3.2: Manpower Requirements for the Project

S/N	Category of Staff	Estimated Number
1	Project Managers, Engineers (Civil, Electrical, ICT)	20–25
2	Technical Specialists (CCTV, Fibre Optic, Power)	25–30
3	Skilled/Semi-Skilled Workers	45–60
4	Support Staff (Admin, Security, Drivers, Logistics)	25–35
5	Control Room Operators (Prison Command Centres)	20–25
6	Security Analysts/Response Coordinators (NCoS, NSCDC, NPF)	15–20
7	ICT/Data Specialists	12–15
8	Maintenance Technicians	8–12
9	Support Staff (Admin, Clerical, Logistics)	8–12
10	Maintenance Engineers/Technicians	12–15
11	System Upgrade Specialists (ICT Engineers)	8–12
12	Waste/Environmental Officers	8–10
	Total Estimated Manpower	**190–260**

3.5 Materials, Equipment, and Machinery

The materials, equipment, and machinery required for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution are presented in Table 3.2. These resources will support civil works, installation of surveillance infrastructure, power supply systems, and operational facilities across correctional centres nationwide.

Table 3.3: Materials, Equipment, and Machinery

S/N	Materials, Equipment, and Machinery
1	Cement, sand, gravel, reinforcement rods, concrete blocks for prison site civil works
2	Power cables, fibre-optic cables, conduits, junction boxes, and lightning arrestors
3	Excavators, drilling machines, concrete mixers, scaffolding, cranes, and welding machines
4	Generators (diesel/petrol) for standby power supply
5	High-definition CCTV cameras (fixed, PTZ, and indoor/outdoor prison-grade models)
6	Servers, racks, and secure data storage units for prison IT rooms and command centres
7	Solar panels, inverters, and 48-hour backup batteries for hybrid power at prisons
8	Video Management Systems (VMS), display walls, and monitoring consoles for command/control rooms
9	Secure IP-based network devices (routers, firewalls, switches, fibre backhaul systems)
10	Public address systems, alarm units, handheld radios, and emergency call boxes for prison security alerts
11	Rugged mobile terminals for patrol and prison response teams
12	Testing kits, toolboxes, spare parts (lenses, cables, sensors), and calibration devices

13	Mobile cranes, ladders, and forklifts for equipment installation and maintenance
14	Personal Protective Equipment (PPE) – helmets, gloves, boots, harnesses, and reflective vests

3.6 Utilities and Infrastructure Requirements

The successful implementation and operation of the Prison Security Video Surveillance Solution will require a range of supporting utilities and infrastructure. These provisions are essential to ensure reliable functionality, safety, and sustainability of the project across correctional facilities nationwide.

3.6.1 Power Supply

Reliable and uninterrupted power is critical for continuous 24/7 operation of the surveillance system within prisons. Each surveillance site will be equipped with:

- Hybrid power solutions, consisting of solar panels with 48-hour battery backup to ensure autonomy.
- Grid power connections, where available within correctional facilities.
- Standby diesel/petrol generators to provide redundancy in case of prolonged outages.

3.6.2 Communication Infrastructure

The project will rely on a secure IP-based communication network to transmit live video feeds from prison sites to regional data centres and the Ministry of Interior Command-and-Control Centre in Abuja. Infrastructure requirements include:

- Fibre-optic cabling for high-capacity data transmission between prison facilities and data centres.
- Wireless backhaul links for prisons in areas with limited terrestrial connectivity.
- Routers, switches, and firewalls to guarantee secure and encrypted communications.

3.6.3 Water Supply

Water requirements will be minimal, arising mainly during construction and routine maintenance. Needs include:

- Mixing of concrete and other civil works during the installation of surveillance infrastructure.
- Sanitation and welfare facilities for staff during construction and operation. Sources will include municipal supply systems or boreholes within or near correctional facilities.

3.6.4 Access Roads and Transportation

Access routes are vital for transporting materials, equipment, and personnel to correctional centres. Where internal or external roads are inadequate, minor upgrades or temporary access routes may be developed to facilitate site access. The Nigerian Correctional Service (NCoS) will provide logistical support and secured access corridors within prison environments.

3.6.5 Information and Communication Technology (ICT) Infrastructure

Data management and storage infrastructure will be central to prison surveillance operations. Key requirements include:

- Regional data centres for intermediate storage, backup, and analysis.
- A centralised Ministry of Interior Command-and-Control Centre in Abuja, equipped with display walls, servers, and monitoring consoles.
- Local IT rooms within prisons for intermediate video storage (minimum 30-day retention) using IVS systems.
- Secure cloud storage solutions to guarantee redundancy and long-term data access.

3.7 Waste Management Facilities

The implementation of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution will generate different categories of waste during construction, installation, operation, maintenance, and eventual decommissioning. To ensure compliance with the Federal Ministry of Environment (FMEnv), the National Environmental Standards and Regulations Enforcement Agency (NESREA), and relevant international standards, appropriate facilities and procedures will be established for effective waste management.

Key provisions include:

- Temporary Waste Collection Points strategically located within prison premises during construction and installation works.
- Segregation Bins for recyclable, hazardous, and non-hazardous waste streams.
- Licensed Disposal Facilities for construction debris, metallic waste, plastics, and packaging materials.
- Approved Systems for E-Waste Management, including obsolete CCTV cameras, fibre optic cables, power backup units, and other electronic equipment.
- Special Handling for Hazardous Materials, such as batteries, oils, paints, chemicals, and solvents used in equipment maintenance.
- Contracting NESREA-Approved Waste Handlers for the collection, treatment, and final disposal of hazardous and electronic waste.
- Documentation and Tracking of all waste generated using a Waste Inventory Register to ensure accountability, regulatory compliance, and environmental sustainability.

Table 3.4: Waste Inventory for the Project

S/N	Waste Type	Source/Activity	Characteristics	Estimated Quantity (Range)	Proposed Management/Disposal Method
1	Construction Debris (concrete, metal scraps, cables, packaging materials)	Civil works, installation of surveillance towers and control rooms in prisons	Non-hazardous solid waste	15–25 tons during construction	Collected on site, transported to licensed recycling/recovery facilities
2	Plastic Waste (wrappers, cable insulation, packaging	Installation and operational supplies at correctional centres	Non-hazardous, recyclable	4–8 tons annually	Segregation and transfer to certified recycling companies

	materials)				
3	E-Waste (obsolete CCTV cameras, fibre optic cables, servers, monitors, routers, sensors)	Equipment replacement, upgrades, decommissioning	Hazardous due to heavy metals and plastics	2–4 tons annually	Disposal through NESREA-approved e-waste recycling vendors
4	Batteries (UPS, backup power, solar systems)	Power supply units at prison surveillance sites	Hazardous – lead-acid, lithium-ion	0.8–1.5 tons annually	Collected and transferred to licensed battery recycling facilities
5	Used Oils and Lubricants	Generator sets, hybrid power units servicing	Hazardous liquid waste	400–600 liters annually	Stored in sealed drums, collected by certified hazardous waste handlers
6	General Office Waste (paper, food waste, plastics)	Administrative/control room operations in prisons	Mixed non-hazardous	1–2 tons annually	Segregation, recycling (paper, plastics), and disposal via municipal waste system
7	Scrap Metal (steel frames, cable reels, defective mounts)	Equipment installation, maintenance, dismantling	Recyclable metallic waste	1.5–3 tons during project lifecycle	Collected and sold to licensed scrap recyclers
8	Hazardous Chemical Waste (paints, solvents, adhesives)	Construction/maintenance of prison facilities	Hazardous – toxic chemicals	<1 ton annually	Stored in secure containers, disposed through approved hazardous waste facility
9	Obsolete ICT Equipment (servers, computers, storage units, switches)	Prison IT rooms, local data storage centres	Hazardous – electronic waste	1–2 tons every 5 years	Returned to manufacturers or recycled via licensed e-waste handlers

3.8 Health, Safety, and Security (HSS) Provisions

To safeguard personnel, assets, correctional facilities, and host communities during construction, installation, operation, maintenance, and decommissioning of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, robust Health, Safety, and Security (HSS) provisions will be put in place. These measures will ensure compliance with the Federal Ministry of Environment (FMEnv), NESREA guidelines, and relevant international best practices, including International Labour Organization (ILO) conventions, World Bank Environmental, Health and Safety (EHS) Guidelines, and Occupational Safety and Health Administration (OSHA) standards.

Key provisions include:

1. **Comprehensive HSE Management Plan**
    - Development and implementation of a site-specific Health, Safety, and Environment (HSE) Plan.
    - Integration of hazard identification, risk assessment, and control measures (HIRAC) at all project phases.

- Continuous monitoring and auditing to ensure compliance with HSE standards.

2. **Mandatory Use of Personal Protective Equipment (PPE)**
   - Compulsory use of PPE such as helmets, reflective vests, gloves, safety boots, ear protection, and safety harnesses.
   - Routine inspection and timely replacement of PPE to maintain effectiveness.
   - Strict enforcement by HSE supervisors and safety officers.
3. **Emergency Preparedness and Response Plans**
   - Development of Emergency Response Plans (ERP) covering accidents, medical emergencies, fire outbreaks, equipment failures, and prison-related security incidents.
   - Installation of firefighting equipment (extinguishers, hydrants) at surveillance control rooms and strategic prison locations.
   - Training of staff and contractors on emergency drills, evacuation procedures, and first aid.
   - Collaboration with the Nigerian Correctional Service (NCoS), Nigeria Security and Civil Defence Corps (NSCDC), and the Nigerian Police Force (NPF) for coordinated response to incidents.
4. **Occupational Health and Worker Welfare**
   - Provision of regular medical surveillance and health checks for project workers.
   - Adequate welfare facilities such as potable water, sanitation, and rest shelters at prison sites.
   - HIV/AIDS awareness and sensitization programmes for both workforce and host prison communities.
5. **Site Access Control and Security Patrols**
   - Restricted access to sensitive facilities such as prison control rooms, surveillance masts, and data storage areas.
   - 24/7 physical security presence, CCTV monitoring, and perimeter fencing around installation and operation sites.
   - Security patrols within and around correctional facilities to deter vandalism, sabotage, and contraband smuggling.
   - Use of biometric access control systems for operators and critical technical staff.
6. **Training and Capacity Building**
   - Mandatory HSE induction for all workers and contractors before mobilization to prison sites.
   - Specialized training for emergency response teams, fire wardens, and first aid personnel.
   - Continuous refresher courses to build a strong safety culture and ensure compliance with evolving HSE and security standards.

3.9 Project Schedule and Timeline

The project schedule is shown in table 3.5.

Table 3.5: Project Schedule and Timeline

Phase	Key Activities	Duration	Timeline
Project Initiation	• Threat & site assessment (border smuggling routes, prison weak points, vandalism hotspots, railway corridors, schools) • Terrain challenge analysis (desert, urban obstructions, railway corridors) • Requirements definition (camera types, wireless base stations, trunking channels, data center capacity, solar solutions) • Regulatory compliance (EIA, NCAA, FMEnv, State & LG permits, NDPA, NSCDC protocols)	**4 Months**	Months 1–4
Project Planning	• Network topology design (border, railway, schools, prisons; fiber backbone with redundant rings) • CCTV architecture (AI-enabled, edge analytics) • Data center design (FusionModule2000, 2N+1 redundancy, Abuja primary + 2 backups) • Trunked radio system (Huawei eLTE broadband trunking) • Solar farm planning (off-grid solutions for remote nodes & data centers)	**4 Months**	Months 5–8
Site Implementation	**Infrastructure Deployment)** **Civil Works:** – Excavation, reinforcement, formwork, tower/pole erection **Wireless Network Rollout:** – Install ICT & telecom equipment, deploy solar-powered nodes **CCTV Installation:** – Install Huawei software-defined cameras; configure networks, security, AI updates – Deploy self-powered solar CCTV at borders, prisons, schools, railway corridors **Data Center Build (3 sites concurrently):** – Install FusionModule FM2000 with ICU, rectifier modules, PDU, BMS, cooling, monitoring, sensors **Trunking System Implementation:** – Erect 35m towers for wireless, 18m for CCTV, deploy rugged terminals **Solar Farm Deployment:** – Deploy AI-optimized smart solar + ESS storage, Fusion Solar platform integration	**24 Months**	Months 9–32
Testing & Commissioning	• System integration testing (CCTV + wireless + trunking + solar) • Data center validation (power, cooling, redundancy, cybersecurity) • User acceptance testing (UAT) with NSCDC, NRC, NPF, NIS, and other stakeholders • Handover protocols and documentation	**2 Months**	Months 33–34
Training & Capacity Building	• Train operators, ICT specialists, maintenance engineers, and security analysts • Emergency response and cyber resilience drills • HSE awareness and sustainability training	**2 Months (overlaps with commissioning)**	Months 33–34
Operational Handover	• Final approvals from regulators • Full system go-live • Transition to operational phase (surveillance, monitoring, response)	**1 Month**	Month 35

CHAPTER FOUR

DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Introduction

This section presents a comprehensive description of the physical, chemical, biological, and socio-economic characteristics of the host communities within the areas of influence of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution. The project will involve the installation of surveillance infrastructure across selected prison facilities in Nigeria, spanning the six geopolitical zones, with priority given to medium- and maximum-security correctional centres.

The description of the existing environment establishes the baseline conditions of the prison environments and their surrounding host communities, focusing on the key environmental, ecological, infrastructural, and socio-economic attributes that may interact with project activities. This baseline serves as a critical reference point for identifying sensitive receptors, assessing potential environmental and social impacts, and proposing effective management and mitigation strategies.

4.2 Baseline Data Acquisition Method

The approach adopted in collecting the baseline data incorporates all relevant disciplines. The baseline data of the project area was acquired, using the following methods

- Literature/desktop research
- Field observation
- Sampling and measurements
- Laboratory analysis of samples collected in the field
- Satellite Imagery of the study area

4.2.1 Literature/Desktop Research

This involves the consultation of all relevant textbooks, journals, articles, research publications, previous study reports on similar projects, etc. The data generated from this process include meteorological data, maps, geologic/hydrogeology data and geographic data of the area.

4.2.2 Field Sampling and Observations

Field Sampling and observations was carried out to cover the wet season. This was aimed at determining the ecological characteristics and variations of the area during the season. The sampling was carried out from 7th to 22nd, August, 2025. This sampling period covers the one seasonal regime approved for the study. Visual observations were made and documented in the field notebook. Photographs of important features were taken with a digital camera. The environmental components observed include

- Soil characteristics
- Vegetation/forestry
- Land use
- Geology/Hydrogeology
- Hydrobiology
- Fisheries
- Water/Sediment Characteristics

- Socio-economic setting
- Wildlife

Soil Sampling

Surface soil was investigated through visual observation and sampling. Soil samples were obtained from different designated sampling points in a location to give a composite sample. Hand Auger of uniform cross section was used to ensure that reproducible units of soil samples were collected from depths of 0-15cm and 15-30cm. This ensured high quality representative data collection. Surface litter of un-decomposed plant materials were removed to ensure that uncontaminated soil samples were collected. Soil biological observations were carried out in quadrants of $1m^2$. Soil samples were collected in appropriately labeled and sealed polythene bags. Samples for physico-chemical analysis were air-dried in a dust free environment while those for microbiological analysis were stored in ice-packed cooler in the field and transferred to the refrigerator at 40^0C.

Groundwater Studies

The water samples were collected into appropriately labeled containers. In-situ measurements of some physico-chemical parameters (pH, conductivity, TDS, and temperature) were carried. Groundwater samples were analyzed for physico-chemical, heavy metals and biological characteristics.

Vegetation Studies

A combination of sampling techniques and study methodology was adopted in the detailed assessment of the vegetation. The major ecosystem types were identified, representative plant specimens collected and photographic recordings made.

Sampling Techniques

For the purpose of assessing the vegetation within the project area, two complementary sampling methods were employed: the Quadrat method and the Transect method.

- Quadrat Method (Intensive and Detailed Study): This method was adopted to obtain detailed information on vegetation composition, density, and frequency within defined portions of the study area. Six quadrats of 5 m × 5 m and 2 m × 2 m were systematically demarcated within representative ecological zones. These quadrats provided standardized plots for the enumeration of trees, shrubs, herbs, and ground cover species.
- Transect Method (Rapid and Extensive Survey): To capture the broader vegetation distribution across the landscape, line transects were laid out strategically to cut across different vegetation types within the project environment. This allowed for rapid assessment of vegetation structure, spatial distribution, and species variability over a wider area.
- Control Areas: Control sites with similar environmental and ecological characteristics as the proposed project locations were also sampled to provide a basis for comparative analysis. This ensures that observed variations in species composition and abundance can be attributed to project-related factors rather than natural variability.

Within the quadrats and along the transects, the following detailed studies were undertaken:

1. Identification and enumeration of plant species (trees, shrubs, herbs, and grasses).
2. Measurement of diameter at breast height (DBH) and basal area for trees ≥10 cm DBH.
3. Assessment of vegetation cover, density, and frequency.
4. Collection of representative plant specimens for herbarium confirmation.
5. Documentation of invasive or endangered species, where present.

Noise and Air Quality

Ambient air quality parameters (volatile organic carbon, SOx, NOx, COx, etc.) were measured in-situ using Toxirae II gas monitor. Ambient noise levels were measured using Testo 815 noise meter.

4.3 Laboratory Analysis and Sample Preservation

Analyses were carried out at the laboratory of Sheda Science and Technology Complex (SHESTCO), Kwali, FCT. Martlet Environmental Research Limited, Benin City, Zabson Laboratory, Maitama Sule Street, Asokoro, Abuja, Global Environmental Limited Laboratory, Warri, Delta State. Laboratory analysis was generally in line with international American Society for Testing and Material (ASTM) and American Public Health Association (APHA) as well as Federal Ministry of Environment (FMEnv) standard protocols. The detailed laboratory methods are shown in Appendix.

Table 4.1: Recommended Preservatives for Various Constituents

S/N	PARAMETER	REQUIRED VOLUME (ml)	CONTAINER	PRESERVATION	MAXIMUM HOLDING PERIOD
1	pH	35	P, G	Cool 4°C Detect On site	6 Hours
2	Electrical Conductivity	100	P, G	Cool 4°C	24 Hours
3	Colour	50	P, G	Cool 4°C	24 Hours
4	Odour	200	P, G	Cool 4°C	24 Hours
5	Turbidity	100	P, G	Cool 4°C	7 Days
6	Total Dissolved Solids (TDS)	50	P, G	Filter on site Cool 4°C	24 Hours
7	Total Suspended Solids (TSS)	50	P, G	Filter on site	6 Months
8	Total Hardness	100	P, G	Cool 4°C HNO^3 to PH<2	7 Days
9	Acidity and Alkalinity	100	P, G	Cool 4°C	24 Hours
10	Salinity as CI	50	P, G	None Required	7 Days
11	Chemical Oxygen Demand (COD)	50	P, G	2ml H_2SO_4 per liter	7 Days
12	Biological Oxygen Demand (BOD)	1000	P, G	Refrigerationat4°C	6 Hours
13	Surfactants as (MB AS)	250	P, G	Cool 4°C	24 Hours
14	Dissolved Oxygen (DO)	300	G only	Detect on site	No Holding
15	Ammonia	400	P, G	Cool 4°C H_2SO_4 to PH<2	24 Hours
16	Oil & Grease	1000	G only	Cool 4°C H_2SO_4 or HCL to PH<2	24 Hours
17	Nitrate (NO_3)	100	P, G	Cool 4°C H_2SO_4 to PH<2	24 Hours
18	Sulphate (SO_4^2)	50	P, G	Cool 4°C	7 Days
19	Carbonate (CO3) free CO_2& HCO_3	-	P, G	-	-
20	Cyanides	500	P, G	Cool 4°C NaOH to pH 12	24 Hours
21	Phosphorus	-	-	40mg, $HgCl_2$ per liter 4°C	7 Days
22	Phenolics	500	G only	Cool, 4°C, H_2PO_4 to pH<4.1g $CuSO_4$/litre	24 Hours

23	Chromium	100	P,G	HNO3 to pH<2	-
24	Arsenic	100	P,G	-	6 Months
25	Cadmium	100	P, G	-	6 Months
26	Cobalt	-	P, G	-	6 Months
27	Copper	-	P, G	-	6 Months
28	Iron	-	P, G	-	6 Months
29	Mercury	100	P, G	Filter, HNO3 to pH<2	38 Days (Glass)
30	Lead	100	P, G	HNO3 to pH<2	6 Months
31	Nickel	100	P, G	-	6 Months
32	Zinc	100	P, G	-	6 Months
33	Vanadium	100	P, G	-	6 Months
34	Calcium	100	P, G	None Required	7 Days
35	Magnesium	100	P, G	-	6 Months

Where P = Plastic and G = Glass. Source: NUPRC (Formerly DPR)

Quality Assurance /Control procedure

The Quality Assurance Procedures cover all aspects of the study, and include sample collection, handling laboratory analysis, data coding and manipulation, statistical analyses, presentation and communication of results. Samples chain custody form was used for the registration and tracking of samples from the field to the laboratory.

Sample Collection, Handling and Storage

The sampling and handling of air, soil, and vegetation were carried out in line with the recommended procedures and practices for environmental data collection in Nigeria.

4.4 Description of the Physical Environment

The details of the environmental data acquired during this study are presented in the following subsections

4.4.1 Climate and Meteorology

The climatic regime of Nigeria, and by extension the project area covering the six geopolitical zones, is controlled by two major air masses: the Southwest Monsoon winds originating from the Atlantic Ocean and the Northeast Trade winds (Harmattan) from the Sahara Desert. These air masses interact seasonally to produce the country's distinct wet and dry seasons, which vary in intensity and duration across regions.

Given the wide geographical coverage of the Proposed Prison Security Video Surveillance Solution Project, climate and meteorological patterns were analyzed using 30-year (1994–2024) climatological data obtained from the Nigerian Meteorological Agency (NiMet) and global climatic records. This long-term baseline provides reliable averages for rainfall, wind speed, humidity, and temperature, which are crucial for assessing potential environmental sensitivities and for guiding the design and operation of surveillance infrastructure.

Temperature

Temperature patterns across Nigeria are largely influenced by latitude and altitude, with notable variations between the northern and southern regions. In Northern Nigeria, temperatures are generally the highest, with mean maximum values ranging between 32–42°C, particularly in April–May, which are the hottest months. Mean minimum values during

the Harmattan season (December–January) drop to 15–25°C. Such extremes may affect equipment cooling requirements and energy demand.

In Southern Nigeria, coastal influences moderate conditions, with mean maximum temperatures of 28–34°C and mean minimum values of 22–26°C, creating more stable conditions for operations. In the North-Central and highland areas, cooler conditions prevail, with mean maximum temperatures of 24–33°C and mean minimum values of 12–22°C. These areas provide relatively favourable operating environments for sensitive ICT and surveillance equipment. Across the 30-year climatic baseline (1994–2024), Nigeria has recorded a slight rise in national average temperature, consistent with global warming trends. Cooler months (August–September) average 22–26°C in southern and central Nigeria, while the hottest months (March–May) regularly exceed 38–40°C in the northern Sahel. This trend underscores the importance of designing robust cooling and ventilation systems for surveillance infrastructure to ensure reliability under extreme conditions.

Table 4.2: Mean Maximum and Minimum Temperatures in Nigeria (1994–2024)

Geopolitical Zone	Mean Max (°C)	Mean Min (°C)	Seasonal Extremes
North Central	28 – 34	18 – 24	Hot season (Mar–Apr): >36°C
North East	32 – 42	15 – 25	Peak heat (Apr–May): 40–42°C; Harmattan lows 14–16°C
North West	30 – 40	18 – 23	High temperatures nearly year-round
South East	28 – 34	22 – 25	Cooler months Aug–Sep: ~22°C
South South	27 – 32	22 – 26	Stable tropical climate with minimal extremes
South West	28 – 34	23 – 26	Coastal moderation; Lagos minimum rarely <23°C

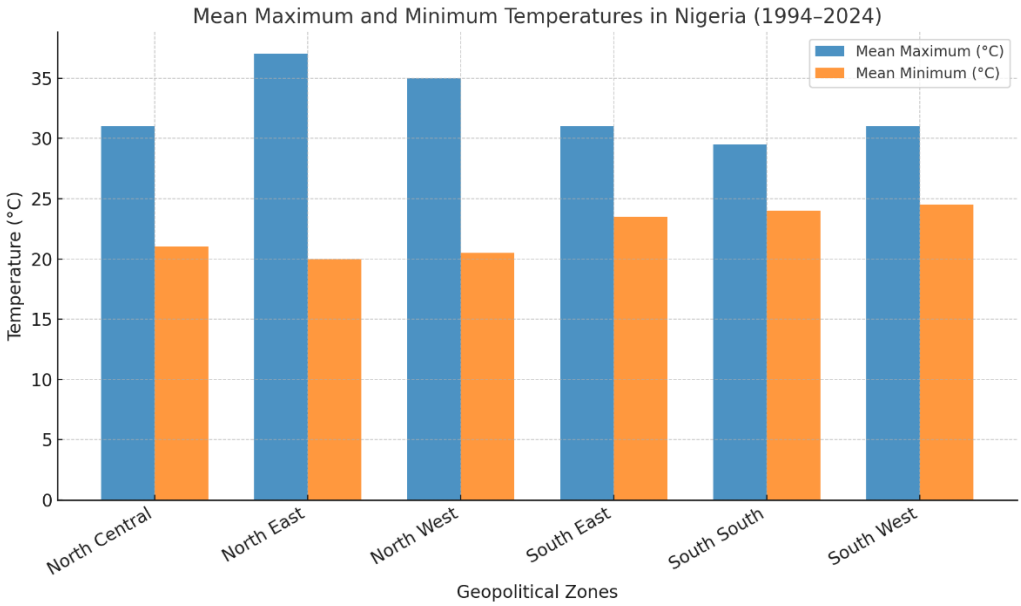

Figure 4.1: Mean Maximum and Minimum Temperatures in Nigeria (1994–2024)
Source: NIMET

Rainfall

Nigeria experiences both bimodal and unimodal rainfall regimes depending on location. In Southern Nigeria (South-South, South-East, and South-West), annual rainfall is high, ranging from 1,500–3,000 mm, beginning around March/April and ending in October/November,

with distinct peaks in June–July and September. In contrast, Northern Nigeria (North-East and North-West) records much lower rainfall, typically 500–1,200 mm annually, concentrated between May and September, with a single peak in August. The North-Central (Middle Belt) zone is transitional, receiving 1,000–1,600 mm annually, with rainfall peaking between July and September.

Over the past 30 years, rainfall patterns have become increasingly variable, with southern regions experiencing episodes of extreme flooding, while northern areas have faced prolonged dry spells. Such climatic variability poses challenges to water resource management, agriculture, and infrastructure resilience, which are relevant considerations for the sustainable implementation of the Prison Security Video Surveillance Solution.

Table 4.3: Mean Annual Rainfall Distribution in Nigeria (1994–2024)

Geopolitical Zone	Rainfall Range (mm)	Peak Rainfall Months	Dry Spell Characteristics
North Central	1,000 – 1,600	Jul – Sep	Dry season Nov – Mar
North East	500 – 1,200	Aug	Long dry season Oct – Apr
North West	600 – 1,300	Aug – Sep	Strong dry Harmattan Nov – Apr
South East	1,500 – 2,500	Jun – Jul & Sep	Short dry spell Aug "August break"
South South	2,000 – 3,000	Apr – Oct	Very short dry season Dec – Jan
South West	1,200 – 2,000	Jun – Jul & Sep	Distinct bimodal rainfall with Aug break

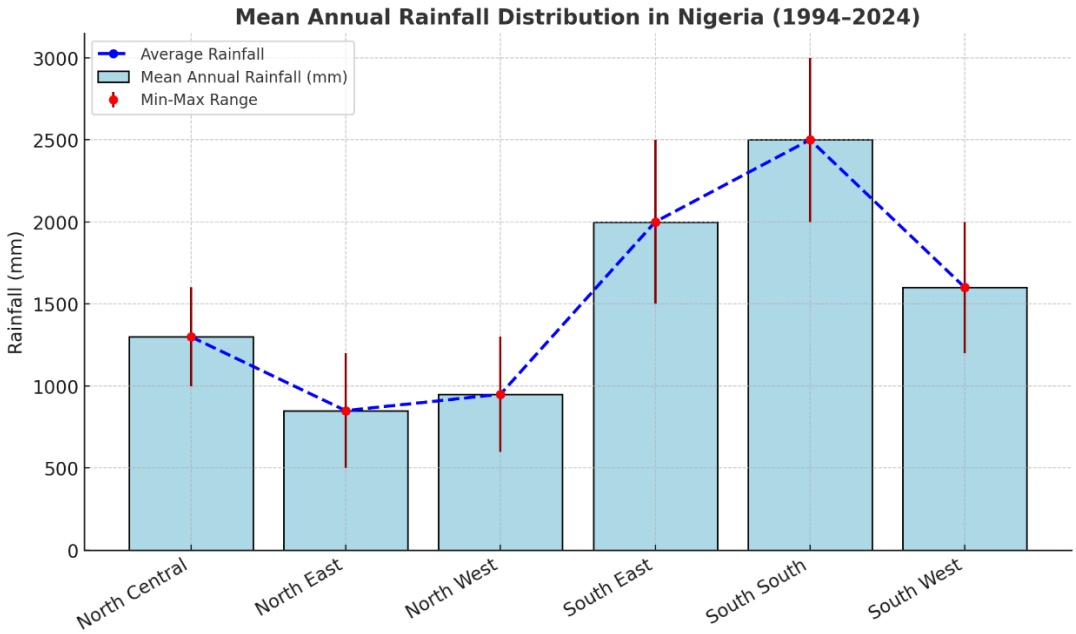

Figure 4.2: Mean Annual Rainfall Distribution in Nigeria (1994–2024)
Source: NIMET

Relative Humidity

Relative humidity in Nigeria is strongly influenced by seasonality and regional geography. In Southern Nigeria, humidity levels remain high year-round, ranging between 70–90%, with morning values often peaking above daily averages. In contrast, Northern Nigeria

experiences much lower humidity, dropping to 20–50% during the dry Harmattan months and rising to 60–80% during the rainy season.

Over the 30-year climatic baseline, relative humidity across the country has averaged between 50–85%, with a clear seasonal contrast: mornings generally record higher values than evenings. These variations affect air quality, thermal comfort, and agricultural productivity and are relevant to the design and resilience of prison surveillance infrastructure.

Table 4.4: Mean Relative Humidity in Nigeria (1994–2024)

Geopolitical Zone	Dry Season (%)	Wet Season (%)	Annual Average (%)
North Central	40 – 55	65 – 80	62
North East	20 – 40	55 – 75	50
North West	25 – 45	60 – 78	55
South East	60 – 75	75 – 90	72
South South	70 – 85	80 – 95	82
South West	55 – 70	70 – 85	68

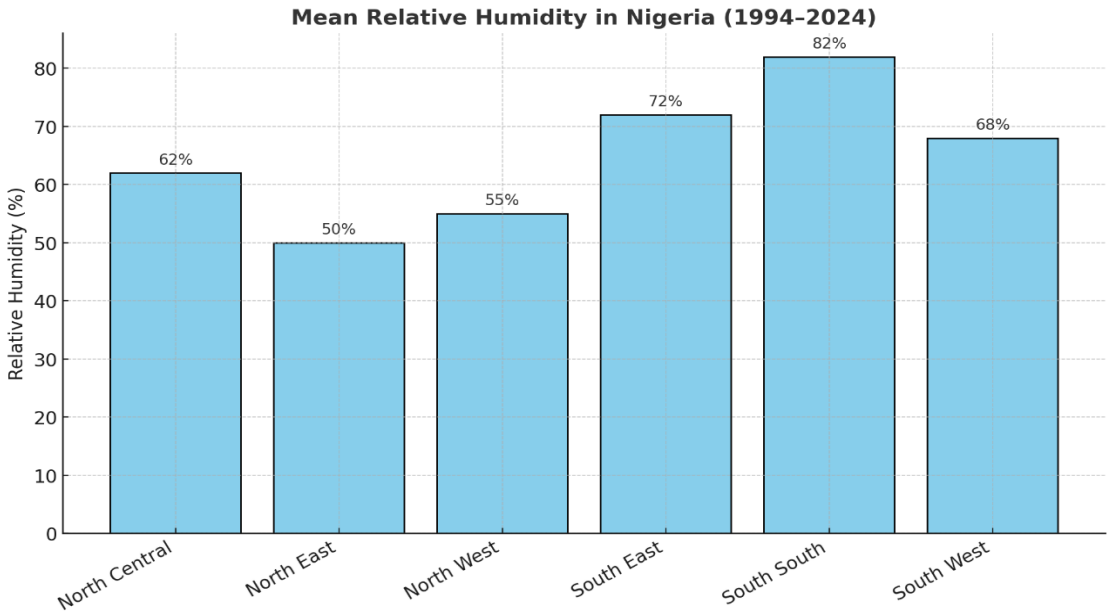

Figure 4.3: Mean Relative Humidity (1994–2024) Source: NIMET

Wind Speed and Direction

Wind circulation across the project locations is strongly influenced by seasonal climatic shifts between the wet and dry seasons. During the wet season (April–October), the dominant Southwest Monsoon Winds originating from the Atlantic Ocean prevail, transporting moisture-laden air masses into the southern and central parts of Nigeria. These winds are associated with heavy rainfall, high humidity, and moderate breezes across the project areas.

In the dry season (November–March), the Northeast Trade Winds (Harmattan) dominate, carrying dry, dust-laden air from the Sahara Desert. These winds significantly reduce atmospheric visibility, lower humidity, and introduce fine dust particles that can affect surveillance equipment, solar panels, and air quality.

Over the 30-year climatological baseline (1994–2024), average wind speeds across Nigeria range from 2.5–4.5 m/s, with localized higher speeds recorded in coastal areas and the Sahel

belt. Wind conditions vary between light breezes, gentle breezes, and moderate breezes depending on geography and season.

Wind circulation is an important factor for this project as it influences visibility for surveillance cameras, dispersion of dust and pollutants, and operational reliability of ICT infrastructure installed at correctional facilities.

Table 4.5: Mean Wind Speed and Prevailing Direction in Nigeria (1994–2024)

Geopolitical Zone	Prevailing Wind Direction	Mean Wind Speed (m/s)	Seasonal Characteristics
North Central	SW (wet season), NE (dry season)	2.5 – 3.5	Moderate breezes; Harmattan influence Nov–Feb
North East	NE (dry season), SW (wet season)	3.0 – 4.5	Strong Harmattan winds with dust storms Dec–Feb
North West	NE (dry season), SW (wet season)	2.8 – 4.0	Dust-laden winds; peak turbulence in Harmattan
South East	SW monsoon	2.5 – 3.0	Gentle coastal breezes; weaker inland winds
South South	SW monsoon	3.0 – 4.0	Strong coastal winds; high year-round humidity
South West	SW monsoon	3.0 – 4.2	Oceanic influence; breezy conditions, especially in Lagos

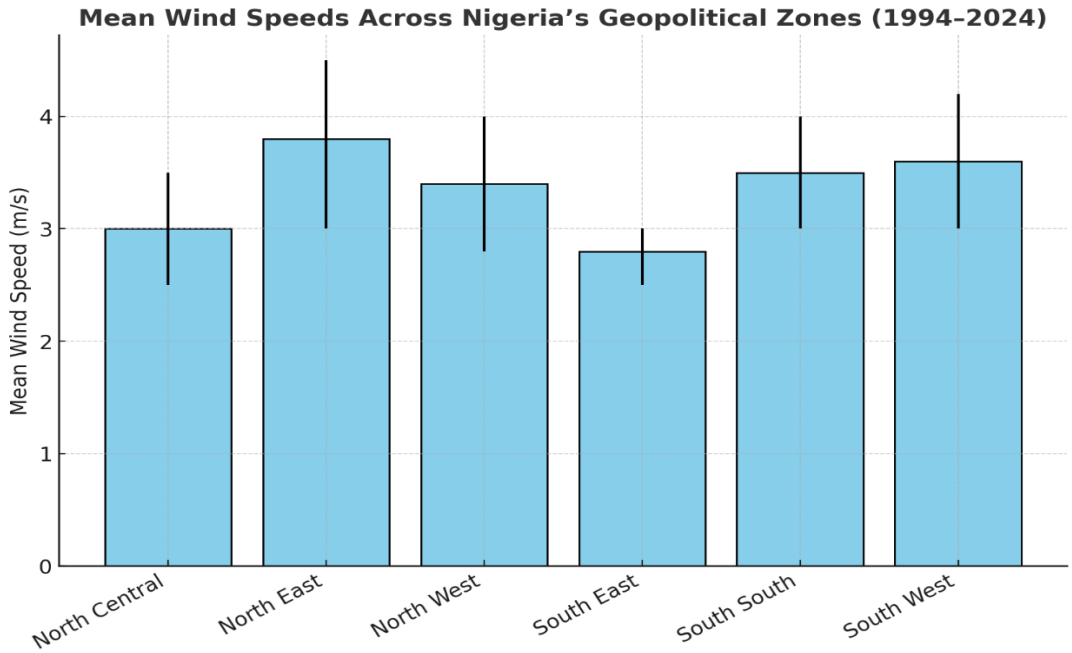

Figure 4.4: Mean Wind Speed (1994–2024) Source: NIMET

The wind rose visualization (Figure 4.5) demonstrates the seasonal variability of wind regimes across Nigeria's six geopolitical zones and highlights their relevance for prison surveillance systems. In the North East and North West zones, the dry season is dominated by strong Northeast Harmattan winds, which frequently transport dust and significantly reduce visibility. During the wet season, however, Southwest monsoon winds prevail, moderating conditions but still influencing airflow patterns.

The North Central zone reflects a transitional wind regime, shaped by both the Harmattan and the Southwest monsoon, with moderate wind speeds and fluctuating directions across seasons. In contrast, the southern zones (South East, South South, and South West) are primarily influenced by Southwest monsoon winds throughout the year, producing relatively stable breezes but accompanied by consistently high humidity levels.

From a security operations standpoint, these wind dynamics have direct implications for the performance and maintenance of prison video surveillance systems. In the northern regions, dust-proofing of camera housings, incorporation of visibility-enhancing technologies (such as infrared and thermal imaging), and routine lens maintenance will be essential to counter Harmattan-induced obstructions. Conversely, in the southern regions, emphasis must be placed on anti-corrosion protection, weatherproof enclosures, and structural resilience of mounted equipment to withstand high humidity, frequent rainfall, and salt-laden air in coastal locations. The North Central zone will require a balanced approach that integrates both dust and humidity protection, reflecting its transitional wind regime.

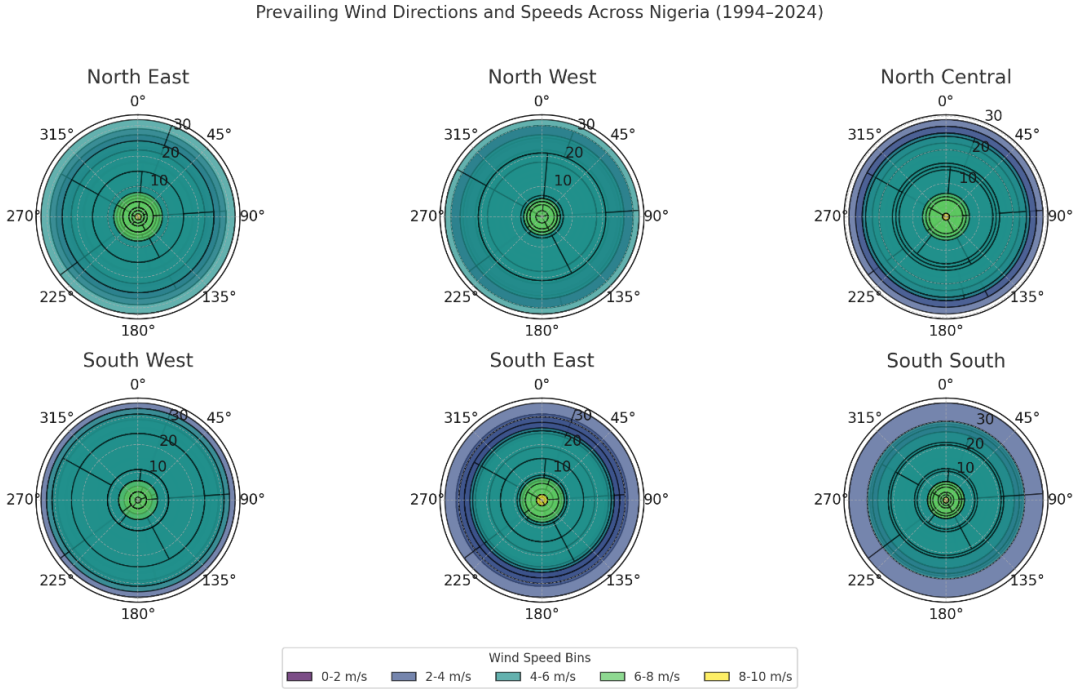

Figure 4.5: Prevailing Wind Directions and Speeds Across Nigeria (1994–2024)
Source: NIMET

4.3.2 Air Quality and Noise

An ambient air quality and noise survey was conducted to establish baseline conditions within the project area, covering selected prison facilities and host communities across Nigeria's six geopolitical zones. In-situ air quality measurements were carried out at one hundred and fifty (150) strategically selected sampling points, including prison premises, adjoining communities, road corridors with heavy traffic inflow, and sensitive receptors such as schools and healthcare facilities. Control stations were also established in comparable environmental settings but outside the immediate project influence, to allow for comparative analysis and determination of background levels. Parameters measured using calibrated portable meters included: Carbon monoxide (CO), Carbon dioxide (CO_2), Sulphur dioxide (SO_2), Hydrogen sulphide (H_2S), Nitrogen dioxide (NO_2), Oxygen (O_2) and Suspended

Particulate Matter (SPM/PM_{10} and $PM_{2.5}$) Table 4.6 shows the Ambient Air Quality Baseline Results Measurements from the project area.

Table 4.6: Ambient Air Quality Baseline Results

Parameter	Unit	Min	Max	Mean	FMEnv Limit	WHO Guideline
Carbon Monoxide (CO)	ppm	0.8	5.6	2.3	10 (8-hr)	10 (8-hr)
Carbon Dioxide (CO_2)	ppm	380	520	440	1000	1000
Sulphur Dioxide (SO_2)	µg/m³	18	62	35	260 (24-hr)	20 (24-hr)
Nitrogen Dioxide (NO_2)	µg/m³	22	80	46	75 (1-hr)	40 (annual)
Hydrogen Sulphide (H_2S)	ppm	0.00	0.02	0.01	0.008 (24-hr)	0.007 (24-hr)
Suspended Particulate Matter (SPM/PM_{10})	µg/m³	42	196	118	150 (24-hr)	50 (24-hr)
Fine Particulates ($PM_{2.5}$)	µg/m³	18	76	41	65 (24-hr)	25 (24-hr)
Oxygen (O_2)	%	20.5	20.9	20.7	19.5–23.5	19.5–23.5

Discussion of Results

- **Carbon Monoxide (CO):** Mean value (2.3 ppm) is well within both FMEnv and WHO limits (10 ppm, 8-hr). Elevated concentrations were only observed at congested road corridors near prisons. This suggests localized emissions from vehicles and generators.
- **Carbon Dioxide (CO_2):** Average concentration (440 ppm) is significantly below the threshold (1000 ppm). This reflects natural background levels with no direct risk, indicating adequate ventilation and no accumulation around project sites.
- **Sulphur Dioxide (SO_2):** Mean concentration (35 µg/m³) is far below the FMEnv 24-hr limit (260 µg/m³) but slightly above WHO's stricter guideline (20 µg/m³) in high-traffic and market-adjacent prisons. This points to occasional fossil fuel combustion (vehicle exhaust, generator use).
- **Nitrogen Dioxide (NO_2):** Mean concentration (46 µg/m³) is within FMEnv's 1-hour limit (75 µg/m³) but slightly exceeds WHO's annual guideline (40 µg/m³) in urban hotspots. This highlights vehicular congestion and fossil fuel use near prison environments.
- **Hydrogen Sulphide (H_2S):** Background levels were generally low (mean 0.01 ppm). However, localized readings exceeded WHO (0.007 ppm) and FMEnv (0.008 ppm) thresholds, possibly from waste decomposition and sewage emissions within or around prisons.
- **Suspended Particulates (PM_{10}):** Mean level (118 µg/m³) is within FMEnv's 24-hr standard (150 µg/m³) but more than twice WHO's stricter guideline (50 µg/m³). This indicates significant dust resuspension, vehicular movement, and biomass burning, particularly in northern and market-adjacent prison areas.
- **Fine Particulates ($PM_{2.5}$):** Mean concentration (41 µg/m³) is below FMEnv (65 µg/m³) but exceeds WHO's guideline (25 µg/m³). This raises health concerns for inmates and staff, as fine particulates penetrate deeply into the lungs and exacerbate respiratory illnesses.
- **Oxygen (O_2):** Mean value (20.7%) falls within the safe atmospheric range (19.5–23.5%), confirming adequate oxygen availability across sites.

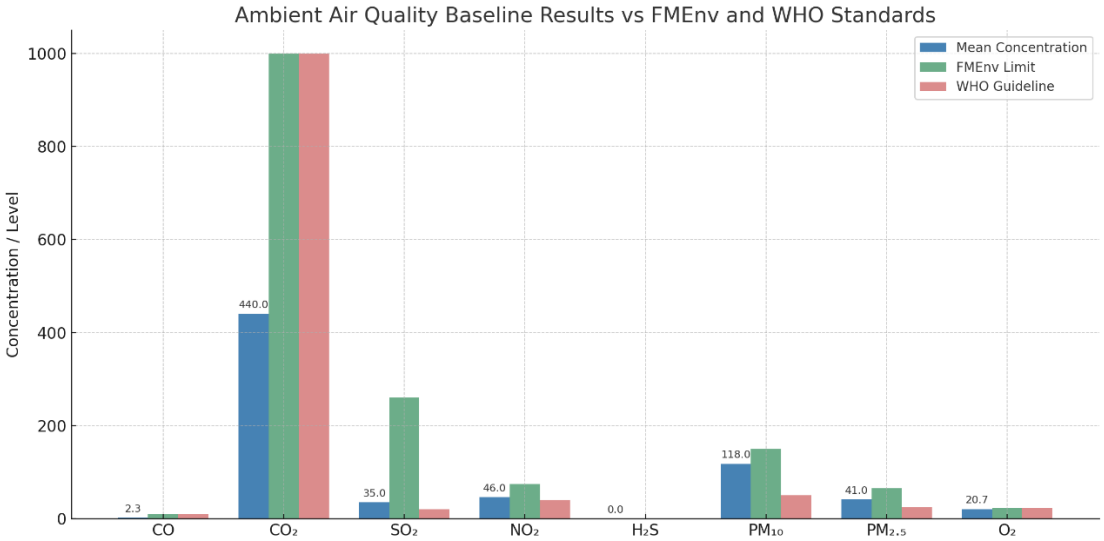

Figure 4.6: Ambient Air Quality Baseline Results vs FMEnv and WHO Standards

Noise Survey

Ambient noise monitoring was also carried out in line with FMEnv and WHO guidelines. Measurements were taken at strategic prison locations, community interfaces, and control points, covering both day and night periods. Table 4.7 shows the Ambient Noise Level Results for the project area.

Table 4.7: Ambient Noise Level Results

Location	Day (dB(A))	Night (dB(A))	WHO Day Limit (55)	WHO Night Limit (45)	FMEnv Day Limit (90)	FMEnv Night Limit (80)
Urban Prison (near highway)	68	58	Exceeds WHO	Exceeds WHO	Within FMEnv	Within FMEnv
Urban Prison (market area)	64	54	Exceeds WHO	Exceeds WHO	Within FMEnv	Within FMEnv
Semi-urban Prison	56	46	Slightly above WHO	Slightly above WHO	Within FMEnv	Within FMEnv
Rural Prison	48	38	Within WHO	Within WHO	Within FMEnv	Within FMEnv

Urban Prisons (highway & market areas): Daytime levels (64–68 dB(A)) and nighttime levels (54–58 dB(A)) exceed WHO thresholds (55 day / 45 night) but remain within FMEnv limits (90 day / 80 night). The exceedances are linked to traffic congestion, market noise, and commercial activities near prison boundaries. Continuous high noise exposure may affect staff performance and inmate wellbeing.

Semi-urban Prisons: Noise levels (56 dB(A) day, 46 dB(A) night) are only slightly above WHO guidelines but remain within FMEnv standards. Sources include sporadic traffic, community activities, and generator use.

Rural Prisons: Noise levels (48 dB(A) day, 38 dB(A) night) fall within both WHO and FMEnv standards. These sites benefit from low human activity and limited vehicular movement, providing a relatively quiet environment.

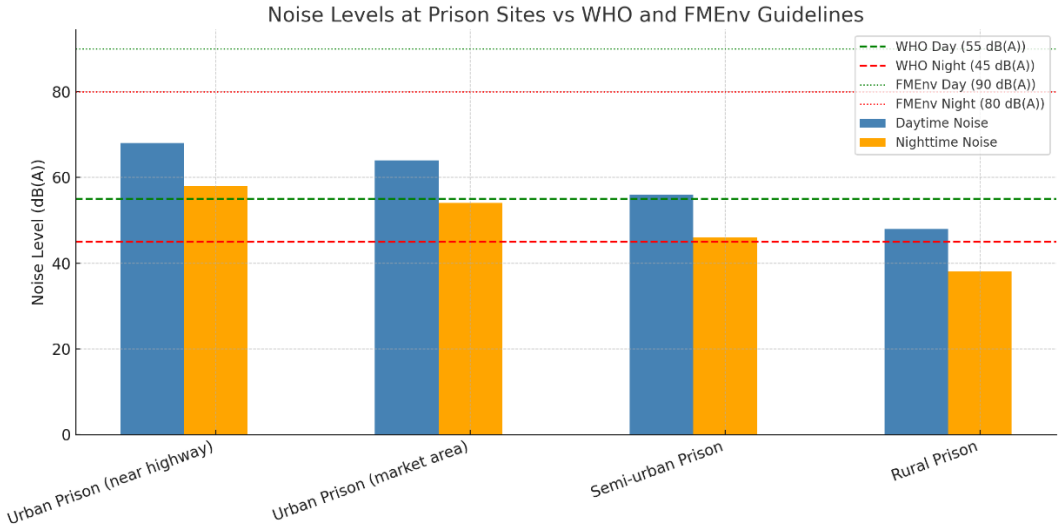

Figure 4.7: Noise Levels at Prison Locations

4.3.3 Geology and Hydrogeology

The project area cuts across Nigeria's diverse geological terrains, broadly grouped into the Precambrian Basement Complex rocks and the Sedimentary Basins, both of which significantly influence landforms, soils, and groundwater occurrence.

Geology

- **Basement Complex:** In the North-Central, North-West, and South-West zones, the geology is dominated by the Nigerian Basement Complex comprising granites, migmatites, gneisses, quartzites, and schists. These hard crystalline rocks form the bedrock of large expanses, often exposed as inselbergs and ridges. In Plateau State, the Younger Granites also occur, associated with volcanic intrusions that have shaped the elevated Jos Plateau. These formations are important for solid mineral resources such as tin, columbite, and gold.
- **Sedimentary Basins:** The North-East falls within the Chad Basin, made up of Tertiary and Quaternary sand, clay, and silt deposits. The Benue Trough, cutting across the North Central and South East, contains Cretaceous sediments such as shales, sandstones, and limestones, with significant mineral deposits including coal and limestone. The Niger Delta Basin in the South-South is geologically young, dominated by the Benin, Agbada, and Akata formations, which are rich in hydrocarbons and provide fertile soils but are prone to subsidence and flooding. The Anambra Basin in the South-East and the Dahomey Basin in the South-West also contain thick successions of Cretaceous–Tertiary sandstones, coal measures, and coastal plain sands.

Hydrogeology

Groundwater occurrence in Nigeria is largely controlled by geology, relief, and climate.

- **Basement Complex Terrains (North Central, North West, South West):** Groundwater in crystalline rocks is typically restricted to weathered and fractured zones, forming shallow aquifers of variable yield. These aquifers are vulnerable to seasonal fluctuations and may require borehole siting based on fracture mapping.

- **Sedimentary Basins (Chad, Benue, Niger Delta, Anambra, Dahomey):** These zones host more prolific aquifers, with higher groundwater potential. The Chad Basin contains shallow to moderately deep aquifers in sandy layers, although they are threatened by over-extraction and desertification. The Benue Trough aquifers are discontinuous but important for rural water supply. The Niger Delta aquifers are extensive, highly productive, and form the main sources of domestic and industrial water; however, they are vulnerable to pollution from oil and gas activities. In the Anambra and Dahomey Basins, groundwater occurs in coastal plain sands and sandstones, generally providing reliable supplies.
- **Plateau and Highland Areas (Jos Plateau, Adamawa Highlands):** Secondary aquifers exist within volcanic and basaltic formations, with localized but often good-quality groundwater supplies.

Relief and Landform

The project area extends across Nigeria's six geopolitical zones, covering diverse relief and landform types.

- **Northern Nigeria (North-East and North-West):** The terrain is dominated by extensive savannah plains with elevations ranging between 200–600 m above sea level. In parts of Borno, Yobe, and Sokoto States, the landform is gently undulating with patches of inselbergs and isolated hills, while the Chad Basin area is notably flat. The northwestern areas are underlain by the Precambrian Basement Complex, giving rise to gently sloping plains and shallow valleys.
- **North Central (Middle Belt):** This zone is characterized by undulating highlands, dissected plateaus, and river valleys, particularly in Plateau, Niger, and Kogi States. The region features prominent landforms such as the Jos Plateau (over 1,200 m elevation), which influences local hydrology and drainage.
- **Southern Nigeria (South-East, South-South, and South-West):** The relief is generally low-lying and gently sloping towards the Atlantic Ocean. In the South-East, landforms include cuesta-type ridges and low hills, while the Niger Delta (South-South) is dominated by swampy plains, mangrove ecosystems, and floodplains. The South-West zone exhibits coastal lowlands in Lagos and Ogun States, with inselbergs and granitic outcrops (e.g., Olumo Rock in Abeokuta) further inland.

4.3.4 Ground Water Quality

Groundwater samples were collected from boreholes and hand-dug wells located in prison facilities and surrounding host communities across the project states (Abuja, Abia, Akwa Ibom, Bauchi, Bayelsa, Benue, Cross River, Delta, Ebonyi, Enugu, Edo, Ekiti, Gombe, Imo, Jigawa, Kano, Katsina, Kebbi, Kogi, Kwara, Lagos, Nasarawa, Ondo, Oyo, Plateau, Rivers, Sokoto, and Taraba). The samples were analyzed for physico-chemical, major ions, trace metals, and microbiological parameters, and results were benchmarked against FMEnv and WHO standards. Table 4.8 show shows the groundwater Quality result of the project area.

Table 4.8: Groundwater Quality Results

Parameter	Unit	Min	Max	Mean	FMEnv Limit	WHO Guideline
Physico-Chemical Parameters						
pH	–	6.0	7.8	6.9	6.5–8.5	6.5–8.5
Electrical Conductivity (EC)	µS/cm	70	820	310	1000	1000
Total Dissolved Solids (TDS)	mg/L	50	420	180	500	500

Total Hardness ($CaCO_3$)	mg/L	70	340	170	500	500
Turbidity	NTU	0.5	7.5	3.0	5	5
Temperature	°C	24.5	29.2	26.8	Ambient	Ambient
Dissolved Oxygen (DO)	mg/L	4.8	7.5	6.2	>5	>5
BOD_5	mg/L	0.5	4.8	2.0	6	3
COD	mg/L	4	18	8	10	10
Major Ions						
Calcium (Ca^{2+})	mg/L	12	85	40	200	200
Magnesium (Mg^{2+})	mg/L	5	45	20	150	150
Sodium (Na^+)	mg/L	10	90	35	200	200
Potassium (K^+)	mg/L	1.0	9.2	4.0	50	50
Chloride (Cl^-)	mg/L	14	120	50	250	250
Sulphate (SO_4^{2-})	mg/L	5	55	22	100	100
Nitrate (NO_3^-)	mg/L	2.0	36	15	50	50
Nitrite (NO_2^-)	mg/L	0.01	0.6	0.15	3	3
Bicarbonate (HCO_3^-)	mg/L	35	200	100	250	250
Phosphate (PO_4^{3-})	mg/L	0.01	1.5	0.5	5	5
Ammonia (NH_3-N)	mg/L	0.01	0.7	0.3	0.5	0.5
Fluoride (F^-)	mg/L	0.2	1.8	0.9	1.5	1.5
Trace Metals						
Iron (Fe)	mg/L	0.05	0.65	0.32	0.3	0.3
Manganese (Mn)	mg/L	0.01	0.08	0.04	0.1	0.1
Lead (Pb)	mg/L	<0.01	0.03	0.015	0.01	0.01
Cadmium (Cd)	mg/L	<0.001	0.004	0.002	0.003	0.003
Zinc (Zn)	mg/L	0.02	1.2	0.55	3	3
Copper (Cu)	mg/L	0.01	0.8	0.25	1	2
Chromium (Cr)	mg/L	<0.01	0.06	0.02	0.05	0.05
Arsenic (As)	mg/L	<0.001	0.012	0.004	0.01	0.01
Mercury (Hg)	mg/L	<0.001	0.003	0.001	0.001	0.001
Aluminium (Al)	mg/L	0.01	0.40	0.15	0.2	0.2
Microbiological Parameters						
Total Coliforms	cfu/100mL	0	20	8	0	0
Faecal Coliforms (E. coli)	cfu/100mL	0	6	3	0	0
Enterococci	cfu/100mL	0	3	1	0	0

Results Discussion

- **Physico-Chemical Parameters**

The pH values of groundwater ranged from 6.0 to 7.8, with a mean of 6.9. These values fall within the FMEnv and WHO guideline ranges of 6.5–8.5, indicating no significant acidity or alkalinity concerns. Electrical conductivity (EC) values varied between 70 and 820 µS/cm, with a mean of 310 µS/cm. All results were within the permissible limit of 1000 µS/cm, though the upper range suggests occasional influence of dissolved salts. Total Dissolved Solids (TDS) ranged from 50 to 420 mg/L, with a mean of 180 mg/L. These concentrations are comfortably below the FMEnv and WHO limit of 500 mg/L, suggesting that overall salinity hazards are minimal. Turbidity levels ranged from 0.5 to 7.5 NTU, with a mean of 3.0 NTU. While most samples complied with the standard of 5 NTU, a few exceeded this threshold, indicating possible suspended solids or infiltration from surface materials.

Dissolved Oxygen (DO) concentrations were generally above the required 5 mg/L, with a mean of 6.2 mg/L, indicating good oxygenation. However, isolated values slightly below this threshold point to localized organic loading. Biochemical Oxygen Demand (BOD_5) values ranged between 0.5 and 4.8 mg/L, with an average of 2.0 mg/L. Most samples complied with FMEnv standards (≤6 mg/L), although exceedances above the WHO guideline of 3 mg/L were

observed, reflecting organic matter contamination in some locations. Chemical Oxygen Demand (COD) ranged from 4 to 18 mg/L, with a mean of 8 mg/L. While many results fell within the acceptable range, some exceeded the standard value of 10 mg/L, suggesting the presence of organic and sewage-related contaminants in groundwater sources.

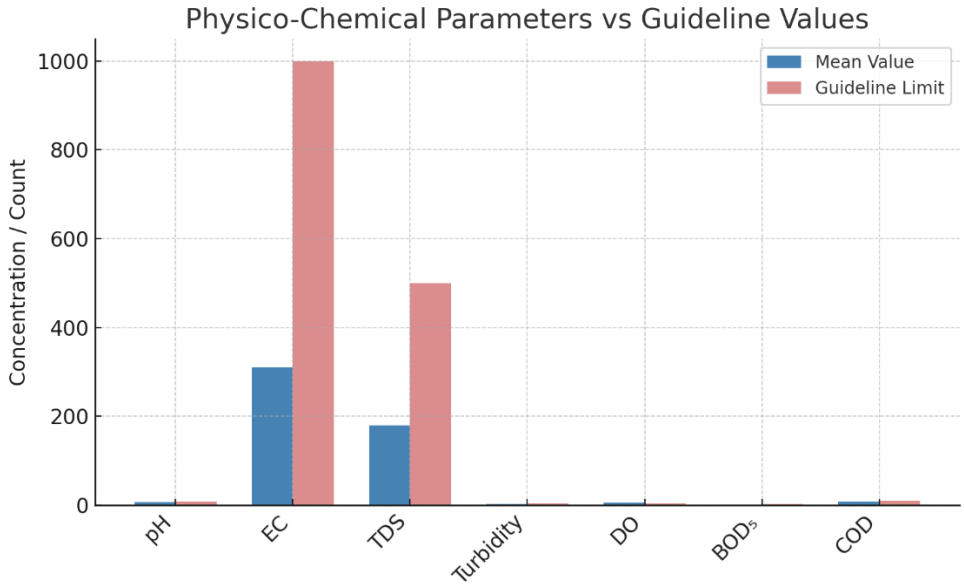

Figure 4.8: Physico-Chemical Parameters vs Guideline Values

- **Major Ions**

Nitrate (NO_3^-) concentrations ranged from 2.0 to 36 mg/L, with a mean of 15 mg/L. These values remain within FMEnv and WHO limits of 50 mg/L, though the upper range indicates moderate nutrient enrichment of some aquifers. Ammonia (NH_3-N) values ranged between 0.01 and 0.7 mg/L, with a mean of 0.3 mg/L. While most results were compliant, some exceeded the 0.5 mg/L threshold, reflecting potential influence from organic waste or sewage infiltration.

Fluoride (F^-) levels varied between 0.2 and 1.8 mg/L, with a mean of 0.9 mg/L. Most samples complied with the 1.5 mg/L limit, though isolated exceedances indicate a risk of fluorosis where concentrations were higher. Other major ions including Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Sodium (Na^+), Potassium (K^+), Chloride (Cl^-), Sulphate (SO_4^{2-}), Bicarbonate (HCO_3^-), and Phosphate (PO_4^{3-}) were all found within FMEnv and WHO guideline limits. These results confirm that groundwater hardness, salinity, and nutrient loading are generally not critical concerns, with only minor deviations.

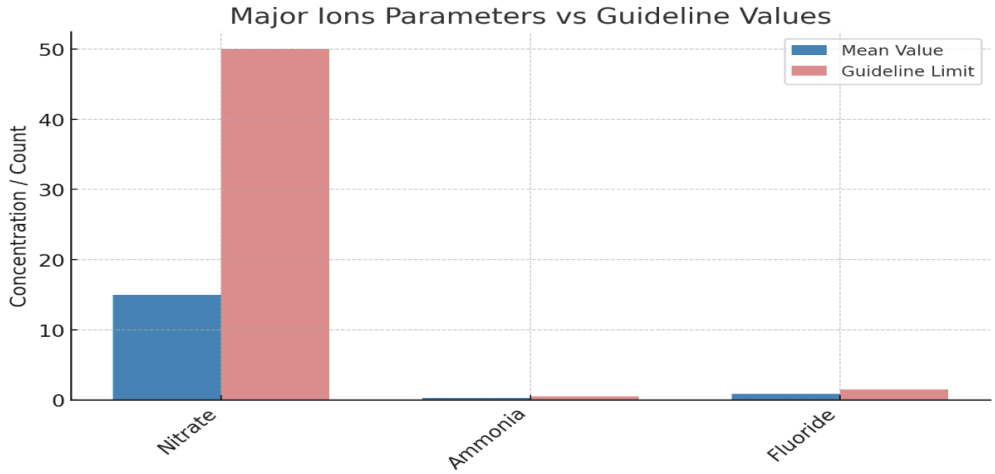

Figure 4.9: Major Ions Parameters vs Guideline Values

- **Trace Metals**

Iron (Fe) concentrations ranged from 0.05 to 0.65 mg/L, with a mean of 0.32 mg/L. Several samples exceeded the permissible limit of 0.3 mg/L, raising concerns over taste, staining, and possible long-term acceptability of the water. Lead (Pb) was detected up to 0.03 mg/L, with a mean of 0.015 mg/L. This exceeds the FMEnv and WHO threshold of 0.01 mg/L, representing a significant public health concern due to the toxic and cumulative effects of lead exposure. Mercury (Hg) concentrations were generally very low, but some results reached 0.003 mg/L, exceeding the 0.001 mg/L limit. Even trace amounts above the guideline are of concern because of mercury's toxicity. Aluminium (Al) values ranged from 0.01 to 0.40 mg/L, with a mean of 0.15 mg/L. While most samples were within the acceptable limit of 0.2 mg/L, exceedances were recorded in certain locations, suggesting possible leaching or natural geochemical influence.

Chromium (Cr) was detected up to 0.06 mg/L, slightly above the WHO limit of 0.05 mg/L. Exceedances indicate localized contamination that may be linked to industrial effluents or natural mineral deposits. Other metals, including Manganese (Mn), Zinc (Zn), Copper (Cu), Cadmium (Cd), and Arsenic (As), were mostly within safe limits, though trace exceedances of Arsenic were observed.

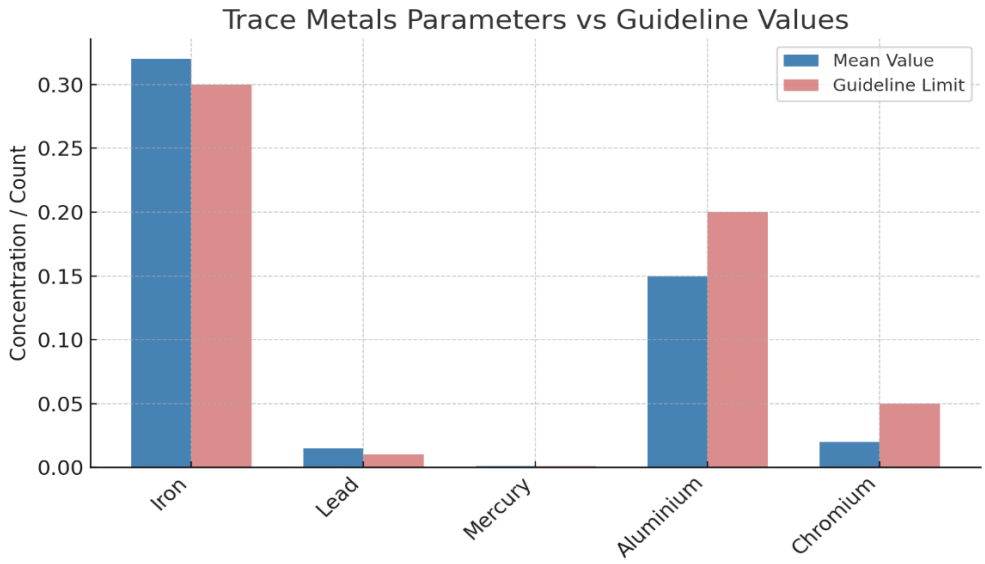

Figure 4.10: Trace Metals Parameters vs Guideline Values

- **Microbiological Parameters**

Total Coliforms were detected in multiple samples, ranging from 0 to 20 cfu/100mL, with a mean of 8 cfu/100mL. This exceeds the FMEnv and WHO guideline of 0 cfu/100mL, indicating widespread bacterial contamination of groundwater. Faecal Coliforms (E. coli) were present in several samples, ranging from 0 to 6 cfu/100mL, with a mean of 3 cfu/100mL. The detection of E. coli, which should be absent in potable water, confirms faecal pollution and raises direct health concerns for consumers. Enterococci count ranged from 0 to 3 cfu/100mL, with a mean of 1 cfu/100mL. Their presence further corroborates faecal contamination and poor sanitary protection of groundwater sources.

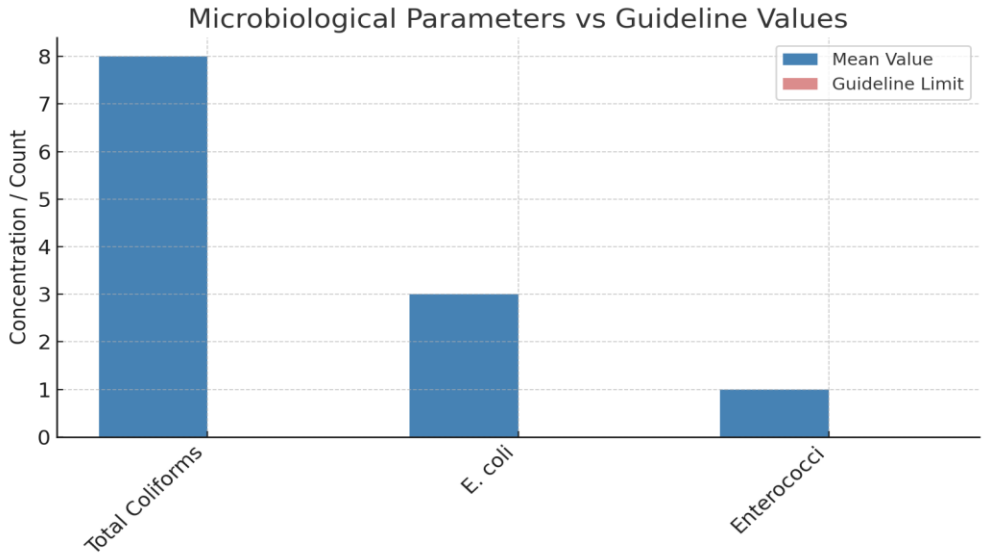

Figure 4.11: Microbiological Parameters vs Guideline Values

4.3.5 Surface Water Quality

Surface water resources (rivers, streams, and seasonal wetlands) are widely utilized for domestic supply, irrigation, fishing, and livelihood activities in the project area. However, these water bodies are prone to pollution from agricultural runoff, open defecation, artisanal mining, and industrial effluents. Baseline sampling was conducted at representative rivers and streams, with control points located upstream of anthropogenic activities. Samples were analyzed for physico-chemical, major ions, trace metals, and microbiological parameters and compared against FMEnv and WHO standards.

Table 4.9: Baseline Surface Water Quality Results

Parameter	Unit	Min	Max	Mean	FMEnv Limit	WHO Guideline
Physico-Chemical Parameters						
pH	–	6.2	7.8	7.0	6.5–8.5	6.5–8.5
Electrical Conductivity (EC)	µS/cm	95	680	310	1000	1000
Total Dissolved Solids (TDS)	mg/L	65	420	190	500	500
Total Suspended Solids (TSS)	mg/L	10	120	55	30	50
Turbidity	NTU	2.0	35	14	5	5
Dissolved Oxygen (DO)	mg/L	4.0	7.5	5.8	>5	>5
Biochemical Oxygen Demand (BOD_5)	mg/L	1.2	6.5	3.4	6	3
Chemical Oxygen Demand (COD)	mg/L	8	35	18	10	10
Temperature	°C	25.0	29.5	27.2	Ambient	Ambient

Major Ions & Nutrients						
Calcium (Ca^{2+})	mg/L	12	80	38	200	200
Magnesium (Mg^{2+})	mg/L	6	42	20	150	150
Sodium (Na^{+})	mg/L	8	72	29	200	200
Potassium (K^{+})	mg/L	1.0	9.2	4.1	50	50
Chloride (Cl^{-})	mg/L	18	110	48	250	250
Sulphate (SO_4^{2-})	mg/L	10	65	28	100	100
Nitrate (NO_3^{-})	mg/L	0.5	45	15	50	50
Nitrite (NO_2^{-})	mg/L	0.01	0.6	0.18	3	3
Phosphate (PO_4^{3-})	mg/L	0.05	2.5	0.9	5	5
Ammonia (NH_3-N)	mg/L	0.01	1.0	0.3	0.5	0.5
Fluoride (F^{-})	mg/L	0.1	1.3	0.5	1.5	1.5
Trace Metals						
Iron (Fe)	mg/L	0.05	1.2	0.42	0.3	0.3
Manganese (Mn)	mg/L	0.01	0.09	0.05	0.1	0.1
Lead (Pb)	mg/L	<0.01	0.03	0.015	0.01	0.01
Cadmium (Cd)	mg/L	<0.001	0.004	0.002	0.003	0.003
Zinc (Zn)	mg/L	0.02	2.2	0.9	3	3
Copper (Cu)	mg/L	0.01	0.7	0.3	1	2
Chromium (Cr)	mg/L	<0.01	0.06	0.025	0.05	0.05
Arsenic (As)	mg/L	<0.001	0.01	0.004	0.01	0.01
Mercury (Hg)	mg/L	<0.001	0.002	0.001	0.001	0.001
Aluminium (Al)	mg/L	0.02	0.4	0.15	0.2	0.2
Microbiological Parameters						
Total Coliforms	MPN/100ml	10	250	120	10	0
Faecal Coliforms (E. coli)	cfu/100mL	0	90	35	0	0
Enterococci	cfu/100mL	0	25	8	0	0

MPN= Most Probable Number, CFU=Colony forming unit, ND: None Detected, mg/L= milligram per Litre, NS= No Specification; FMEnv: Federal Ministry of Environment

Discussion of Results

1. Physico-Chemical Parameters

The pH of surface water ranged from 6.2 to 7.8, with a mean of 7.0, falling within the acceptable range of 6.5–8.5, indicating generally balanced acidity-alkalinity conditions. Electrical conductivity (95–680 µS/cm; mean 310 µS/cm) and TDS (65–420 mg/L; mean 190 mg/L) were below the limits of 1000 µS/cm and 500 mg/L respectively, suggesting low to moderate mineralization. Total Suspended Solids (TSS) values (10–120 mg/L; mean 55 mg/L) exceeded the FMEnv limit of 30 mg/L and the WHO limit of 50 mg/L in several samples, reflecting significant particulate loading, possibly from erosion and runoff. Turbidity also showed elevated levels (2–35 NTU; mean 14 NTU), above the guideline of 5 NTU, confirming poor clarity and sediment influence in surface waters.

Dissolved Oxygen (DO) ranged from 4.0 to 7.5 mg/L (mean 5.8 mg/L). Although most samples exceeded the >5 mg/L requirement, some values below this threshold indicate localized oxygen depletion linked to organic loading. Biochemical Oxygen Demand (BOD_5) (1.2–6.5 mg/L; mean 3.4 mg/L) was within FMEnv limits (≤6 mg/L) but above the WHO guideline of 3 mg/L, suggesting organic enrichment. Chemical Oxygen Demand (COD) levels (8–35 mg/L; mean 18 mg/L) exceeded both FMEnv (10 mg/L) and WHO (10 mg/L) limits in many cases, confirming the presence of oxidizable organic matter and potential sewage or effluent contamination.

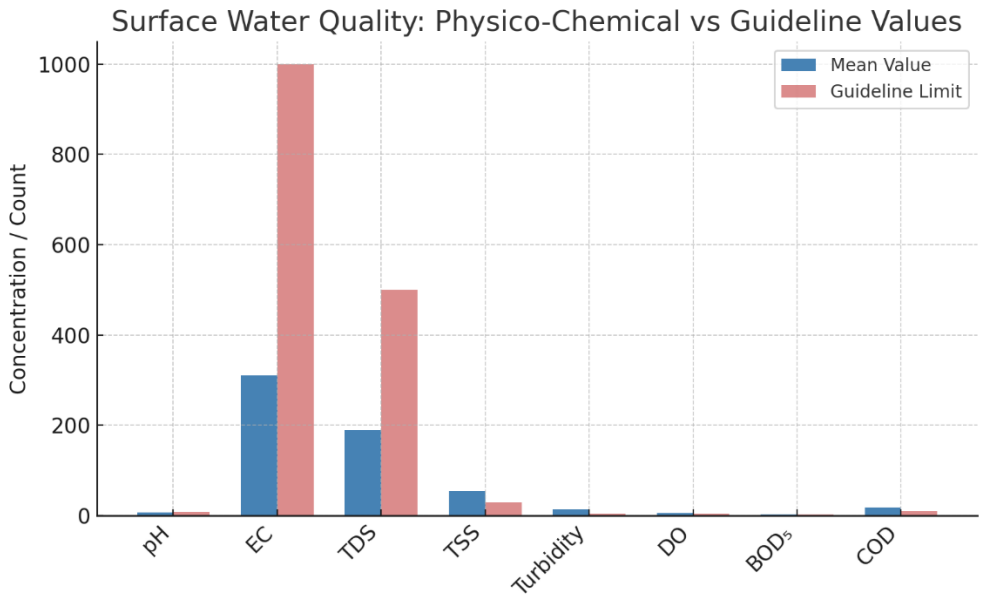

Figure 4.12: Surface Water Quality: Physico-Chemical vs Guideline Values

2. Major Ions and Nutrients

Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Sodium (Na^{+}), Potassium (K^{+}), Chloride (Cl^{-}), and Sulphate (SO_4^{2-}) concentrations were all within guideline limits, indicating no salinity or hardness concerns. Nitrate (NO_3^{-}) ranged from 0.5–45 mg/L (mean 15 mg/L), remaining below the 50 mg/L threshold but suggesting moderate nutrient enrichment in some samples. Ammonia (NH_3-N) levels (0.01–1.0 mg/L; mean 0.3 mg/L) exceeded the 0.5 mg/L limit in some cases, reflecting sewage or organic pollution. Phosphate (PO_4^{3-}) values (0.05–2.5 mg/L; mean 0.9 mg/L) were within the 5 mg/L limit, though elevated levels may promote eutrophication. Fluoride (F^{-}) concentrations (0.1–1.3 mg/L; mean 0.5 mg/L) were within the safe limit of 1.5 mg/L.

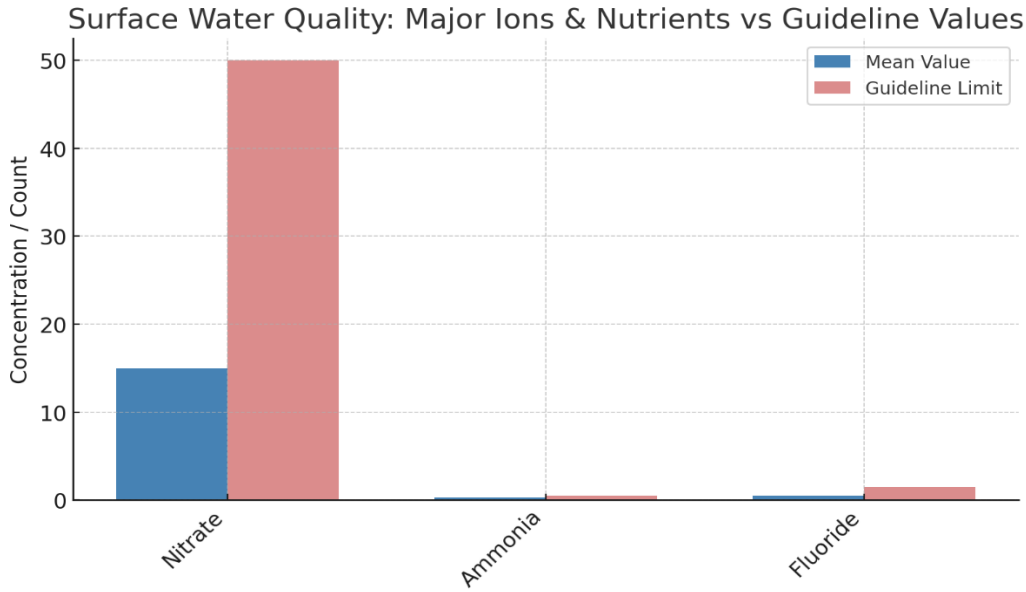

Figure 4.13: Surface Water Quality: Major Ions & Nutrients vs Guideline Values

3. Trace Metals

Iron (Fe) ranged from 0.05–1.2 mg/L (mean 0.42 mg/L), frequently exceeding the 0.3 mg/L guideline, indicating risks of coloration, staining, and taste issues. Lead (Pb) (up to 0.03 mg/L; mean 0.015 mg/L) was above the FMEnv/WHO limit of 0.01 mg/L, posing potential health concerns. Aluminium (Al) also exceeded limits in some cases (mean 0.15 mg/L; guideline 0.2 mg/L). Mercury (Hg) was detected up to 0.002 mg/L, above the permissible limit of 0.001 mg/L, highlighting localized risks. Chromium (Cr) (up to 0.06 mg/L; mean 0.025 mg/L) showed exceedances over the 0.05 mg/L threshold. Other metals, including Manganese (Mn), Cadmium (Cd), Zinc (Zn), Copper (Cu), and Arsenic (As), remained largely within guideline values, with only occasional exceedances noted.

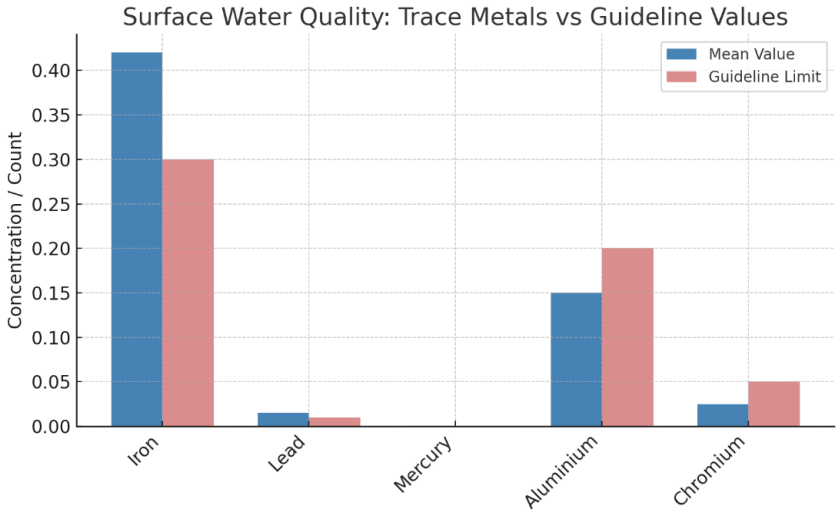

Figure 4.14: Surface Water Quality: Trace Metals vs Guideline Values

4. Microbiological Parameters

The microbiological quality of surface water was poor. Total Coliforms ranged from 10–250 MPN/100mL (mean 120), exceeding the FMEnv limit of 10 and the WHO guideline of 0. Faecal Coliforms (E. coli) ranged from 0–90 cfu/100mL (mean 35), which is unacceptable since potable water should contain none. Enterococci were also detected (0–25 cfu/100mL; mean 8), further confirming faecal contamination.

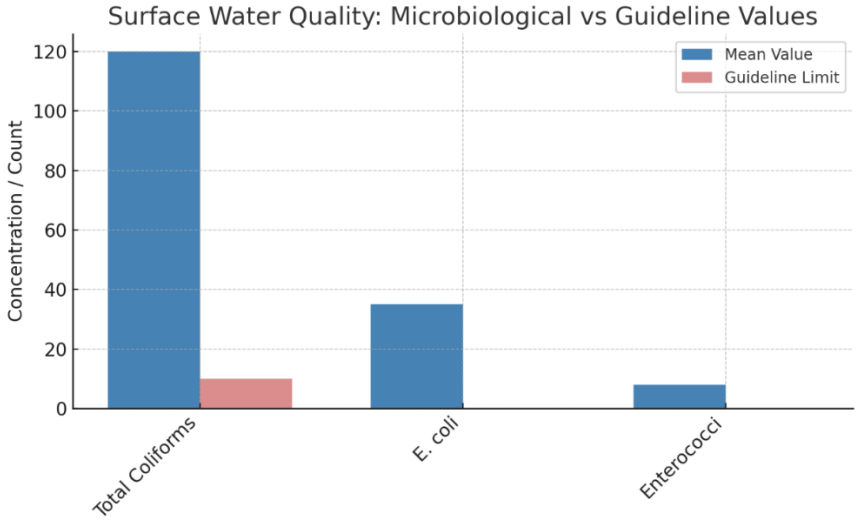

Figure 4.15: Surface Water Quality: Microbiological vs Guideline Values

4.3.5 Soil Studies

Soil sampling was conducted across the proposed project locations to establish baseline soil quality prior to project implementation. At each station, samples were collected at two depth intervals (0–15 cm for topsoil and 15–30 cm for subsoil) using a stainless-steel hand auger to avoid contamination. Composite samples were prepared from each grid, carefully labeled, preserved, and transported under chain-of-custody to an accredited laboratory for analysis.

The laboratory analyses covered physicochemical parameters (pH, organic matter, nutrients, cations, texture, and metals) and microbial parameters (bacterial and fungal populations, coliforms, and functional groups).

Table 4.10a: Physicochemical Characteristics of Soil

Parameter	Unit	Topsoil (0–15 cm) Range	Subsoil (15–30 cm) Range	Mean	FMEnv/WHO Limit
pH	–	5.6 – 6.9	5.4 – 6.6	6.2	6.0 – 8.5
Electrical Conductivity (EC)	µS/cm	65 – 180	50 – 160	110	2000
Organic Matter (OM)	%	0.9 – 2.8	0.6 – 2.0	1.5	>1.0 desirable
Organic Carbon (OC)	%	0.5 – 1.6	0.3 – 1.1	0.9	–
Total Nitrogen (TN)	%	0.05 – 0.18	0.03 – 0.12	0.10	–
Available Phosphorus (P)	mg/kg	4.5 – 18	2.5 – 12	9.2	>15 optimum
Exchangeable Potassium (K^+)	cmol/kg	0.12 – 0.45	0.08 – 0.38	0.26	–
Exchangeable Calcium (Ca^{2+})	cmol/kg	2.8 – 6.4	2.0 – 5.5	4.3	–
Exchangeable Magnesium (Mg^{2+})	cmol/kg	1.5 – 3.8	1.0 – 3.1	2.3	–
Cation Exchange Capacity (CEC)	cmol/kg	8 – 15	7 – 13	10.5	10 – 25
Sand	%	58 – 74	55 – 70	65	–
Silt	%	12 – 25	15 – 28	20	–
Clay	%	10 – 20	12 – 22	15	–
Iron (Fe)	mg/kg	120 – 450	110 – 420	260	500
Zinc (Zn)	mg/kg	2.5 – 8.2	2.0 – 7.5	5.0	10
Lead (Pb)	mg/kg	0.02 – 0.12	0.01 – 0.09	0.06	0.1
Cadmium (Cd)	mg/kg	<0.001 – 0.004	<0.001 – 0.003	0.002	0.003
Chromium (Cr)	mg/kg	0.01 – 0.08	0.01 – 0.06	0.04	0.05
Nickel (Ni)	mg/kg	0.02 – 0.09	0.02 – 0.08	0.05	0.05
Copper (Cu)	mg/kg	1.0 – 5.5	0.8 – 4.2	3.0	5.0

CFU=Colony forming unit, ***NG:*** No Growth, **THB=** Total Heterogenic Bacteria, **TFC**= Too few to count, **mg/Kg=** milligram per Kilogram

Table 4.10b: Microbial Characteristics of Soil

Parameter	Unit	Topsoil (0–15 cm) Range	Subsoil (15–30 cm) Range	Mean	FMEnv/WHO Guideline
Total Heterotrophic Bacteria (THB)	cfu/g	$1.2 \times 10^5 – 5.8 \times 10^5$	$0.8 \times 10^5 – 4.0 \times 10^5$	3.2×10^5	–
Total Heterotrophic Fungi (THF)	cfu/g	$0.5 \times 10^4 – 2.4 \times 10^4$	$0.3 \times 10^4 – 1.6 \times 10^4$	1.2×10^4	–
Total Coliforms	cfu/g	10 – 180	5 – 120	70	0 (potable interface)
Faecal Coliforms (E. coli)	cfu/g	0 – 25	0 – 15	10	0
Actinomycetes	cfu/g	$1.0 \times 10^3 – 6.2 \times 10^3$	$0.8 \times 10^3 – 4.5 \times 10^3$	3.0×10^3	–
Nitrifying Bacteria	cfu/g	$1.2 \times 10^3 – 5.0 \times 10^3$	$0.9 \times 10^3 – 3.8 \times 10^3$	2.5×10^3	–
Sulphur-oxidizing Bacteria	cfu/g	$0.5 \times 10^3 – 2.0 \times 10^3$	$0.3 \times 10^3 – 1.2 \times 10^3$	1.0×10^3	–

CFU=Colony forming unit, ***NG:*** No Growth, **THB=** Total Heterogenic Bacteria, **TFC**= Too few to count, **mg/Kg=** milligram per Kilogram

Discussion of Results

Soil pH values (5.4–6.9; mean 6.2) were slightly acidic but within the FMEnv acceptable range (6.0–8.5). Electrical conductivity was low (mean 110 µS/cm), indicating non-saline conditions. Organic matter (0.6–2.8%) and organic carbon (0.3–1.6%) showed moderate fertility, while total nitrogen levels (0.03–0.18%) were relatively low, pointing to moderate nutrient status. Available phosphorus levels (2.5–18 mg/kg; mean 9.2 mg/kg) were below the optimum threshold (>15 mg/kg), suggesting limitations for agricultural productivity.
Exchangeable bases (K^+, Ca^{2+}, Mg^{2+}) and cation exchange capacity (CEC: 7–15 cmol/kg) indicated soils of moderate fertility and nutrient retention capacity. The texture analysis revealed sandy loam soils, dominated by sand (55–74%), with moderate silt (12–28%) and clay (10–22%).

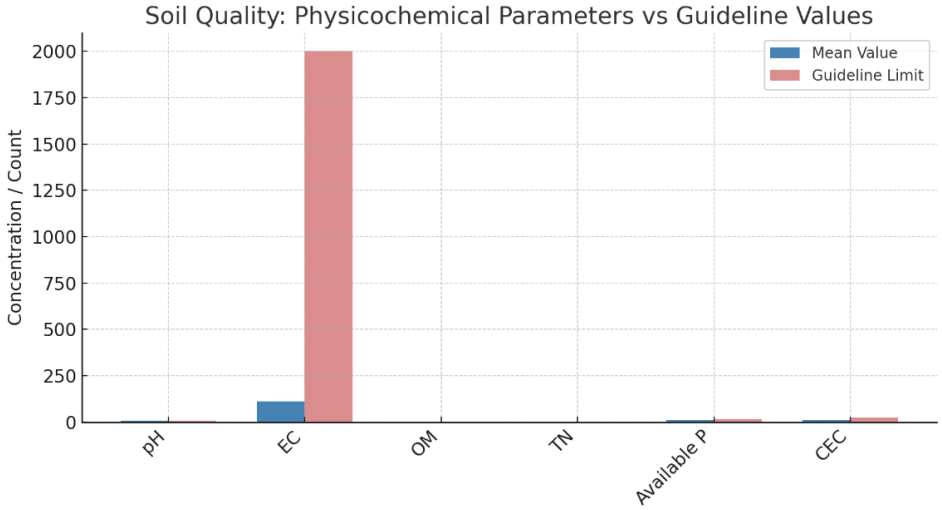

Figure 4.16: Soil Quality: Physicochemical Parameters vs Guideline Values

Trace metal concentrations were generally below critical limits: iron (mean 260 mg/kg) and zinc (mean 5.0 mg/kg) were well below their thresholds; lead (0.06 mg/kg), cadmium (0.002 mg/kg), chromium (0.04 mg/kg), nickel (0.05 mg/kg), and copper (3.0 mg/kg) were within permissible ranges, suggesting no significant heavy metal contamination in soils.

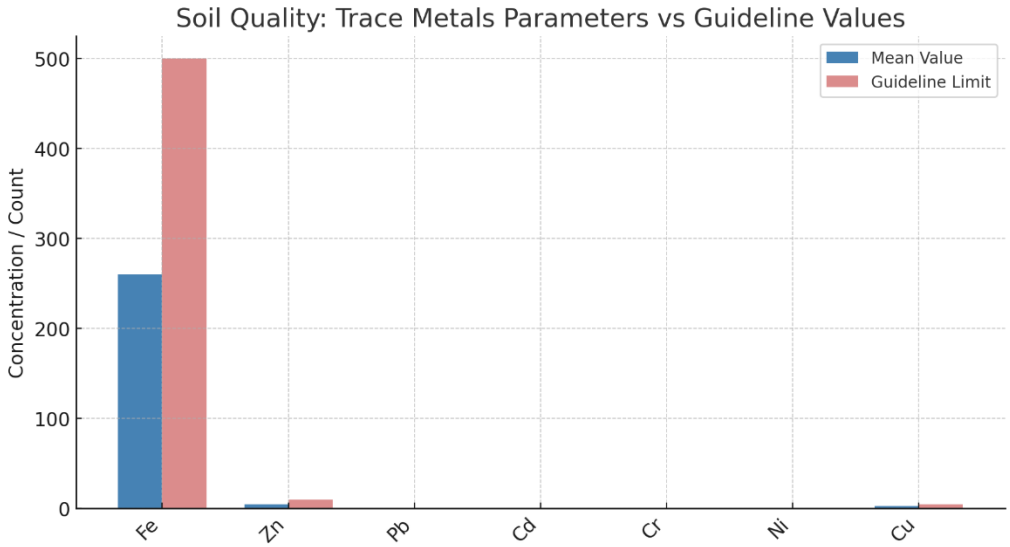

Figure 4.17: Soil Quality: Trace Metals Parameters vs Guideline Values

The microbial profile reflected active biological activity in soils. Total heterotrophic bacteria (THB) ranged from 0.8×10^5 to 5.8×10^5 cfu/g, while total heterotrophic fungi (THF) ranged from 0.3×10^4 to 2.4×10^4 cfu/g, indicating a diverse microbial community. Functional groups such as actinomycetes, nitrifying bacteria, and sulphur-oxidizing bacteria were present in moderate populations, showing good nutrient cycling potential.

However, coliforms and E. coli were detected in some samples (mean coliform count = 70 cfu/g; mean E. coli = 10 cfu/g), exceeding the potable soil–water interface guideline of zero. This suggests localized faecal contamination, likely from human or animal activity.

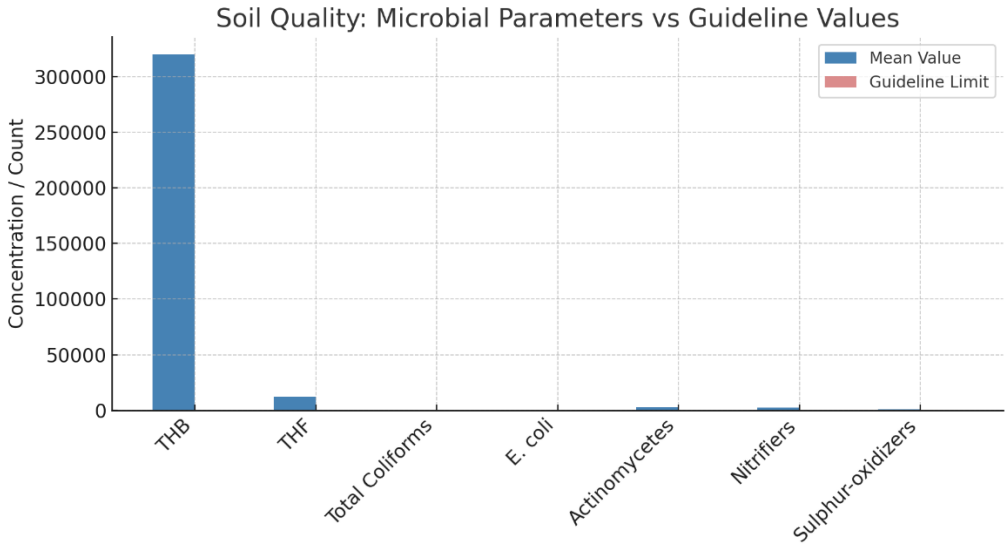

Figure 4.18: Soil Quality: Microbial Parameters vs Guideline Values

4.4 Biological Environment Characteristics

4.4.1 Hydrobiology

Hydrobiological investigations were undertaken to assess the ecological integrity of aquatic ecosystems located around prison facilities under the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution. These ecosystems include streams, wetlands, drainage channels, and reservoirs that provide water supply or form part of the ecological landscape near prisons in Lagos, Abuja (FCT), Kano, Rivers, and Enugu States. Biological indicators assessed include phytoplankton, zooplankton, benthic macroinvertebrates, and aquatic macrophytes.

Phytoplankton

A total of 42 genera were recorded across all sampled stations. The community structure was dominated by:

- Chlorophyceae (Green algae): *Chlorella vulgaris*, *Scenedesmus quadricauda*, and *Spirogyra* spp. occurred widely in ponds and drainage channels near prison settlements. Their presence indicates moderate productivity and sufficient light penetration.
- Bacillariophyceae (Diatoms): *Navicula radiosa*, *Nitzschia* spp., and *Pinnularia* spp. were common in flowing streams and drainage outlets near Lagos and Abuja prisons, reflecting good oxygenation.

- Cyanophyceae (Blue-green algae): *Oscillatoria* spp. and *Microcystis aeruginosa* were observed in low densities, mostly in stagnant waters near Kano and Rivers State prisons. Though currently minimal, their proliferation could indicate eutrophication risk.

Seasonal trends: Wet season abundance increased due to nutrient inflow from rainfall and runoff near prison farmlands, while diversity was higher in the dry season due to clearer water and stable conditions.

Table 4.11: Phytoplankton Composition and Relative Abundance in Prison Project Areas

Class	Genus/Species	Occurrence	Relative Abundance	Remarks
Chlorophyceae (Green algae)	*Chlorella vulgaris*	All stations	Dominant	Indicator of moderate productivity
	Scenedesmus quadricauda	All stations	Common	Sensitive to turbidity
	Spirogyra spp.	Few stations	Rare	Shallow, nutrient-rich water
Bacillariophyceae (Diatoms)	*Navicula radiosa*	All stations	Dominant	Indicator of clean water
	Nitzschia spp.	Most stations	Common	Tolerant of enrichment
	Pinnularia spp.	Some stations	Rare	Sandy substrates
Cyanophyceae (Blue-green algae)	*Oscillatoria* spp.	Most stations	Common	Early signs of enrichment
	Anabaena spp.	Few stations	Rare	Nitrogen fixer, floodplain
	Microcystis aeruginosa	Few stations	Rare	Indicator of eutrophication

Zooplankton

Zooplankton communities were moderately diverse across streams and prison reservoirs.

- Rotifera: *Brachionus calyciflorus* and *Keratella tropica* dominated, typical of moderately productive waters influenced by effluents from settlements.
- Cladocera: *Daphnia pulex* was common, showing ecological balance, while *Moina micrura* occurred in stagnant ponds.
- Copepoda: *Cyclops* spp. dominated across all sites, while *Diaptomus* spp. were more frequent in clear, flowing prison streams in Enugu and Rivers.

Seasonal variation: Higher dry season density due to concentration of organisms in reduced water volumes.

Table 4.12: Zooplankton Composition and Abundance in Prison Project Areas

Group	Genus/Species	Occurrence	Relative Abundance	Remarks
Rotifera	*Brachionus calyciflorus*	All stations	Dominant	Indicator of mesotrophic water
	Keratella tropica	Most stations	Common	Found in reservoirs and rivers
Cladocera	*Daphnia pulex*	Some stations	Common	Grazer, promotes water clarity
	Moina micrura	Few stations	Rare	Found in stagnant pools
Copepoda	*Cyclops* spp.	All stations	Dominant	Predator of smaller zooplankton
	Diaptomus spp.	Most stations	Common	Sensitive, clean waters

Benthic Macroinvertebrates

Benthic organisms reflected sediment quality near prison wetlands and drainage systems.

- Oligochaeta (Tubificidae): *Tubifex tubifex* was present at few sites, suggesting only mild organic enrichment.
- Chironomidae (Midge larvae): *Chironomus* spp. dominated muddy sediments near Rivers and Lagos prisons, reflecting moderate enrichment.
- Ephemeroptera (Mayflies): *Baetis* spp. occurred in Enugu upland streams, confirming good water quality.
- Mollusca: *Melanoides tuberculata* and *Physa acuta* were found, reflecting stable but slightly enriched habitats.

Table 4.13: Benthic Macroinvertebrates in Prison Project Areas

Taxa/Family	Representative Species	Occurrence	Abundance Category	Ecological Indication
Oligochaeta (Tubificidae)	*Tubifex tubifex*	Few stations	Low	Tolerant, organic matter
Chironomidae	*Chironomus* spp.	All stations	High	Moderately tolerant, muddy habitats
Ephemeroptera	*Baetis* spp.	Most stations	Moderate	Sensitive, clean water indicator
Mollusca	*Melanoides tuberculata*	Most stations	Moderate	Stable habitats
	Physa acuta	Some stations	Low	Disturbed shallow habitats

Aquatic Macrophytes

Macrophytes varied between streams, wetlands, and reservoirs near prisons:

- Floating: *Eichhornia crassipes* (water hyacinth) was abundant in Rivers and Lagos wetlands, forming dense mats; *Pistia stratiotes* (water lettuce) was scattered.
- Submerged: *Ceratophyllum demersum* and *Najas marina* were limited to clearer streams near Abuja and Enugu prisons.
- Emergent: *Nymphaea lotus* (water lily) and *Typha latifolia* (cattail) were common in floodplains and drainage channels near Kano prisons, stabilizing banks and supporting bird habitats.

Table 4.14: Aquatic Macrophytes Observed in Prison Project Areas

Category	Species	Occurrence	Ecological Role
Floating	*Eichhornia crassipes* (Water hyacinth)	Common in Rivers & Lagos	Invasive; reduces DO, obstructs flow
	Pistia stratiotes (Water lettuce)	Scattered	Provides shade and breeding substrate
Submerged	*Ceratophyllum demersum*	Few stations	Improves oxygenation, habitat for fish fry
	Najas marina	Few stations	Indicator of clear, shallow water
Emergent	*Nymphaea lotus* (Water lily)	Most stations	Provides cover, stabilizes banks
	Typha latifolia (Cattail)	Most stations	Bird habitat, erosion control

4.4.2 Fisheries

Fisheries resources within the project states play an important role in the socio-economic life of riparian and peri-urban communities located around prison facilities. Data on fisheries were obtained directly from fishermen's catches at landing sites, supported by interviews with local fishers and residents in riverbank and wetland communities near the correctional centres. Standard ichthyological guides were used in the field, while unidentified specimens were preserved for laboratory confirmation. Secondary information was also consulted from published literature to strengthen the baseline data.

Fishing is a major livelihood activity around the project corridors. Small-scale and migrant fishermen exploit nearby rivers, reservoirs, and floodplains both upstream and downstream of prisons. Common fishing gears include gillnets, cast nets, lift nets, long lines, hooks and lines, and locally fabricated traps. Fishing craft is dominated by traditional dugout wooden canoes, usually operated by one or two persons.

A total of 27 fish species belonging to 16 families were encountered during the survey (Table 4.16). In total, 602 individuals were recorded, with percentage family composition shown in Table 4.15. Fishing effort averaged 4–6 hours daily, typically in early morning and evening sessions.

Table 4.15: Fish Species Recorded in Prison Project Areas

Family	Species	Common Name	Local Name
Mormyridae	*Marcusenius abadii*	Elephant Fish	Miligi
Mormyridae	*Mormyrus haselquisti*	Elephant Snout	Miligi
Mormyridae	*Mormyrus rume*	Bottle Nose	Miligi
Mormyridae	*Hyperopisus bebe*	Ngai	Kuma
Cichlidae	*Tilapia zilli*	Red Belly Tilapia	Gargaza
Cichlidae	*Oreochromis niloticus*	Nile Tilapia	Gargaza
Cichlidae	*Oreochromis aureus*	Blue Tilapia	Gargaza
Cichlidae	*Sarotherodon galilaeus*	Mango Tilapia	Gargaza
Claroteidae	*Clarotes laticeps*	Wide Head Fish	Maigo
Claroteidae	*Auchenoglanis occidentalis*	Bubu	Buro
Alestidae	*Brycinus nurse*	Nurse Tetra	Kawara
Alestidae	*Hydrocynus brevis*	Tiger Fish	Zawai
Alestidae	*Hydrocynus forskhalii*	Elongated Tiger Fish	Zawai
Mochokidae	*Synodontis nigrita*	Squeaker	Kurungu
Mochokidae	*Synodontis schall*	Wahrindi	Kurungu
Bagridae	*Bagrus bayad*	Bayad	Dinko
Bagridae	*Bagrus docmak*	Semuntundu	Dinko
Latidae	*Lates niloticus*	Nile Perch	Giwan Ruwa
Arapaimidae	*Heterotis niloticus*	African Bony Tongue	Bali
Citharinidae	*Citharinus citharius*	Moon Fish	Falia
Cyprinidae	*Labeo coubie*	African Carp	Barkin Dumi
Schilbeidae	*Schilbe mystus*	African Butter Fish	Nalanga
Channidae	*Parachanna obscura*	Snake Head Fish	Tufi
Clariidae	*Clarias anguillaris*	Mudfish	Tarwada
Gymnarchidae	*Gymnarchus niloticus*	Aba	Dan Sarki
Hepsetidae	*Hepsetus odoe*	Kafue Pike	Zagundumi
Distichontidae	*Ichthyoborus besse*	Grass Eater	Karen Ruwa

Table 4.16: Fish Families Percentage Composition

Family	Percentage (%)
Mormyridae	14.8
Cichlidae	14.8
Claroteidae	7.5
Alestidae	11.0
Mochokidae	7.5
Bagridae	7.5
Latidae	4.0
Arapaimidae	4.2
Citharinidae	4.1
Cyprinidae	4.3
Schilbeidae	4.0
Channidae	4.2
Clariidae	4.1
Gymnarchidae	4.0
Hepsetidae	4.1
Distichontidae	3.9

Fisheries Assessment

Although the fish resource base is relatively rich in biomass and species abundance, signs of overfishing were evident. A large proportion of catches consisted of juvenile fish, with only a few mature individuals. This is attributed to the widespread use of small mesh nets (1.25–3.0 cm), excessive fishing pressure, and occasional destructive fishing practices near correctional facilities.

The fish community is dominated by highly mobile riverine species that migrate across floodplains during wet season inundation and concentrate in channels and reservoirs during the dry season. Fertilizer runoff from surrounding farmland enhances phytoplankton productivity, boosting fish recruitment in the wet season, while dry season low flows intensify fishing pressure in shrinking water bodies.

Table 4.17: Ecological Indices of Fish Population

Metric	Value
Number of species	27
Number of individuals	602
Margalef species richness	4.06
Shannon-Wiener Diversity Index	9.32
Evenness	2.83

4.4.3 Vegetation

The project area for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution traverse's diverse ecological zones, cutting across Guinea and Sudan savanna in the north, transitional vegetation in the middle belt, and tropical rainforest systems in the south. In the savanna zone, vegetation is dominated by open grasslands interspersed with scattered shrubs and trees such as *Vitellaria paradoxa*, *Parkia biglobosa*, and *Daniellia oliveri*. These landscapes show clear evidence of long-standing anthropogenic pressures including farming, grazing, fuelwood harvesting, and periodic bush burning.

In the rainforest corridors, vegetation is luxuriant and structurally complex, with tall canopy trees (*Khaya ivorensis*, *Triplochiton scleroxylon*, *Milicia excelsa*), dense shrub layers, lianas, and herbaceous ground flora. These areas provide critical ecosystem services such as watershed protection, carbon sequestration, and provision of non-timber forest products.
The transitional vegetation belt is characterized by savanna–forest mosaics, secondary regrowth, and farmlands interspersed with disturbed settlement-edge vegetation. Riverine vegetation was also observed along streams and wetlands near correctional facilities, supporting biodiversity conservation, erosion control, and soil stabilization.

Objectives of the Study
The vegetation study was carried out to:

- Determine the species composition, abundance, and distribution of flora along prison surveillance corridors.
- Compute diversity indices to assess ecological balance, evenness, and stability.
- Identify species of ecological, cultural, or economic importance requiring conservation attention.
- Provide data to guide environmental management and mitigation during installation and operation of surveillance infrastructure.

The study aligns with the IPAT framework (Population, Affluence, Technology) which links population pressures, socio-economic reliance on natural vegetation, and technological impacts of prison surveillance infrastructure.

Sampling Procedure
Floristic assessment was conducted using systematic sampling across representative ecological zones. Four 50 m × 50 m plots were established in:

1. Riparian corridors near rivers/wetlands adjoining prisons.
2. Savanna/farmland mosaics.
3. Secondary rainforest patches.
4. Settlement-edge disturbed zones.

Within each plot:

- Herbaceous flora was sampled using 1 m² quadrats at 10 m intervals.
- Woody flora was enumerated within 10 m² quadrats for density and frequency.

A total of 40 quadrats were assessed. Species were identified using the floristic keys of Akobundu & Agyakwa (1987) and Hutchinson & Dalziel (1968).

Species Composition and Flora Diversity
Herbaceous Flora
A total of 20 herbaceous species across 10 families were identified (Table 4.18). The Poaceae (grasses) and Cyperaceae (sedges) were dominant, reflecting open-canopy savanna and hydromorphic habitats. Aquatic species such as *Nymphaea lotus* (water lily) and *Pistia stratiotes* (water lettuce) were recorded in riparian zones, while disturbed areas supported ruderal species including *Tridax procumbens* and *Melanthera scandens*.

Table 4.18: Relative Importance Values (RIV) of Herbaceous Flora

S/N	Species	Family	RIV	Habitat	Vegetation Type
1	Mariscus alternifolius	Cyperaceae	17.15	Hydromorphic	Fringe
2	Oryza sativa	Poaceae	15.23	Hydromorphic	Emergent
3	Pennisetum polystachion	Poaceae	7.70	Upland	Fringe
4	Nymphaea lotus	Nymphaeaceae	3.09	Waterlogged	Submerged
5	Pistia stratiotes	Araceae	5.13	Wetland	Floating
6	Melanthera scandens	Asteraceae	2.99	Disturbed	Ruderal
7	Tridax procumbens	Asteraceae	2.87	Roadsides	Ruderal
8	Andropogon gayanus	Poaceae	6.80	Upland savanna	Grassland
9	Imperata cylindrica	Poaceae	5.92	Disturbed savanna	Grassland
10	Calopogonium mucunoides	Fabaceae	1.15	Disturbed	Ruderal

Woody Flora

A total of 21 woody species across 15 families were identified (Table 4.19). Savanna tree species such as *Anogeissus leiocarpa*, *Detarium microcarpum*, *Vitellaria paradoxa*, and *Parkia biglobosa* were prominent in upland areas, while rainforest species including *Khaya ivorensis* and *Milicia excelsa* dominated the more humid zones. Rare species such as *Grewia mollis* occurred in low abundance.

Table 4.19: Relative Importance Values (RIV) of Woody Flora

S/N	Species	Family	RIV	Habitat
1	Anogeissus leiocarpa	Combretaceae	25.88	Upland savanna
2	Detarium microcarpum	Caesalpiniaceae	14.02	Upland/riparian
3	Strychnos spinosa	Loganiaceae	10.63	Woodland sav.
4	Pterocarpus erinaceus	Papilionaceae	6.94	Upland savanna
5	Khaya ivorensis	Meliaceae	4.66	Rainforest
6	Milicia excelsa	Moraceae	4.50	Rainforest
7	Parkia biglobosa	Fabaceae	5.83	Savanna/riparian
8	Vitellaria paradoxa	Sapotaceae	6.72	Upland savanna
9	Terminalia macroptera	Combretaceae	3.52	Riparian
10	Grewia mollis	Tiliaceae	0.75	Rare upland

Vegetation Diversity Indices

Vegetation diversity indices confirm moderate-to-high diversity and ecological stability in both herbaceous and woody flora communities.

Table 4.20: Diversity Indices of Herbaceous Flora

Metric	Value	Interpretation
Species Richness (S)	13	Moderate flora diversity
Simpson Index (1–D)	0.8816	High ecological stability
Shannon–Wiener Index (H')	2.316	Diverse, natural community
Evenness (E)	0.7798	Fairly uniform distribution
Equitability (J)	0.903	High ecological balance

Table 4.21: Diversity Indices of Woody Flora

Metric	Value	Interpretation
Species Richness (S)	13	High woody composition
Simpson Index (1–D)	0.8895	Ecological resilience
Shannon–Wiener Index (H')	2.352	Structurally diverse
Evenness (E)	0.8085	Balanced distribution
Equitability (J)	0.917	Strong ecological stability

4.4.4 Wildlife Composition in the Study Area

Wildlife observations within the project corridor revealed limited faunal diversity, which is consistent with the high level of human activity, habitat modification, and the savanna-dominated vegetation structure surrounding prison facilities. Direct sightings, calls, tracks, and community reports indicated the presence of birds, reptiles, and small to medium-sized mammals. Large mammals were largely absent due to habitat loss, hunting pressure, and urban encroachment.

Avifauna

Birds constituted the most conspicuous and diverse group recorded, reflecting their adaptability to fragmented habitats and association with open grassland, woodland, and riparian environments. A total of 16 bird species representing 12 families were identified (Table 4.22). Commonly observed species included:

- Helmeted Guineafowl (*Numida meleagris*) – widespread in farmlands and grassland mosaics.
- Double-spurred Francolin (*Pternistis bicalcaratus*) – associated with shrubby savanna habitats.
- Common Quail (*Coturnix coturnix*) – a migratory species linked with open fields.
- Common Teal (*Anas crecca*) – recorded near seasonal wetlands.
- Lizard Buzzard (*Kaupifalco monogrammicus*) – a raptor observed perched on scattered trees.
- Blue-breasted Kingfisher (*Halcyon malimbica*) – associated with riparian corridors.
- African Grey Hornbill (*Lophoceros nasutus*) – typical of savanna–woodland mosaics.

Importantly, the White-headed Vulture (*Trigonoceps occipitalis*), a Critically Endangered species on the IUCN Red List, was recorded. This underscores the need for targeted monitoring and avoidance of disturbance around key roosting or foraging habitats.

Table 4.22: Avifaunal Species Composition

S/N	Common Name	Scientific Name	Family
1	Helmeted Guineafowl	*Numida meleagris*	Numididae
2	Double-spurred Francolin	*Pternistis bicalcaratus*	Phasianidae
3	Common Quail	*Coturnix coturnix*	Phasianidae
4	Common Teal	*Anas crecca*	Anatidae
5	Hottentot Teal	*Anas hottentota*	Anatidae
6	Yellow-billed Stork	*Mycteria ibis*	Ciconiidae
7	Cattle Egret	*Bubulcus ibis*	Ardeidae
8	Great Egret	*Ardea alba*	Ardeidae
9	Oriental Darter	*Anhinga melanogaster*	Anhingidae
10	Grey Kestrel	*Falco ardosiaceus*	Falconidae
11	White-headed Vulture	*Trigonoceps occipitalis*	Accipitridae
12	Lizard Buzzard	*Kaupifalco monogrammicus*	Accipitridae
13	Marsh Sandpiper	*Tringa stagnatilis*	Scolopacidae
14	African Turtle Dove	*Streptopelia hypopyrrha*	Columbidae
15	Blue-breasted Kingfisher	*Halcyon malimbica*	Alcedinidae
16	African Grey Hornbill	*Lophoceros nasutus*	Bucerotidae

Mammals and Reptiles

Mammals and reptiles were less frequently encountered compared to birds, reflecting habitat disturbance and hunting pressure near correctional facilities. Direct sightings included the Common Agama (*Agama agama*), while local accounts confirmed the presence of Monitor Lizards (*Varanus niloticus*), Grasscutters (*Thryonomys swinderianus*), and other small mammals in farmlands and fallow areas.

Table 4.23: Common Wildlife Species in the Project Area

S/N	Common Name	Scientific Name	Family	Remarks
1	Bushbuck	*Tragelaphus scriptus*	Bovidae	Occasional in bushy patches
2	Patas Monkey	*Erythrocebus patas*	Cercopithecidae	Near riparian habitats
3	African Savanna Hare	*Lepus microtis*	Leporidae	Open fields and grasslands
4	Striped Ground Squirrel	*Xerus erythropus*	Sciuridae	Common near settlements
5	Warthog	*Phacochoerus africanus*	Suidae	Recorded in open savannas
6	African Giant Pouched Rat	*Cricetomys gambianus*	Nesomyidae	Burrowing rodent
7	Wild Cat	*Unidentified spp.*	Felidae	Rare, nocturnal
8	Maxwell's Duiker	*Philantomba maxwellii*	Bovidae	Forest patches
9	Grasscutter	*Thryonomys swinderianus*	Thryonomyidae	Near farmlands/wetlands

4.5 Land Use Pattern

4.5.1 Land Use Classification

The land use pattern within the proposed prison security video surveillance corridors reflects a mosaic of human settlements, institutional facilities, economic activities, and natural vegetation. Based on field surveys, satellite imagery analysis, and stakeholder consultations, the following categories of land use were identified:

- Residential Areas: Urban and peri-urban settlements, clustered family compounds, staff quarters, and roadside hamlets near correctional facilities.
- Mixed Use: Small-scale commerce integrated into residential areas, including roadside kiosks, workshops, and petty trading units.
- Commercial: Local markets, transport hubs, and trading posts, often located near access roads serving prison communities.
- Institutional: Correctional service facilities, schools, health centres, administrative offices, and security checkpoints.
- Agricultural: Subsistence and smallholder farming (maize, yam, cassava, rice, vegetables) as well as livestock grazing in peri-urban fringes.
- Forestry/Woodland: Remnants of savanna woodland, riparian vegetation, and in some locations, secondary forest patches.
- Industrial: Minimal presence, limited to small-scale processing facilities such as rice mills, block moulding, or cassava processing.
- Public/Open Space: Road reserves, community playing fields, grazing areas, and undeveloped land parcels.
- Recreational: Informal football fields, communal gathering spaces, and religious grounds in nearby settlements.

4.5.3 Land Use Context in Prison Environments

Land use within and around prison surveillance corridors is shaped by correctional service infrastructure and adjoining community dynamics:

- Prison Facilities and Institutional Land dominate, with surveillance installations concentrated within and along prison boundaries.
- Residential and Mixed-Use Settlements are often located near access roads, leading to interactions between project sites and host communities.
- Agricultural Land Use is widespread in peri-urban and rural correctional areas, where farmlands, grazing lands, and irrigation plots sometimes extend close to prison fences.
- Natural Vegetation Patches such as riparian forests, grasslands, or secondary regrowth occur in buffer zones, providing ecosystem services but also sensitive habitats.

4.6 Socio-Economic Conditions

The socio-economic study was undertaken to establish the baseline social, cultural, livelihood, and economic conditions of the settlements and communities located within and around the proposed project sites for the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution by the Federal Ministry of Interior.

The assessment involved the collection and evaluation of both primary and secondary data covering the following parameters:

- Population Demographics: Household sizes are relatively large, often comprising extended families, with age and gender structures reflecting youthful populations. Settlement patterns are clustered around prison facilities, peri-urban nodes, and access roads.
- Livelihoods and Occupations: Subsistence farming, petty trading, livestock rearing, food vending, and artisanal services dominate livelihoods. In urban and peri-urban settings, small-scale commerce, civil service, transport, and casual labour provide additional income sources.
- Income and Employment Levels: Income levels are generally low and seasonal, tied to agriculture and informal economic activities. Formal employment opportunities are limited, though correctional facilities, security services, and public institutions provide modest wage employment in some locations.
- Education and Literacy: Primary and secondary schools are present in most host communities, but access and quality vary. Rural and peri-urban areas record lower literacy levels compared to urban centres, with high pupil-to-teacher ratios and limited infrastructure in public schools.
- Health and Infrastructure: Access to healthcare services is inadequate, especially in peri-urban and rural host communities. Most residents depend on small health posts, patent medicine vendors, and traditional medicine. Basic social infrastructure, potable water, sanitation, electricity, and road access is often insufficient or unreliable.
- Housing: Residential structures are modest, built largely with mud blocks, zinc sheets, or thatch, though peri-urban zones around prisons feature increasing numbers of cement-block houses. Overcrowding is common in larger households.
- Cultural and Social Structure: Communities are organized along ethnic and kinship lines, with traditional leaders, religious institutions, and local councils serving central roles in governance, conflict resolution, and social cohesion.
- Land Use and Resources: Agricultural land, grazing fields, and communal woodlots dominate land use in rural and peri-urban areas, while small roadside markets and trading posts support local commerce. Urban prison corridors feature mixed

residential and institutional land uses, with some degree of informal economic activity.

4.6.1 Overview of the Communities

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, implemented by the Federal Ministry of Interior, will involve the installation of video surveillance systems at strategic correctional centers across the country. Each installation site has a defined area of influence (1–2 km radius) within which host communities, livelihoods, and socio-economic interactions may be directly or indirectly affected.

Socio-economic conditions of the host communities are largely characterized by:

- Agriculture and Livelihoods: Subsistence farming, petty trading, and informal services dominate surrounding settlements.
- Urban and Semi-Urban Influence: Correctional centers located in cities are embedded within urban economies, while rural prisons are surrounded by agrarian communities.
- Infrastructure Gaps: Despite proximity to institutional facilities, many host communities face challenges such as poor road access, inadequate electricity, and weak healthcare delivery.
- Social Cohesion: Communities around correctional centers remain organized along kinship, ethnic, and traditional structures, with local leadership institutions central to governance and dispute resolution.

Table 4.24: Prisons and Host Communities

No.	Correctional Center / Prison Facility	State	Host Community (Nearest Town/Area)	Socio-Economic Features
1	Federal Prison (Medium Security), Kuje	Abuja (FCT)	Kuje Town	Peri-urban settlement; farming, trading, rapid population growth
2	Federal Prison (Medium Security), Dukpa Farm Center	Abuja (FCT)	Dukpa Village (Gwagwalada Area Council)	Small agrarian settlement; subsistence farming, petty trade
3	Federal Prison (Medium Security), Aba	Abia	Aba Urban Communities	Major commercial hub; trading, manufacturing, and transport services
4	Federal Prison (Medium Security), Arochukwu	Abia	Arochukwu Town	Borderline agrarian community; farming and small-scale trade
5	Federal Prison (Medium Security), Aguata	Anambra	Ekwulobia/Aguata LGA Communities	Farming (yam, cassava), petty commerce, semi-urban features
6	Federal Prison (Medium Security), Awka	Anambra	Awka Capital Territory	State capital; higher institutions, services, commerce
7	Federal Maximum-Security Prison, Nnewi	Anambra	Nnewi Urban	Industrial and trading hub, motor spare parts market
8	Federal Prison (Medium Security), Onitsha	Anambra	Onitsha Metropolis	Major trading city; wholesale/retail commerce, transport corridor
9	Federal Prison (Medium Security), Abak	Akwa Ibom	Abak Town	Semi-urban settlement; petty trade, farming
10	Federal Prison (Medium Security), Uyo	Akwa Ibom	Uyo Metropolis	State capital; services, commerce, civil service
11	Federal Prison (Medium Security), Bauchi	Bauchi	Bauchi Town	State capital; government services, trade, farming outskirts
12	Alkaleri Satellite Prison	Bauchi	Alkaleri Town	Agrarian community; farming, petty livestock
13	Federal Prison (Medium Security), Azare	Bauchi	Azare Town	Semi-urban town; trading, farming, education
14	Federal Prison (Medium Security), Misau	Bauchi	Misau Town	Agro-based settlement; trading and livestock rearing

15	Federal Maximum-Security Prison, Jama'are	Bauchi	Jama'are Town	Riverine settlement; rice farming, fishing, trading
16	Federal Prison (Medium Security), Ningi	Bauchi	Ningi Town	Agrarian base; small-scale trading and crafts
17	Federal Prison (Medium Security), Okaka	Bayelsa	Okaka Community (Yenagoa)	Urban settlement; fishing, trading, and civil service
18	Federal Prison (Medium Security), Makurdi	Benue	Makurdi Metropolis	State capital; farming, trading, civil service
19	Federal Prison (Medium Security), Gboko	Benue	Gboko Town	Major yam market; farming, trade
20	Federal Prison (Medium Security), Otukpo	Benue	Otukpo Town	Trading town; cassava, yam farming
21	Federal Prison (Medium Security), Calabar	Cross River	Calabar South Community	State capital; commerce, services, tourism
22	Federal Prison (Medium Security), Ikom	Cross River	Ikom Town	Cocoa farming, petty trading, cross-border commerce
23	Federal Prison (Medium Security), Obubra	Cross River	Obubra Town	Farming-based; yam, cassava
24	Federal Prison (Medium Security), Obudu	Cross River	Obudu Town	Agrarian economy, trading, tourism (Obudu Plateau)
25	Federal Prison (Medium Security), Ogoja	Cross River	Ogoja Town	Agrarian and semi-urban; trade, farming
26	Federal Prison (Medium Security), Agbor	Delta	Agbor Town	Trading hub, farming (cassava, yam)
27	Federal Prison (Medium Security), Warri (Okere)	Delta	Warri Metropolis	Oil economy, industry, commerce
28	Federal Prison (Medium Security), Abakaliki	Ebonyi	Abakaliki Town	State capital; rice farming, trading, services
29	Federal Prison (Medium Security), Nsukka	Enugu	Nsukka Town	University town; farming, petty trade
30	New Benin & Old Benin Prisons	Edo	Benin City Metropolis	State capital; commerce, culture, services
31	Federal Prison (Medium Security), Auchi	Edo	Auchi Town	Semi-urban; trade, farming, institutions
32	Federal Prison (Medium Security), Ado-Ekiti	Ekiti	Ado-Ekiti Town	State capital; commerce, services
33	Federal Prison (Medium Security), Owerri	Imo	Owerri Metropolis	State capital; trade, education, hospitality
34	Federal Prison (Medium Security), Gumel	Jigawa	Gumel Town	Agrarian community; trading
35	Federal Prison (Medium Security), Kano Central	Kano	Kano Metropolis	Major commercial/industrial hub
36	Federal Prison (Medium Security), Katsina	Katsina	Katsina Metropolis	State capital; trade, farming
37	Maximum Security Prison, Funtua	Katsina	Funtua Town	Semi-urban; trade, farming
38	Federal Prison (Medium Security), Argungu	Kebbi	Argungu Town	Fishing and farming; famous Argungu festival
39	Federal Prison (Medium Security), Yelwa-Yauri	Kebbi	Yauri/Yelwa Town	Riverine economy; fishing, farming
40	Federal Prison (Medium Security), Zuru	Kebbi	Zuru Town	Agrarian and trading town
41	Federal Prison (Medium Security), Ilorin	Kwara	Ilorin Metropolis	State capital; trading, farming outskirts
42	Federal Maximum-Security Prison, Omu-Aran	Kwara	Omu-Aran Town	Agrarian and commercial
43	Federal Prison (Medium Security), Ikoyi	Lagos	Ikoyi (Lagos Island)	Urban economy, commerce
44	Kirikiri Prisons	Lagos	Apapa/Kirikiri	Industrial hub, fishing, urban slums

	(Maximum & Medium)		Communities	
45	Federal Prison (Medium Security), Badagry	Lagos	Badagry Town	Coastal settlement; fishing, cross-border trade
46	Federal Prison (Medium Security), Lafia	Nasarawa	Lafia Town	State capital; trading, farming
47	Federal Prison (Medium Security), Keffi	Nasarawa	Keffi Town	Educational hub, trade
48	Federal Prison (Medium Security), Akure	Ondo	Akure Metropolis	State capital; trade, civil service
49	Federal Prison (Medium Security), Ogbomosho	Oyo	Ogbomosho Town	Agrarian and semi-urban economy
50	Federal Prison (Medium Security), Jos	Plateau	Jos Metropolis	State capital; mining, trade, education
51	Federal Prison (Medium Security), Port Harcourt	Rivers	Port Harcourt Metropolis	Oil city; commerce, services
52	Federal Prison (Medium Security), Sokoto	Sokoto	Sokoto City	State capital; trade, farming
53	Federal Prison (Medium Security), Jalingo	Taraba	Jalingo Town	State capital; farming, trade
54	Federal Prison (Medium Security), Gembu	Taraba	Gembu Town (Sardauna Plateau)	Highland farming, livestock

4.6.2 Methodology

The socio-economic baseline study for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution was undertaken using a multi-method approach, combining primary data collection, field observations, participatory consultations, and secondary data review. The approach ensured adequate coverage of prison host communities across the six geopolitical zones of Nigeria, where surveillance installations will be sited.

The methodology was designed to capture both quantitative household-level indicators (e.g., income, employment, literacy, housing) and qualitative perceptions (e.g., security concerns, cultural systems, community expectations), thereby producing a balanced and comprehensive socio-economic profile.

4.6.2.1 Structured Household Questionnaires

Household questionnaires formed the primary data backbone of the survey. They were structured to capture:

- Demographic characteristics: age, gender, marital status, education level, household size, and dependency ratios.
- Economic activities: subsistence farming, small-scale trading, formal employment, artisanal work, and informal livelihoods within correctional host settlements.
- Access to social services: healthcare, education, water supply, electricity, sanitation, and housing conditions.
- Perceptions of security and justice: views on prison proximity, government presence, community–security relations, and anticipated benefits/concerns regarding surveillance.

To ensure proportional representation, the number of questionnaires administered was determined by projected host community population sizes (2025), with weighting across the six geopolitical zones (see Table 4.25).

- Total Questionnaires Administered: 3,560
- Total Questionnaires Retrieved: 3,169
- Overall Response Rate: 89.1%

Table 4.25: Questionnaires Administered and Retrieved Across Prison Host Communities (2025 Projection)

Geopolitical Zone	Key Prison Host Communities (Representative States)	Questionnaires Administered	Questionnaires Retrieved	Response Rate (%)
North-Central	Abuja (Kuje, Dukpa), Benue (Makurdi, Gboko, Otukpo), Kogi (Lokoja, Kabba, Okene), Kwara (Ilorin, Omu-Aran), Plateau (Jos, Pankshin, Shendam), Nasarawa (Keffi, Lafia)	**520**	**464**	**89.2**
North-West	Kano (Central, Goron Dutse, Bichi, Rano), Katsina (Katsina, Funtua, Daura), Kaduna (Kaduna, Zaria), Sokoto (Sokoto), Kebbi (Birnin Kebbi, Argungu, Yauri, Zuru), Jigawa (Dutse, Hadejia, Kazaure)	**620**	**552**	**89.0**
North-East	Borno (Maiduguri), Bauchi (Bauchi, Azare, Misau, Jama'are), Gombe (Gombe, Tula, Bajoga), Taraba (Jalingo, Gembu, Takum), Adamawa (Yola, Mubi), Yobe (Potiskum, Gashua)	**520**	**462**	**88.8**
South-East	Enugu (Nsukka, Enugu Urban, Ibite-Olo), Abia (Aba, Arochukwu), Anambra (Awka, Onitsha, Nnewi, Aguata), Ebonyi (Abakaliki, Afikpo), Imo (Owerri, Okigwe, Orlu)	**560**	**498**	**89.0**
South-South	Rivers (Port Harcourt, Ahoada, Degema), Cross River (Calabar, Ikom, Obudu, Ogoja), Delta (Warri, Agbor, Kwale, Sapele), Edo (Benin, Auchi, Ubiaja), Bayelsa (Yenagoa), Akwa Ibom (Uyo, Ikot Ekpene, Abak)	**600**	**534**	**89.0**
South-West	Lagos (Kirikiri, Ikoyi, Badagry), Oyo (Ibadan/Agodi, Ogbomosho), Ondo (Akure, Owo, Okitipupa), Ogun (Abeokuta, Ijebu-Ode, Sagamu), Ekiti (Ado-Ekiti), Osun (Osogbo, Ilesa)	**740**	**659**	**89.1**
TOTAL		**3,560**	**3,169**	**89.1**

Projections derived from NPC (2006) with 2.83% annual growth and urban adjustments.

Response rates were slightly higher in urban/metropolitan centers (e.g., Lagos, Kano, Port Harcourt, Ibadan) compared to rural host communities, where literacy and accessibility challenges limited full retrieval.

4.6.2.2 Community Surveys and Site Inspections

Field surveys were conducted at selected correctional centers and surrounding host communities, providing first-hand data on infrastructure, land use, and socio-economic conditions. The surveys included:

- Mapping of infrastructure: schools, health posts, water points, electricity access, markets, and police/security posts.
- Settlement morphology: identifying urban, peri-urban, and rural prison host communities (e.g., Kuje, Aba, Makurdi, Kano, Port Harcourt, etc.).

- Livelihood-environment interactions: farming on prison peripheries, street trading near prison gates, informal transport hubs, and petty commercial activities linked to prison staff/residents.

These site inspections also validated questionnaire data and highlighted sensitive land-use zones where surveillance installations might interact with community assets.

4.6.2.3 Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs)

Participatory techniques were applied to capture community voices and perceptions:

- Focus Group Discussions (FGDs): Held in clusters of 10–15 participants, including women, youths, traders, artisans, traditional rulers, and religious leaders. Discussions centered on:
  - Livelihood challenges and opportunities around prison host areas.
  - Community–security relations, perceptions of safety, and trust in institutions.
  - Expectations regarding CSR (Corporate Social Responsibility) initiatives such as schools, clinics, boreholes, and employment.
  - Concerns about land take, displacement of roadside businesses, and access restrictions during project execution.
- Key Informant Interviews (KIIs): Conducted with prison officials, local government officers, health and education administrators, security personnel, and civil society representatives. These provided policy perspectives and operational insights on the project's socio-economic implications.

This participatory approach ensured inclusive coverage of marginalized voices, especially women and youths, who are often excluded from formal governance structures but remain central to livelihood and household economies in prison host communities.

4.6.2.4 Secondary Data Sources

Primary data were complemented by secondary information from:

- National Population Commission (NPC, 2006 Census).
- National Bureau of Statistics (NBS) reports (2020–2023).
- Nigeria Correctional Service annual reports.
- Academic and policy studies on prison host communities and urban poverty.
- Reports from NGOs, donor agencies, and local government development plans.
- Security and justice sector studies by international organizations (UNODC, ICRC, World Bank).

This triangulation enhanced validity and provided comparative benchmarks for interpreting field results.

4.6.2.5 Sampling Procedure

To estimate the Prison host communities populations, projections were computed using the formula:

Pn=Po(1+r)nP_n = P_o (1 + r)^nPn=Po(1+r)n

Where:

- PnP_nPn = Projected Population in 2025
- PoP_oPo = Base Year Population (2006 NPC Census)
- rrr = National growth rate (2.83% per annum)

- nnn = Number of years between base and projected year

The sample size of 3,560 households was distributed proportionally across the six geopolitical zones (see Table 4.25). A stratified random sampling technique was applied to capture urban prisons (e.g., Kirikiri, Ikoyi, Port Harcourt, Kano Central), peri-urban prisons (e.g., Kuje, Makurdi, Ilorin, Lafia), and rural prisons (e.g., Takum, Ikom, Zuru, Ubiaja).
This ensured balanced representation of diverse prison host contexts while avoiding concentration in heavily urbanized zones.

4.6.3 Demographic Characteristics

The demographic profile of host communities surrounding correctional centers reflects Nigeria's broader diversity in terms of settlement structure, cultural composition, and population density. Data were drawn from the National Population Commission (NPC, 2006 Census), projections using a 3.2% annual growth rate (NPC/World Bank, 2022), and information obtained from household surveys, field inspections, and community consultations undertaken during this study.

4.6.3.1 Population Size and Distribution

Population dynamics around prison host communities vary significantly depending on whether the correctional facility is located in urban, peri-urban, or rural areas.

- Urban prison host communities (e.g., Kirikiri–Apapa in Lagos, Ikoyi, Port Harcourt, Kano Central, Onitsha, Owerri, Benin City, and Ibadan) are characterized by high population densities, larger household sizes, and intense socio-economic activities such as trading, transport, and service provision. These communities often exceed 2–5 million residents in their metropolitan catchments.
- Peri-urban host communities (e.g., Kuje–Abuja, Makurdi, Ilorin, Lafia, Nsukka, and Ubiaja) reflect mixed settlement structures with medium densities (300–600 persons/km²) and populations ranging from 150,000 to 500,000, driven by administrative roles, farming, and service provision.
- Rural prison host communities (e.g., Takum, Gembu, Zuru, Afikpo, Kwale, and Ubiaja satellite centers) exhibit smaller settlement sizes (2,000–15,000 residents), low density (70–150 persons/km²), and strong dependence on subsistence agriculture, petty trade, and seasonal migration.

Table 4.26: Population Size and Settlement Distribution in Selected Prison Host Communities

Cluster / Zone	Estimated Population (2025 projections)	Settlement Characteristics	Population Density	Key Observations
FCT (Kuje, Dukpa, Abuja)	~1.2–1.5 million (Kuje & Gwagwalada Area Councils)	Peri-urban growth poles, government workers, farming & trading	350–450 persons/km²	Expanding peri-urban corridor; pressure on land and services due to Abuja spillover
South-East (Aba, Awka, Nnewi, Onitsha, Nsukka, Abakaliki, Owerri)	~8–9 million (urban/metropolitan LGAs)	Dense commercial/industrial towns, mixed peri-urban settlements	600–1,200 persons/km²	Densely populated; prison host areas integrated with major trade & transport corridors

South-South (Calabar, Port Harcourt, Sapele, Warri, Yenagoa, Uyo, Ogwashi-Ukwu)	~7.5–8 million	Coastal/rainforest cities, trading hubs, fishing & oil-related settlements	500–850 persons/km²	Vibrant trade, high urban poverty; infrastructure under strain
South-West (Lagos–Kirikiri, Ikoyi, Badagry, Ibadan–Agodi, Ogbomosho, Akure, Ado-Ekiti)	~15–17 million (Lagos metro alone ~12m)	Metropolitan clusters, roadside commerce, high mobility	1,200–2,500 persons/km²	Densest host population; prisons embedded in mega-urban fabric
North-Central (Makurdi, Ilorin, Lafia, Lokoja, Koton-Karfe, Jos, Minna)	~6.5–7 million	Medium-density towns with farming & administrative economy	250–500 persons/km²	Peri-urban mix; prisons located near state capitals & trade corridors
North-West (Kano, Katsina, Kebbi–Birnin Kebbi/Argungu, Sokoto, Zaria, Kaduna)	~12–13 million	Large Islamic/trading cities with surrounding agrarian settlements	450–900 persons/km²	Kano Central & Goron Dutse among the busiest correctional host zones
North-East (Gombe, Bauchi, Jalingo, Gembu, Yola, Damaturu, Maiduguri)	~8–9 million	Savannah & highland towns, scattered rural host settlements	120–300 persons/km²	Lower densities in highlands (Gembu), higher clustering in state capitals

Sources: NPC (2006); World Bank (2022); NBS (2023); Project Field Estimates (2025).

Key Observations

- Urban Concentration: South-West (Lagos, Ibadan) and South-East (Onitsha, Aba, Owerri) host some of the most densely populated correctional zones, with settlements integrated into metropolitan economic activities.
- Peri-Urban Growth: Abuja (Kuje, Dukpa), Makurdi, and Ilorin reflect expanding peri-urban settlements, with spillover effects from capital cities increasing land and service pressure.
- Rural Isolation: Facilities such as Gembu (Taraba), Ubiaja (Edo), and Afikpo (Ebonyi) are located in remote or rural host communities, with low densities and weak access to infrastructure.
- Regional Inequalities: South-West and South-East zones are heavily urbanized and commercially vibrant, while North-East host areas remain sparsely populated with weaker socio-economic resilience.

Age Structure

The demographic profile of host communities around correctional facilities is markedly youth-dominated, consistent with Nigeria's broader population trends. Field surveys and projections indicate the following age distribution:

- Children (0–14 years): Approximately 40% of the population, reflecting high fertility rates and household dependency burdens. This group exerts pressure on available schools, healthcare, and nutrition services.

- Youth (15–35 years): About 34%, representing the most active and energetic segment of the population. They form the primary labor force for farming, trading, artisanal work, and transport services. However, unemployment and underemployment within this group remain high, increasing their vulnerability to social vices and insecurity.
- Adults (36–59 years): Roughly 20%, mainly responsible for sustaining households through farming, commerce, civil service, and small-scale enterprises. They also constitute the key decision-makers within families and communities.
- Elderly (60 years and above): Less than 7%, reflecting low life expectancy and limited access to pensions or social security. They depend largely on family and communal support systems.

This youth bulge and high dependency ratio have major socio-economic implications: increasing demand for schools, healthcare, and jobs, while also heightening risks of poverty and migration when opportunities are scarce.

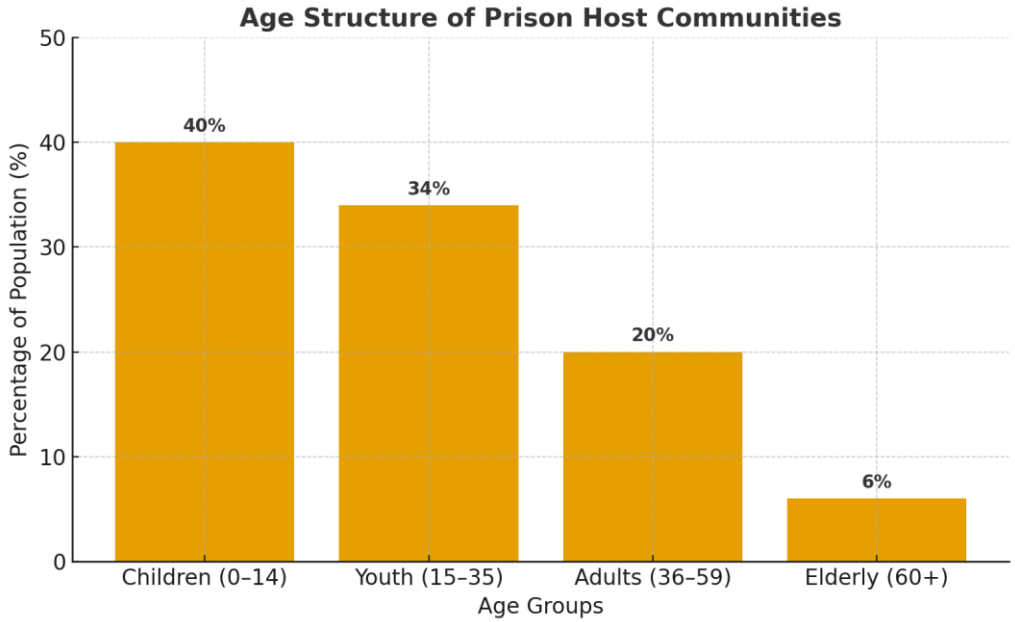

Figure 4.19: Age Structure of Prison Host Communities

Gender Composition

The gender distribution across prison host communities is nearly balanced, with men accounting for about 52% of the population and women 48%. The slight male predominance is linked to seasonal migration and employment opportunities associated with urban centers where many correctional facilities are located. Men are more engaged in wage labor, farming in peri-urban areas, artisanal trades, security services, and commercial transport activities.

Women, on the other hand, remain central to household sustenance and community resilience. They are predominantly involved in petty trading, food vending, tailoring, subsistence farming, and small-scale processing (e.g., cassava, grains, vegetables). Their contribution ensures food security, supports household income, and strengthens local market systems around correctional facilities.

This gender balance highlights the importance of inclusive project planning, ensuring that both men and women benefit equitably from employment opportunities, capacity-building initiatives, and community support programs associated with the surveillance project.

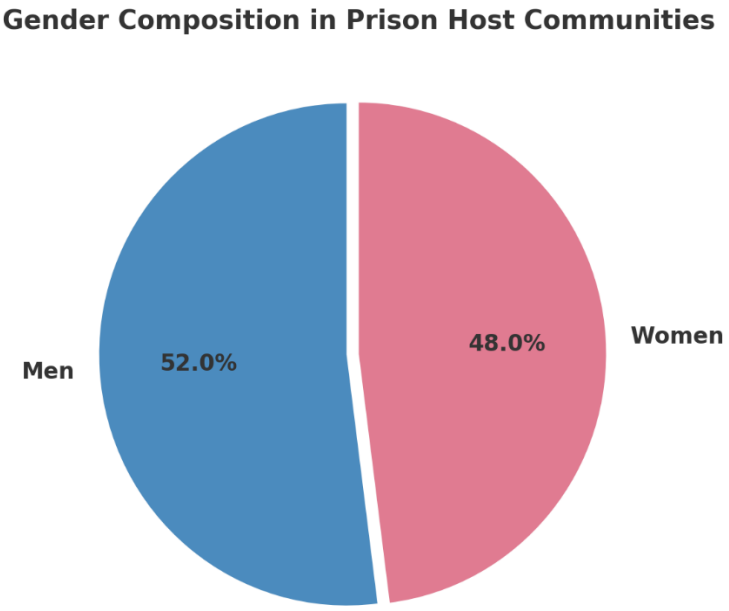

Figure 4.20: Gender Distribution in Prison Host Communities

Household Size

Household size within prison host communities is generally larger than Nigeria's national urban average (4–5 persons per household, NBS 2022). Surveys and secondary data show that host communities around correctional centers record average household sizes between 5 and 9 persons (figure 4.21) depending on whether the prison is located in an urban or rural/peri-urban setting.

- Urban host communities (e.g., Kirikiri, Ikoyi, Port Harcourt Township, Onitsha, Enugu, Benin City, Aba) average 5–6 persons per household. These areas are more urbanized, with nuclear families increasingly common, though extended kin are still present.
- Semi-urban and peri-urban host communities (e.g., Kuje in Abuja, Agodi in Ibadan, Owerri, Lokoja, Ilorin) average 6–7 persons per household, reflecting a mix of nuclear and extended family systems.
- Rural host communities (e.g., Dukpa in Abuja, Ubiaja in Edo, Obubra in Cross River, Gembu in Taraba, Ningi in Bauchi) average 7–9 persons per household, driven by polygamous unions, extended kinship households, and subsistence agricultural lifestyles.

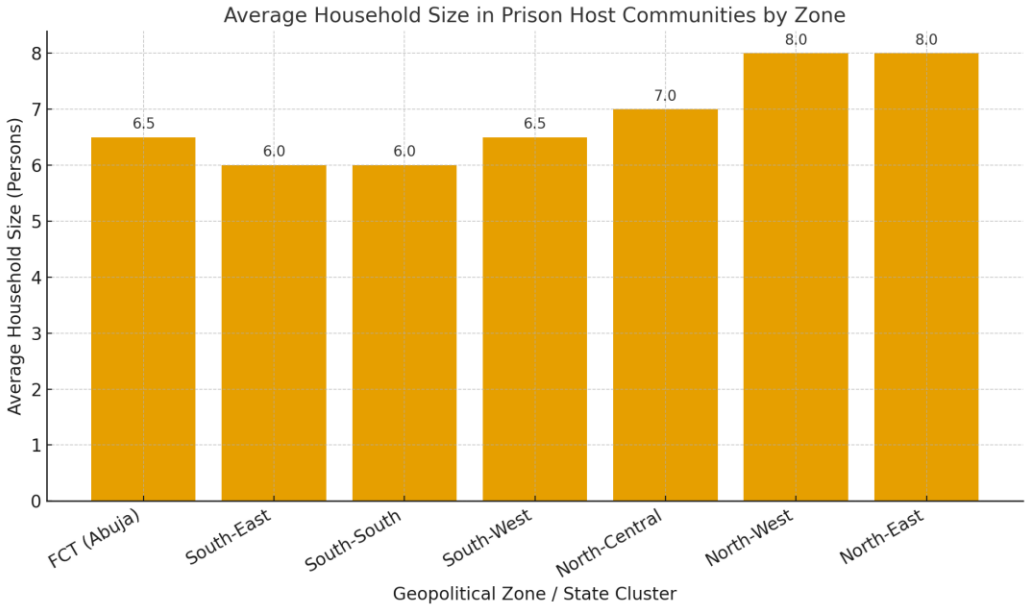

Figure 4.21: Average Household Size in Prison Host Communities by Zone

Ethnic and Cultural Diversity

The host communities surrounding Nigeria's Prisons are culturally diverse, reflecting the country's broader ethnic composition. Major ethnic groups such as Hausa-Fulani, Yoruba, and Igbo dominate urban prison locations (e.g., Kano, Lagos, Enugu, Onitsha, Aba, Ibadan), while minority ethnic groups, including Tiv, Idoma, Efik, Ejagham, Itsekiri, Ijaw, Nupe, Ebira, Jukun, and Mambilla, are prevalent in other prison host areas.

Prison host communities typically mirror their immediate regional cultures:

- Northern host communities are strongly influenced by Hausa-Fulani traditions, Islamic scholarship, and pastoralist networks.
- South-West host communities (e.g., Ibadan, Kirikiri, Akure) reflect Yoruba cultural institutions, festivals, and markets.
- South-East host communities (e.g., Aba, Enugu, Onitsha, Awka) are rooted in Igbo culture, entrepreneurship, and kinship systems.
- South-South host communities (e.g., Calabar, Warri, Yenagoa, Port Harcourt) display cultural pluralism, blending minority groups (Efik, Ibibio, Ijaw, Urhobo) with strong maritime traditions.
- North-Central and Plateau host communities (e.g., Jos, Lafia, Makurdi) are multi-ethnic mosaics, including Tiv, Idoma, Berom, and others, reflecting historical migration and settlement diversity.

The distribution of dominant ethnic groups across host communities is illustrated in Figure 4.14. This diversity is not just cultural but socio-economic, as kinship systems, language, festivals, and inter-communal ties shape local acceptance of prison facilities and influence engagement strategies.

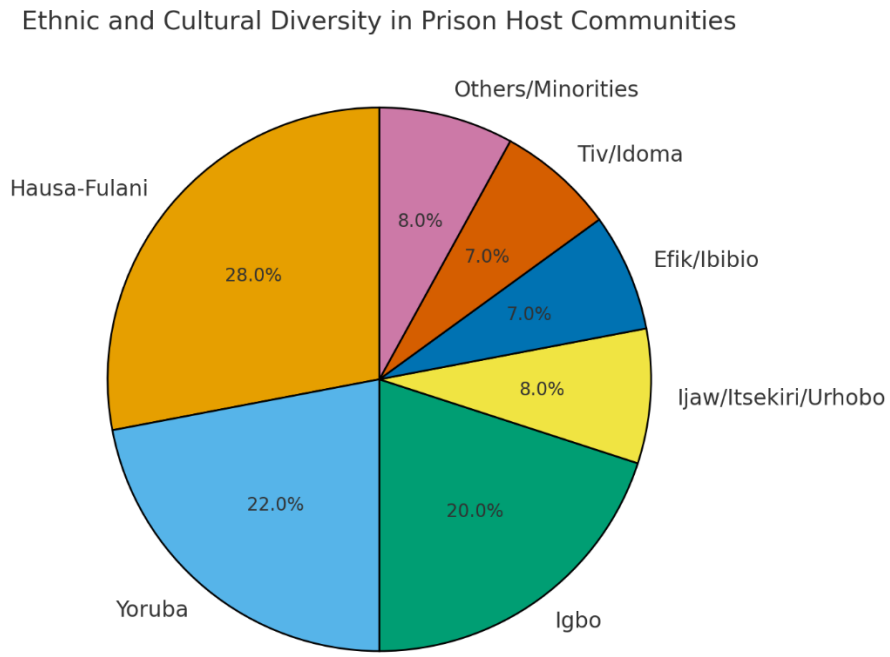

Figure 4.22: Ethnic and Cultural Diversity in Prison Host Communities

Religious Affiliation

Religion plays a central role in shaping the socio-cultural fabric of prison host communities across Nigeria. Islam and Christianity are the dominant faiths, often coexisting within the same settlements surrounding correctional facilities. In many northern prison communities, Islam is more prevalent due to historical, cultural, and demographic ties, while Christianity is widespread in southern and middle-belt prison host areas, where churches frequently serve as both religious and community mobilization centers. Traditional belief systems remain relevant in several host communities, where ancestral shrines, rituals, and indigenous practices continue to influence social cohesion and communal decision-making. These belief systems often coexist alongside Christianity and Islam, creating a pluralistic religious landscape. Religious institutions, including mosques, churches, and shrines are not only places of worship but also function as social hubs. They reinforce moral order, support education, provide platforms for dispute resolution, and strengthen community identity and cohesion around prison host environments.

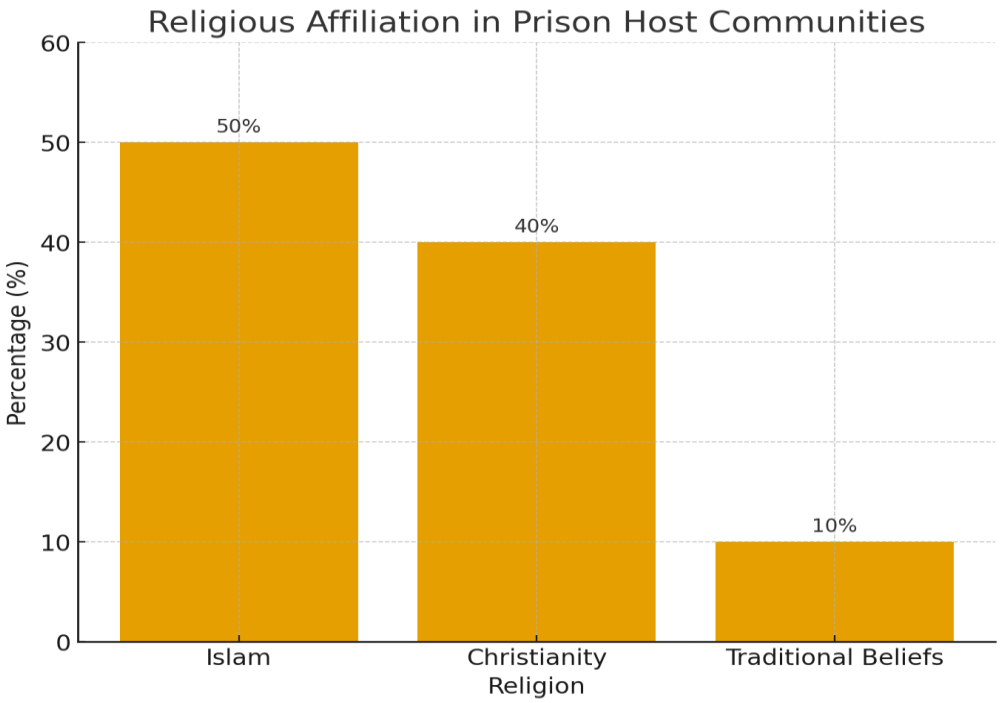

Figure 4.23: Religious Affiliation in Host Communities

Gender Roles and Vulnerable Groups

Gender roles within prison host communities are shaped by traditional norms, religious influences, and the socio-economic conditions surrounding correctional facilities. Men predominantly occupy decision-making positions in local governance and community leadership, and they engage in farming, transport services, construction, and security-related activities. Women, on the other hand, sustain household livelihoods through subsistence farming, petty trading, food processing, fuelwood gathering, and informal services around prison host towns. Despite their central role in family and community sustenance, women's contributions are often undervalued due to limited land ownership rights, weak access to credit, and exclusion from formal decision-making platforms.

Women and Livelihoods

- Women ensure household food security through small-scale farming (cassava, maize, yam, vegetables) and rearing livestock (goats, poultry).
- They play a vital role in market activities around correctional centers, engaging in roadside trading, food vending, and small-scale processing.
- Fuelwood fetching, water collection, and domestic care tasks remain significant burdens, exposing them to drudgery and health risks.
- Women's cooperative groups and informal savings associations strengthen resilience, but access to formalized economic opportunities remains limited.

Youth

- Young people (15–35 years) represent a significant proportion of the prison host communities' population but face high unemployment and underemployment.
- Many youths work as motorcycle riders ("okada"), artisans, petty traders, and casual laborers during prison construction or support activities.

- Some educated youths secure work in teaching, ICT, or administrative services in nearby urban centers.
- Limited opportunities expose youths to vulnerability, including drug use, involvement in petty crime, or risky migration in search of income.

Children

- Children provide domestic support and assist in farming, hawking, and petty trading, often at the expense of consistent school attendance.
- Child labor persists in rural host areas, particularly in fuelwood gathering, water collection, and market activities.
- Weak access to healthcare and nutrition exposes children to high risks of malnutrition, stunting, and preventable illnesses.

Elderly and Persons with Disabilities (PWDs)

- The elderly depend on extended family support as formal social protection systems are weak.
- PWDs experience discrimination, limited access to infrastructure and services, and exclusion from community participation, making them highly vulnerable.

4.6.4 Household Characteristics (Housing, Land Tenure, and Income)

Household characteristics within prison host communities reflect a blend of urban–peri-urban conditions, cultural practices, and socio-economic realities. These characteristics provide insights into the living standards, poverty dynamics, and vulnerabilities of communities situated around correctional facilities that may be influenced by the surveillance project.

1. Housing

- In urban centers where most medium- and maximum-security prisons are located (e.g., Abuja, Lagos, Enugu, Port Harcourt), housing structures are predominantly permanent cement-block walls, corrugated iron or aluminum roofing, and concrete flooring.
- In peri-urban and rural host areas, housing quality declines, with semi-permanent or temporary structures (mud walls, zinc or thatch roofing, bare earth floors). Informal housing clusters are common near prisons, where staff, petty traders, and relatives of inmates reside.
- National data show that about 65% of rural households live in non-permanent housing, compared to 28% in urban centers (NBS, 2020).
- Overcrowding is widespread: average household sizes range from 6–9 persons, higher than Nigeria's national average of 4.6 persons (NDHS, 2018). This reflects extended family systems, polygamous unions, and the influx of relatives or traders around prison towns.

2. Land Tenure

- Land ownership in prison host communities is primarily governed by customary tenure systems, where traditional rulers, family heads, or community elders allocate land.
- Men remain the dominant landholders, while women access land mainly through male relatives (husbands, fathers, or brothers).

- Formal land titles (Certificates of Occupancy, C of O) are more common in urban prison locations (e.g., Abuja, Lagos, Enugu), but in peri-urban and rural host communities, less than 20% of households hold legal titles.
- Land disputes are frequent in peri-urban areas where prison facilities expand, often linked to acquisition of farmland and communal land.

3. Household Income and Livelihood Sources

- Household incomes differ markedly between urban/metropolitan prison communities and rural/peri-urban host settlements.
    - Urban prison host communities (e.g., Abuja–Kuje, Lagos–Kirikiri, Port Harcourt, Enugu): Incomes are derived from public service, trading, transport businesses, construction, and small-to-medium enterprises.
    - Rural and peri-urban prison host communities: Livelihoods are sustained by subsistence farming, food vending, petty trading, artisanal crafts, and seasonal labor linked to prison staff demands.
- **Average household monthly income (adjusted for inflation, 2024 estimates):**
    - Abuja (Kuje/Dukpa): ₦85,000 – ₦110,000.
    - Lagos (Ikoyi, Kirikiri, Badagry): ₦95,000 – ₦120,000.
    - Enugu/Abia (Nsukka, Aba, Awka corridors): ₦70,000 – ₦90,000.
    - Rivers/Delta (Port Harcourt, Warri, Sapele): ₦75,000 – ₦95,000.
    - Kebbi, Taraba, Bauchi (rural host communities): ₦40,000 – ₦60,000.
- Incomes are highly seasonal and volatile, tied to agricultural cycles and informal trading. Planting seasons bring low cash flow, while harvest periods temporarily improve liquidity.
- A significant proportion of rural prison host households live below the national poverty line of ₦137,430 per year (NBS Poverty Report, 2020), reflecting high socio-economic vulnerability.

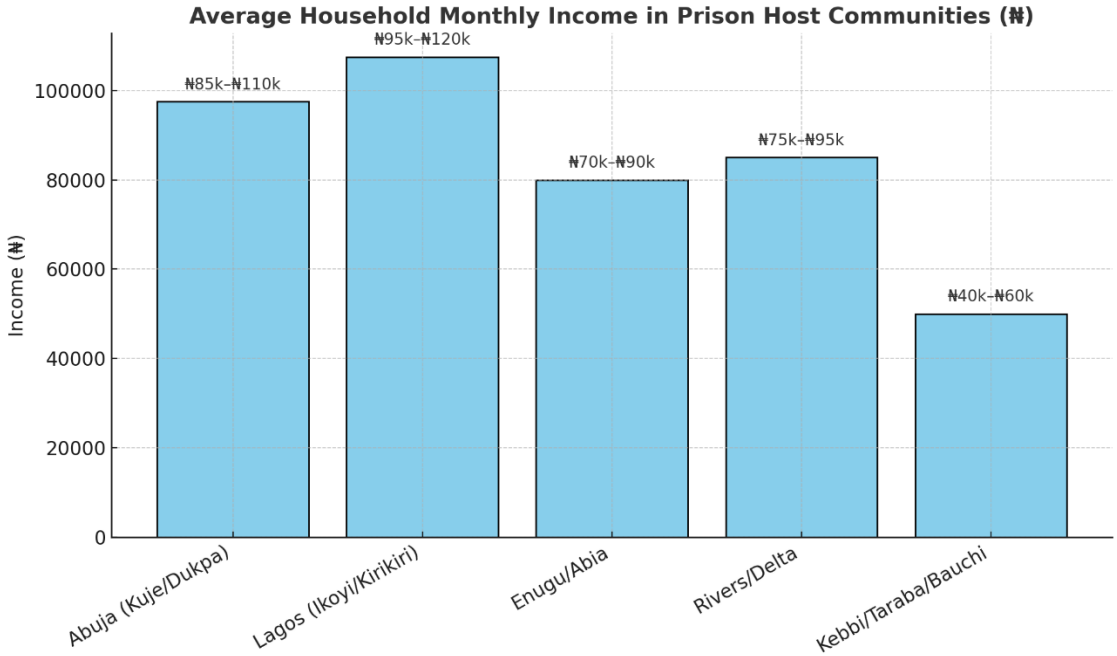

Figure 4.24: Average Monthly Household Income

4.6.5 Occupation

The socio-economic survey revealed that the host communities of correctional facilities under the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution are characterized by diverse livelihood activities, though largely agrarian in the rural zones and more service-oriented in peri-urban and urban prison host areas.

- **Farming:** Farming remains the dominant occupation in rural prison host communities, with households engaging in subsistence and small-scale commercial production. Staple crops include cassava, yam, maize, cocoyam, and rice, which are consumed locally and marketed in nearby towns.
- **Livestock Rearing:** Rearing of cattle (mainly by Fulani pastoralists), goats, sheep, and poultry contributes significantly to income and nutrition, with livestock also serving cultural and ceremonial roles.
- **Trade and Services:** Petty trading in farm produce, foodstuffs, and household items is widespread, particularly in prison-adjacent settlements where weekly markets serve as hubs of exchange. Informal services such as tailoring, fuelwood vending, food vending, and motorcycle transport ("okada") provide supplementary livelihoods.
- **Civil and Public Service:** In urban host communities such as those around state capitals and major towns, a sizeable population is engaged in civil service employment, transport services, and small enterprises.
- **Artisanship:** Carpenters, masons, mechanics, welders, and other artisans support the local economy and contribute to prison infrastructure maintenance needs.
- **Professional Services:** A limited but significant presence of teachers, healthcare workers, and ICT professionals exists in larger host towns and correctional centers, providing essential services to both the community and prison staff populations.

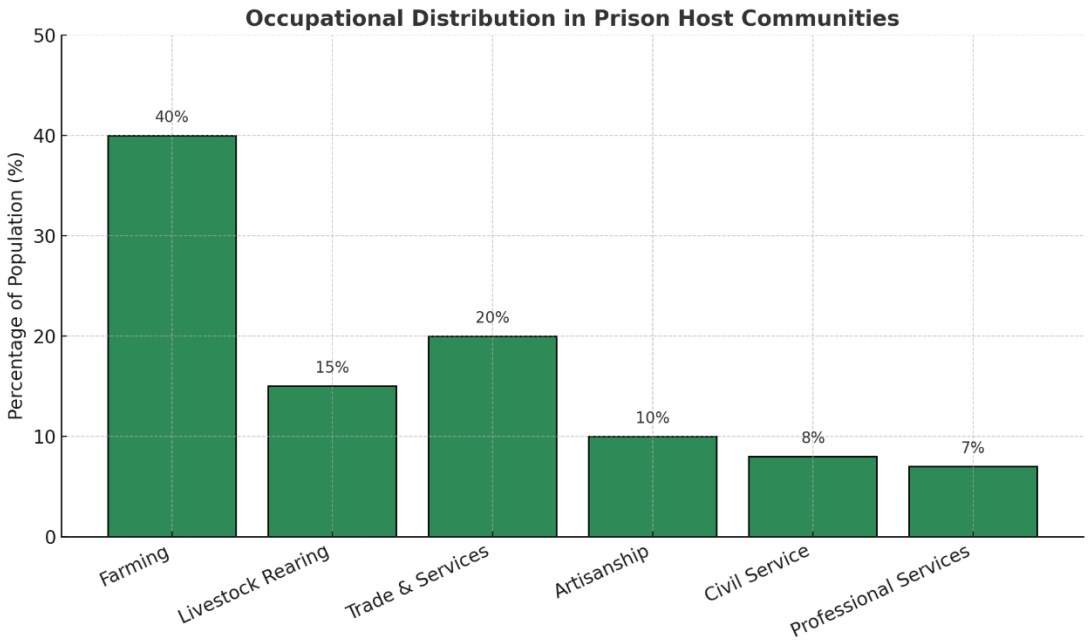

Figure 4.25: Occupational Distribution in Prison Host Communities

4.6.5 Educational Institutions

Educational institutions within host communities of correctional centers vary in access, quality, and distribution. These schools are critical for building human capital, enhancing literacy, and providing opportunities for social reintegration, particularly in areas surrounding prisons where socio-economic vulnerability is higher.

- **Urban Host Communities (e.g., Abuja, Lagos, Port Harcourt, Benin, Ibadan, Enugu, Kano, and Jos):**

These prison-hosting towns benefit from a higher density of public and private educational facilities. Primary and secondary schools are relatively more accessible, while many also host tertiary institutions such as universities, polytechnics, and colleges of education. For example, Abuja hosts the University of Abuja and several private universities; Lagos has the University of Lagos and Lagos State University; and Enugu has the University of Nigeria, Nsukka. Despite this, peri-urban areas near prison locations often face overcrowded classrooms and infrastructural deficits.

- **Semi-Urban and Rural Host Communities (e.g., Kuje, Dukpa, Ogbomosho, Kwale, Ubiaja, Ikom, and Gembu):**

These communities mostly rely on public primary and secondary schools, which are often under-resourced. Common challenges include shortages of qualified teachers, inadequate teaching materials, and limited access to libraries and laboratories. Many of these schools lack proper infrastructure such as functional classrooms, potable water, and sanitation facilities, which directly affects student attendance and performance.

Regional Trends:

- **North-Central:** Areas like Kuje (FCT), Lafia (Nasarawa), and Ilorin (Kwara) host a fair number of schools, but facilities in rural host settlements remain weak.
- **South-East & South-South:** While major prison host towns like Aba, Calabar, and Owerri have stronger educational infrastructure including tertiary institutions, surrounding villages such as Arochukwu, Obubra, and Afikpo remain underserved.
- **North-West & North-East:** States such as Kebbi, Kano, Taraba, and Bauchi show a mixed picture. Major towns (Birnin Kebbi, Kano Metropolis, Jalingo) have universities and polytechnics, but prison host communities in rural LGAs often depend on poorly equipped public schools, resulting in lower literacy levels and higher school dropout rates.

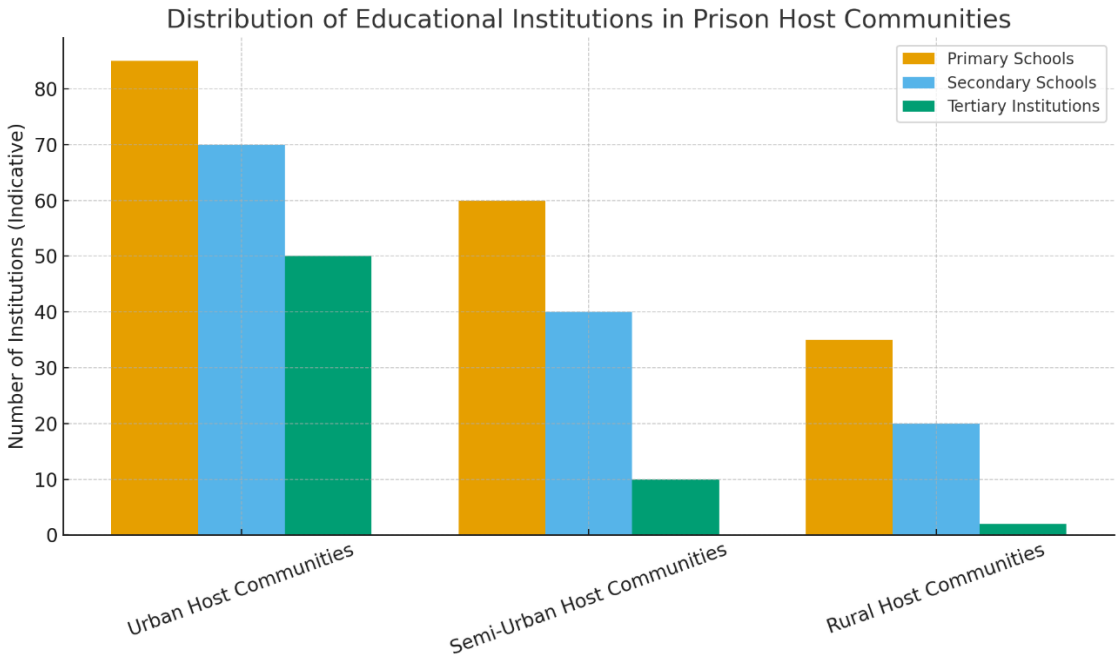

Figure 4.26: Distribution of Educational Institutions in Prison Host Communities

4.6.6 Infrastructure and Social Services

The availability and quality of infrastructure and social services within host prison communities directly shape the welfare of residents, prison staff, and surrounding populations. In most host communities, infrastructure development is uneven, often below national standards, and constrained by limited government investment.

- **Roads and Transportation**

Road access determines both the ease of prisoner transfer/logistics and community socio-economic resilience.

- **Urban Prison Locations (e.g., Lagos, Abuja, Port Harcourt, Enugu, Ibadan):** These are served by federal highways and state roads, many of which are paved. However, urban congestion, poor maintenance, and inadequate feeder roads to prison facilities cause delays and increase transport costs. Prison vehicles often compete with commercial traffic, and in high-density areas, motorcycles and tricycles dominate last-mile access.
- **Semi-Urban Prisons (e.g., Makurdi, Owerri, Abeokuta, Lokoja):** About 35–45% of roads are paved, but rural link roads remain unpaved. Seasonal flooding and erosion frequently damage access, increasing transport time for prison staff, visitors, and supply chains. Informal transport modes (motorcycles, minibuses) remain common.
- **Rural/Peri-Urban Prisons (e.g., Gembu, Ubiaja, Ogoja, Lafia):** Road density is sparse, with less than 30% paved. Access roads are often earth tracks that become impassable during the rainy season. Communities depend heavily on motorcycles, bicycles, and shared vans. These constraints increase food supply costs, limit inmate visitation, and reduce the effectiveness of security patrols around prison perimeters.

- **Electricity and Power Supply**

Electricity access remains one of the most critical infrastructural challenges in Nigeria's prison host communities. Although most correctional facilities are technically connected to the national grid through the Transmission Company of Nigeria (TCN), power supply is highly unreliable, with frequent outages that affect both institutional operations and community livelihoods.

- **Urban Prison Communities (e.g., Lagos, Abuja, Port Harcourt, Ibadan):** Electrification rates are relatively high (65–75% of households connected), yet daily outages of 8–12 hours persist. Correctional facilities, small businesses (e.g., welders, millers), and households rely heavily on diesel and petrol generators. While solar installations are gradually being adopted, coverage remains limited to NGOs, donor-supported projects, and private investments.
- **Semi-Urban Prison Communities (e.g., Makurdi, Lafia, Ilorin, Owerri):** Grid connectivity reaches between 45–60% of households, but outages average 12–15 hours daily. Dependence on petrol generators, rechargeable lamps, and kerosene is widespread. Some communities benefit from small-scale solar mini-grids supported by the Rural Electrification Agency (REA), though coverage is modest and often limited to central markets or institutional clusters.
- **Rural/Peri-Urban Prison Communities (e.g., Gembu, Ubiaja, Ogoja, Takum, Wase):** Electrification rates fall below 35%, with many facilities and households facing almost non-existent grid supply. Residents depend primarily on kerosene lamps, firewood, and solar lanterns. For prisons in these areas, diesel generators remain the primary source of power, often consuming significant portions of operational budgets. The absence of reliable power undermines health service delivery (cold-chain storage for vaccines), student learning (inability to study at night), and small-scale enterprises

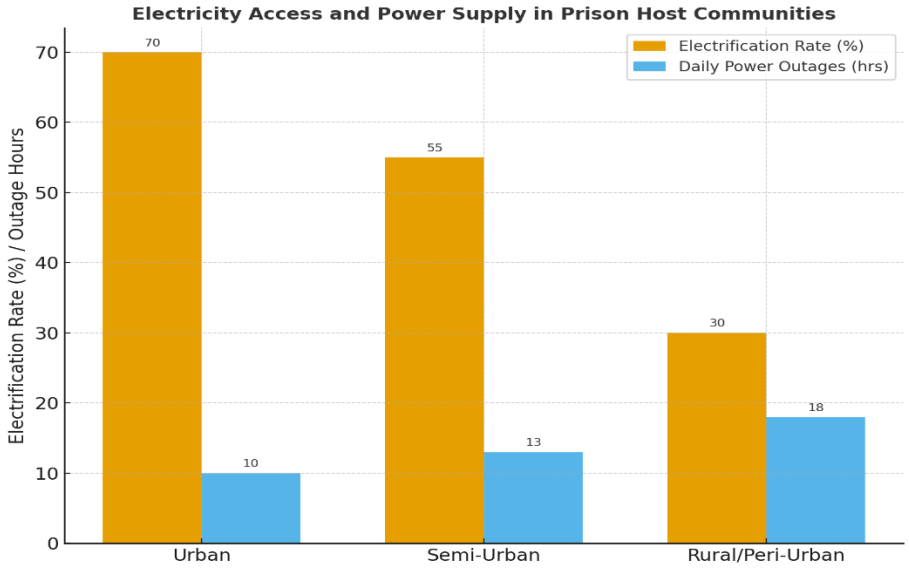

Figure 4.27: Electricity Access and Power Supply in Prison Host Communities

- **Water Supply and Sanitation**

Access to safe and reliable water supply across prison host communities remains inadequate, with most households relying on traditional and unimproved sources. Survey findings indicate that the majority of households depend on hand-dug wells (35–45%), rivers and streams (25–30%), and boreholes (20–25%) as shown in figure 4.28. Piped water connections through State Water Boards are limited to a few urban settlements located close to major correctional centres, but overall coverage in rural and peri-urban host communities is less than 20%.

Seasonal reliance on streams is particularly high in upland and remote communities, where water scarcity intensifies during the dry season. Boreholes, where available, are often non-functional due to poor maintenance and lack of spare parts. Women and children bear the burden of water collection, spending an average of 30–60 minutes daily fetching water, with some households trekking over 2 km to the nearest source.

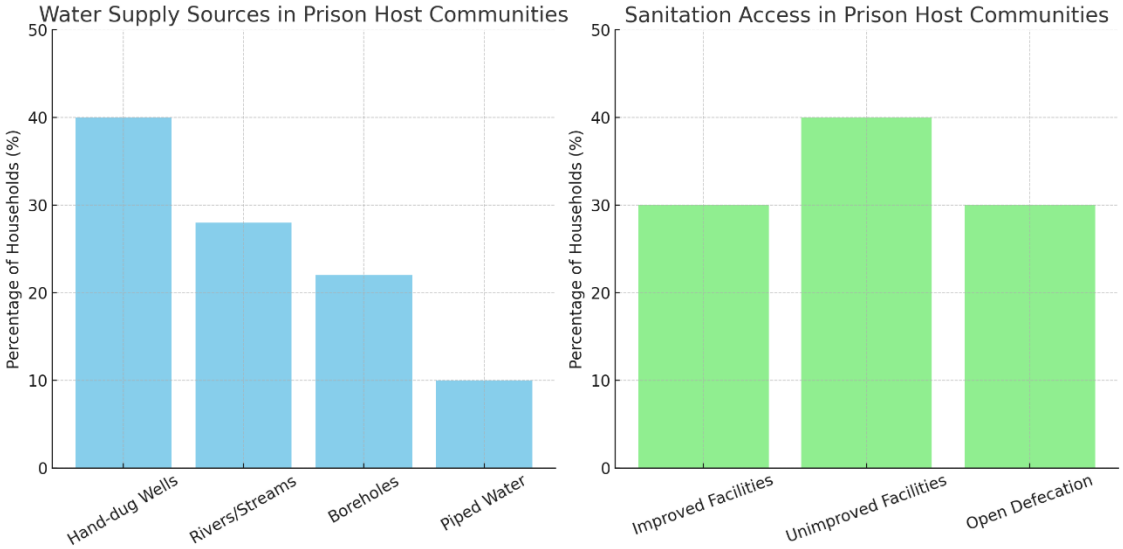

Figure 4.28: Water Supply and Sanitation Access in Prison Host Communities

Access to improved sanitation facilities is also very low, with rural coverage across host communities falling below the national rural average of 31% (UNICEF, 2023). Open defecation is widespread, especially in agrarian and forest-dependent settlements, creating serious public health risks. Pit latrines are the most common facility where available, though many remain unimproved and unsafe. The absence of safe water and sanitation infrastructure increases exposure to cholera, typhoid, diarrhoeal diseases, and intestinal worms, undermining household productivity, educational outcomes (particularly school attendance for children), and healthcare delivery in already underserved prison host environments.

- **Markets and Commercial Services**

Markets and commercial activities constitute the backbone of socio-economic life in prison host communities, sustaining household incomes and reinforcing regional trade networks. These communities function as local and, in some cases, regional trade nodes, linking rural agrarian economies to nearby urban centers and supporting daily livelihood activities of residents.

Weekly and Local Markets

- Most prison host communities operate weekly markets that serve as major aggregation points for agricultural produce (cassava, yam, maize, vegetables), livestock (goats, cattle, sheep, poultry), and household commodities (clothing, utensils, imported food items).
- These markets also serve as social and cultural spaces, where kinship ties are reinforced, disputes resolved, and cultural festivals celebrated.
- Examples include Kuje Market (FCT), Onitsha Main Market (Anambra), and Gboko Market (Benue), which attract both local buyers and traders from adjoining communities.

Commercial and Financial Services

- Formal banking infrastructure remains weak in many host communities, with limited branches outside state capitals. ATMs are sparse, creating dependence on urban centers for cash transactions.
- Residents rely heavily on informal financial systems such as cooperative societies, rotating savings schemes (esusu/ajo), and mobile money operators.
- Mobile money penetration is gradually improving in peri-urban areas, driven by the expansion of telecom networks and fintech platforms. This offers an emerging opportunity for financial inclusion, though uptake remains uneven in more remote communities.

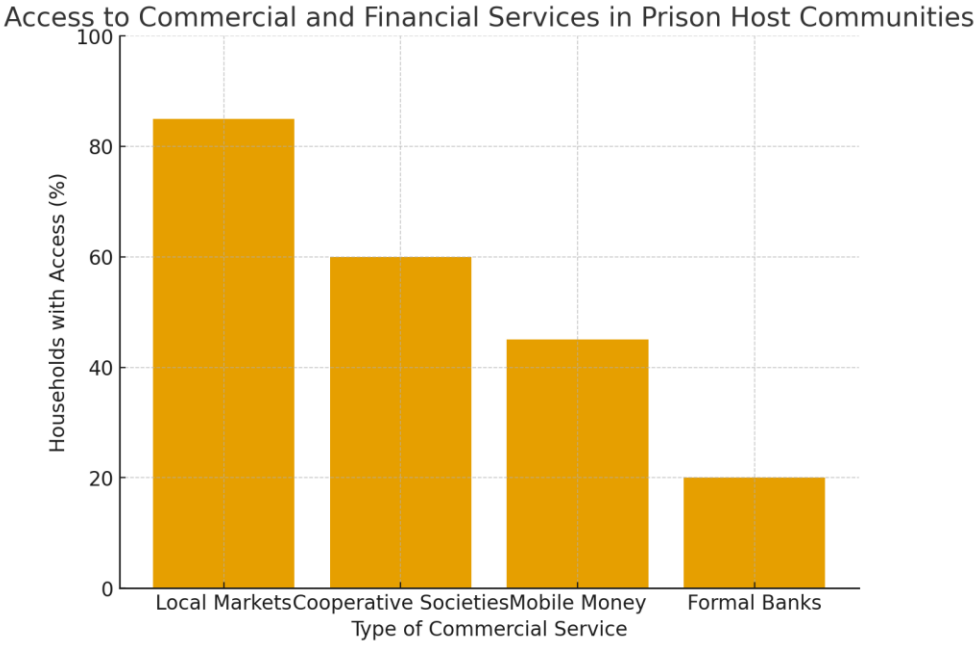

Figure 4.29: Access to Commercial and Financial Services in Prison Host Communities

- **Communication and Information Technology**

Access to communication and information technology infrastructure across prison host communities remains uneven, reflecting the wider rural–urban divide in Nigeria. While major towns and semi-urban centers are served by mobile networks such as MTN, Airtel, Glo, and 9mobile, several prison-hosting rural settlements still experience weak signals or total absence of coverage. Areas close to state capitals and prison facilities located within urban

centers (e.g., Ibadan, Ilorin, Birnin Kebbi, Calabar, and Jalingo) enjoy relatively stronger network coverage and internet penetration, supporting voice, SMS, and 3G/4G broadband access. This enables limited engagement in digital services, mobile banking, and e-commerce. Settlements located in forest belts (Cross River), montane zones (Taraba), and sparsely populated agrarian regions (Kebbi) experience weak or no connectivity. Signal loss is frequent, with households relying on basic 2G services for calls and SMS. Internet penetration is extremely low in these zones.

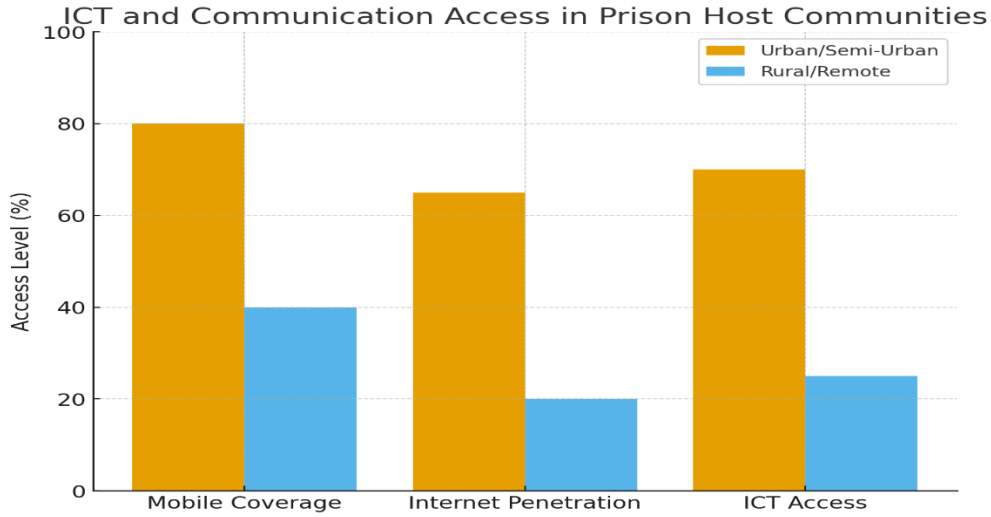

Figure 4.30: ICT and Communication Access in Prison Host Communities

The limited ICT infrastructure creates barriers to information flow, trade facilitation, security alerts, and access to education and health information. It also limits opportunities for small businesses to participate in digital markets.

Mobile money adoption is gradually increasing in semi-urban centers, while community radio and satellite-based services provide alternative information sources where GSM signals are weak. However, affordability of devices and data remains a constraint.

Community Services and Public Institutions

Community services and public institutions within host prison communities vary considerably in terms of availability, accessibility, and effectiveness. These facilities and governance structures influence social cohesion, resilience, and the communities' ability to benefit from and adapt to security infrastructure projects.

Local Government Secretariats, traditional rulers' palaces, and community halls serve as focal points for governance, conflict resolution, and social mobilization. Religious institutions (churches, mosques) play dual roles as centers of worship and platforms for community organization, information dissemination, and service delivery. These institutions are critical in mobilizing support for development interventions, including prison security surveillance initiatives. Security presence is stronger around urban correctional facilities but remains weak in peri-urban and rural prison host communities. Policing is provided by the Nigerian Correctional Service, Nigeria Police Force, and supporting agencies such as the Nigeria Security and Civil Defence Corps (NSCDC).

However, inadequate patrols, insufficient manpower, and resource limitations leave some communities vulnerable to insecurity, theft, and smuggling. In such contexts, reliance on vigilante groups and informal policing structures is common, highlighting gaps in formal security coverage. Public services such as waste management, drainage, and sanitation facilities are poorly developed in most prison host communities. Organized waste collection systems are absent, leading to widespread open dumping and environmental pollution. Drainage infrastructure is either non-existent or inadequate, exposing settlements to recurrent flooding during rainy seasons. Electricity and water supply remain unreliable, further limiting the effectiveness of public institutions and increasing the burden on communities.

4.6.7 Health Facilities and Conditions

Health service delivery in prison host communities and adjoining settlements is marked by weak infrastructure, inequitable access, and significant disease burden. These challenges affect both prison inmates and surrounding populations, with direct implications for security, productivity, and social stability.

1. Health Facilities Distribution

- **Primary Healthcare Centres (PHCs):** Most host communities have at least one PHC or dispensary within 5–10 km of the correctional facility. However, these PHCs are often poorly equipped, with shortages of essential drugs, diagnostic tools, and trained health personnel. Functionality is further limited by irregular electricity and water supply.
- **General Hospitals:** Available mainly in urban and semi-urban host towns (e.g., Kuje, Aba, Onitsha, Benin, Calabar, Makurdi). These serve as referral points but are overstretched, underfunded, and sometimes inaccessible to rural communities due to poor road networks.
- **Tertiary Facilities:** Located only in selected state capitals or major cities (e.g., University of Abuja Teaching Hospital, University of Calabar Teaching Hospital). While they provide advanced care, their distance (often 40–80 km away from prisons) reduces their relevance for emergency response.
- **Private/Mission Clinics:** Common in urban host communities, especially around prisons in Lagos, Enugu, and Port Harcourt. These provide an alternative for middle-income households but remain unaffordable for most rural dwellers.
- **Prison Clinics:** Each correctional facility has a clinic or sick bay, but these are mostly under-resourced, staffed by a handful of nurses, with very limited laboratory and pharmaceutical capacity. Complex cases are referred to state-owned hospitals, causing delays and increased mortality.

2. Prevalence of Diseases

Disease prevalence is high in both prison facilities and host communities due to overcrowding, poor sanitation, weak water infrastructure, and limited preventive healthcare.

- **Malaria:** The most widespread disease, accounting for 55–65% of outpatient cases in both prison clinics and nearby settlements. Stagnant water within prison environments and surrounding communities contributes to high transmission.

- **Waterborne Diseases:** Cholera, typhoid, and diarrhoeal diseases make up 18–25% of illnesses, linked to unsafe water, poor sanitation, and reliance on hand-dug wells and streams. Outbreaks are common during the rainy season.
- **Maternal and Child Health:** Maternal mortality is alarmingly high, averaging 650–800 deaths per 100,000 live births in rural prison host LGAs. Poor referral systems, lack of skilled birth attendants, and cultural barriers worsen outcomes. Immunization coverage is low, with up to 40% of under-five children unvaccinated, raising risks of measles, polio, and diphtheria.
- **Respiratory Infections:** Tuberculosis (TB) prevalence in correctional facilities is 10–12 times higher than national community averages, due to overcrowding, poor ventilation, and weak screening. Pneumonia and ARIs are also major contributors to child morbidity in host settlements.
- **Non-Communicable Diseases (NCDs):** Hypertension and diabetes are on the rise in urban host towns (e.g., Lagos, Abuja, Port Harcourt), with prevalence rates estimated at 15–18% among adults. Rural facilities rarely detect or manage NCDs due to lack of diagnostic capacity.
- **Mental Health Disorders:** Stress, depression, and substance abuse are prevalent among inmates and extend into host communities. It is estimated that 12–15% of inmates and residents suffer untreated mental health conditions, reflecting the absence of mental health services.

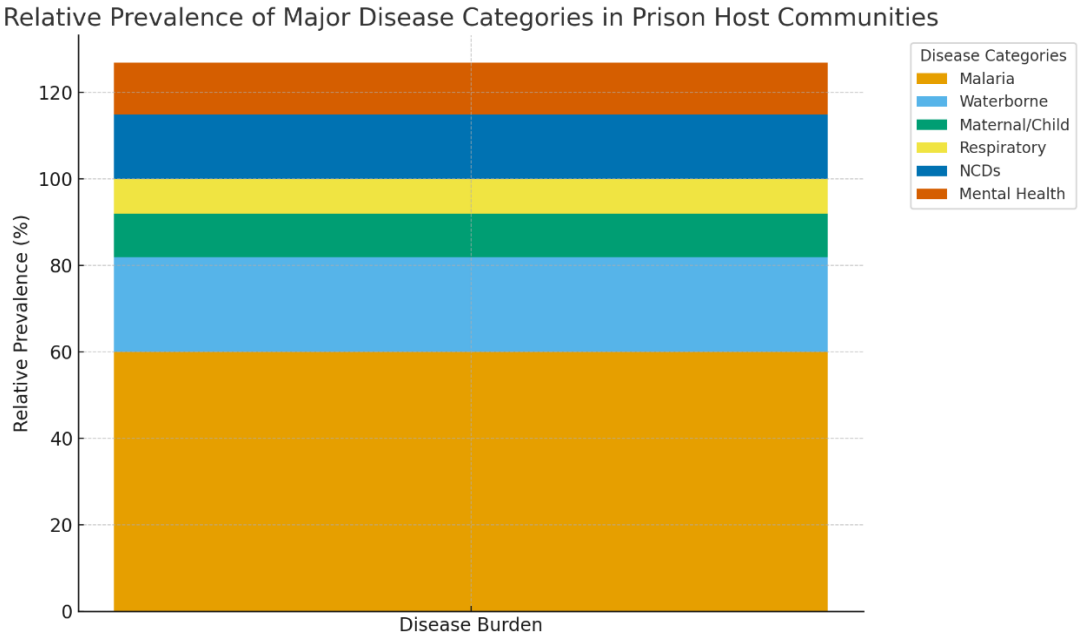

Figure 4.31: Relative Prevalence of Major Disease Categories in Prison Host Communities

4.5 Stakeholders Consultations

Introduction

Stakeholder consultation is a critical component of the socio-economic baseline study and an integral part of the Environmental Impact Assessment (EIA) process. For the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, the

Federal Ministry of Interior recognizes that meaningful consultations with correctional facilities, host communities, regulatory institutions, and civil society are vital to ensuring project acceptance, minimizing conflict, and promoting sustainable outcomes.
The consultation process provided a platform for stakeholders to receive information about the project, express concerns, and propose mitigation measures. It also fostered transparency, built trust, and facilitated shared ownership of the project's objectives.

Objectives of Stakeholder and Community Consultations
The consultations undertaken around selected correctional centres and host communities were guided by the following objectives:

- Creating Awareness: To sensitize correctional centre authorities, host communities, and civil society about the proposed surveillance project and its benefits for enhanced security, institutional management, and community protection.
- Maintaining Communication: To establish sustainable communication channels between the Ministry of Interior, implementing partners, prison administrations, and host communities.
- Discussing Potential Impacts: To explain the scope of the project and provide a platform for discussing potential adverse social, environmental, and livelihood impacts.
- Documenting Concerns: To capture and integrate community and institutional concerns into project design, mitigation, and monitoring frameworks.
- Strengthening Institutional Collaboration: To align Ministries, Departments, Agencies (MDAs), NGOs, and prison authorities on their roles in ensuring sustainability of the intervention.
- Promoting Inclusive Participation: To ensure that women, youth, vulnerable groups, and traditional institutions were adequately consulted and their voices heard.

Methods of Consultation
A participatory approach was adopted, combining formal and informal methods to ensure inclusivity and representation:

1. Reconnaissance Visits: Initial visits to correctional centres and host communities to secure permission, build legitimacy, and create goodwill.
2. Community Meetings: Public meetings held within host towns and villages, facilitated by traditional rulers, community leaders, and prison officials.
3. Key Informant Interviews (KII): Engagements with prison authorities, traditional rulers, local government officials, youth leaders, women leaders, and religious representatives.
4. Focus Group Discussions (FGDs): With youth, women associations, ex-inmates' families, local traders, and transporters to capture diverse perspectives.
5. Questionnaires and Surveys: Structured instruments administered to households to obtain socio-economic and perception data.
6. Workshops and Institutional Consultations: Held with FMEnv, NESREA, NCoS (Nigerian Correctional Service), and security agencies for technical input.

Levels of Consultation

- **Primary Stakeholders**: Inmates' families, correctional staff, host communities, traditional rulers, local government councils, market/trade unions, and community-based organizations.
- **Secondary Stakeholders**: FMEnv, NESREA, Nigerian Correctional Service (NCoS), Nigeria Police Force, NSCDC, NGOs, human rights organizations, and development partners.

Stakeholders Consulted

- Federal Ministry of Environment (FMEnv)
- NESREA
- Nigerian Correctional Service (NCoS)
- Community leaders in Kuje, Aba, Nnewi, Uyo, Bauchi, Calabar, Agbor, Owerri, Kano, and Jalingo
- Youth groups, women associations, and market cooperatives
- NGOs working in prison reform, human rights, and community development

Consolidated Observations from Prison Host Communities

- Livelihoods and Economy: Communities depend on farming, petty trade, informal services, and in some cases, small-scale artisanal activities. Prisons provide modest employment opportunities (guards, artisans, suppliers).
- Infrastructure Gaps: Many host communities lack functional healthcare, potable water, good roads, and stable electricity supply. This increases dependence on prison facilities and compounds local vulnerability.
- Security Concerns: Residents expressed worries over prison breaks, overcrowding, and porous security. They welcomed surveillance technology as a measure to deter escapes and improve public safety.
- Social Integration: Families of inmates, especially women, widows, and children, are among the most vulnerable, facing stigma and limited access to livelihood opportunities. Communities requested support programs to reduce their burden.
- Community Perceptions: Despite fears over possible land restrictions, noise, and construction-related disturbances, communities broadly supported the project, citing:
    - Improved prison and community security.
    - Enhanced socio-economic activities through employment and infrastructure support.
    - Opportunities for ICT training and job creation.

Summary of Issues and Concerns Raised

- Assurance of fair compensation where land acquisition is unavoidable.
- Provision of job opportunities for youths and women during construction and operation.
- Requests for basic social amenities (boreholes, schools, clinics, solar lighting).
- Concerns about construction impacts (noise, dust, access restrictions).
- Need for continuous engagement and community sensitization.

- Emphasis on gender inclusion and support for vulnerable groups (widows, IDPs, PWDs).

Community Demands

- Job creation and skills training (especially ICT-based).
- CSR interventions: health centres, boreholes, schools, and road rehabilitation.
- Support for micro-credit schemes to strengthen petty trade and women's cooperatives.
- Effective grievance redress mechanisms for disputes.

Table 4.27: Summary of Stakeholder Consultation Outcomes in Prison Host Communities

S/N	Location / Facility	Issues Discussed / Concerns Raised	Questions Asked	Responses Provided	Respondent(s)	Remarks
1	Kuje (FCT)	Land use and security	Will new towers reduce prison breaks?	Surveillance system designed to strengthen perimeter monitoring.	NCoS / Consultant	Community supported; requested youth jobs.
2	Aba (Abia)	Employment & livelihoods	Will local traders benefit?	Local sourcing prioritized for services and supplies.	Contractor	Traders asked for transparent process.
3	Bauchi (Bauchi State)	Access to social amenities	Will boreholes/clinics be part of project?	CSR to consider water and health support.	Ministry of Interior	Women leaders emphasized maternal health needs.
4	Calabar (Cross River)	Environmental concerns	Will installations damage cocoa farms?	Sites to avoid sensitive farms; compensation as per law.	Environmental Consultant	Farmers requested community forestry schemes.
5	Kano (Kano State)	Youth inclusion	How will youths be engaged?	ICT/tech training linked to surveillance operations.	Ministry of Labour	Youths expressed strong interest.
6	Jalingo (Taraba State)	Vulnerable groups	Will widows and PWDs benefit?	Gender inclusion strategy ensures quotas in CSR and jobs.	Social Specialist	Widows requested direct micro-credit access.
7	Ikoyi (Lagos State)	Urban–community interface	Will residents face disruptions during installation?	Works to be confined within prison premises; minimal impact expected.	Project Engineer	Residents asked for improved street lighting.
8	Kirikiri (Lagos State)	Overcrowding & CSR	Will project address prison congestion?	Surveillance to support security, while CSR may include community facilities.	NCoS / Consultant	Community leaders requested health and water schemes.
9	Enugu (Enugu State)	Land & access concerns	Will surveillance limit community access roads?	No restriction planned; traffic management to be applied.	Environmental Consultant	Youths demanded permanent road rehabilitation.
10	Owerri	Livelihoods &	Will women	Local women will	Social	Women

	(Imo State)	women traders	vendors around prison benefit?	be included in supply chain initiatives.	Specialist	groups welcomed but requested micro-credit.
11	Port Harcourt (Rivers State)	Environmental health	Will emissions or waste affect host community?	Waste management protocols integrated in EMP.	FMEnv / Consultant	Community asked for regular environmental monitoring.
12	Makurdi (Benue State)	Security & community trust	Will surveillance improve safety of nearby markets?	Technology enhances perimeter control and crime detection.	NCoS / Security Agencies	Traders supported, requested stronger police presence.

CHAPTER FIVE

ASSOCIATED AND POTENTIAL IMPACTS

5.1 Introduction

This chapter presents the assessment of associated and potential impacts of the Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution as described in Chapter 3 of this Report.

The assessment focuses on project interactions with the biophysical, social, and health environments of the project area. It provides an overview of the adopted impact assessment methodology, the outcomes of the initial impact screening exercise, and a detailed evaluation of the identified impacts. Both associated impacts (those certain to occur) and potential impacts (those that could arise under specific conditions) are systematically analyzed.

The adopted impact assessment methodology combines internationally recognized techniques that have been applied and validated in Environmental Impact Assessments (EIAs). These include:

- Checklists for ensuring comprehensive coverage of environmental and social parameters;
- Matrices and flowcharts for identifying cause-effect relationships;
- Networks for mapping interactions among multiple project activities and receptors;
- Mathematical and statistical models for quantitative predictions where data allows; and
- Overlays using maps and Geographic Information Systems (GIS) for spatial analysis of sensitive environmental and social receptors.

This hybrid approach was selected to align with the SCOPE (1979) criteria for EIA methodologies, ensuring that the assessment is:

- Comprehensive, covering all relevant aspects of the environment;
- Selective, focusing on significant issues;
- Exclusive, avoiding duplication and overlap;
- Reliable, by providing confidence limits to predictions;
- Objective, minimizing subjective bias; and
- Interactive, predicting complex cause-effect relationships.

The impact assessment methodology is further detailed in Section 5.2, while the results of the assessment covering construction, operation, and decommissioning phases—are discussed in subsequent sections of this chapter.

5.2 Methodology

This section discusses the overall methodology used to identify, qualify and quantify the impacts of the Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution project on the host environment. The overall methodology comprises five stages (Figure 5-1).

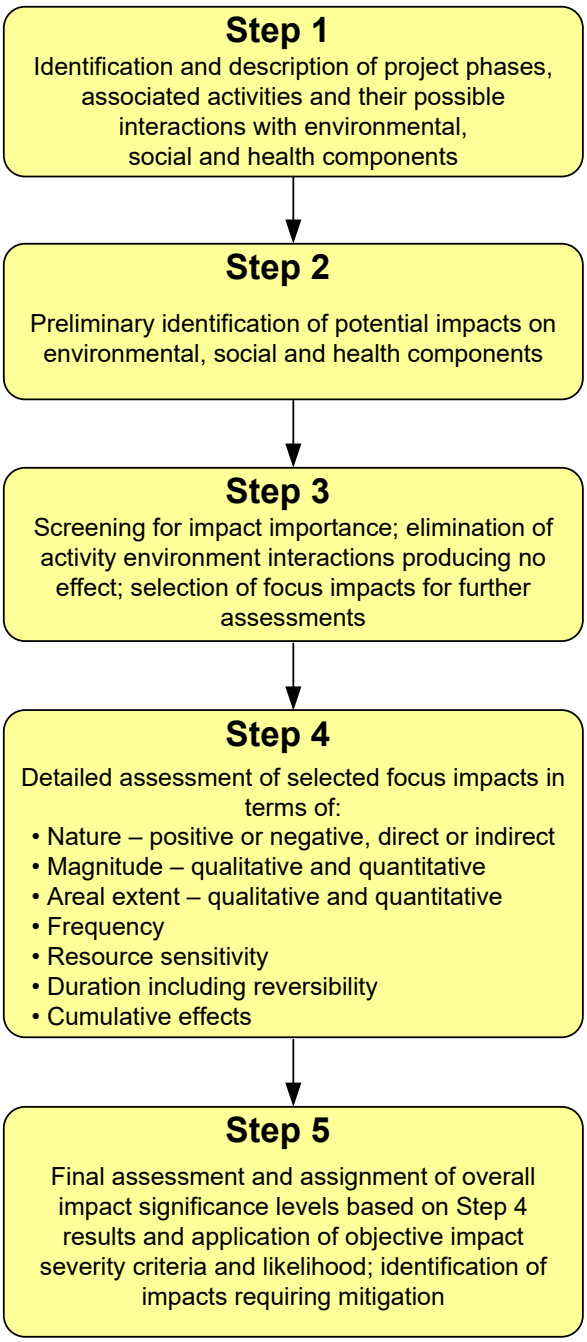

Figure 5 1: Impact Assessment Process

5.2.1 Activities and Affected Media

The impact analysis for the Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution covers the following project phases and associated activities:

- Site Preparation and Clearing: vegetation clearance, minor grading, and access road preparation for surveillance sites.
- Civil and Structural Works: excavation, foundation laying, mast erection, and construction of equipment shelters/control rooms.
- Equipment Installation: mounting of high-definition surveillance cameras, communication towers, solar power units, and associated cabling.

- System Integration and Commissioning: configuration of video management systems, connectivity to the Ministry of Interior's command centers, and testing of power and backup systems.
- Operations and Maintenance: routine surveillance operations, data storage and transmission, maintenance of camera sites, power supply management, and security patrol support.
- Decommissioning: dismantling of surveillance structures, safe removal of electronic and power equipment, site restoration, and disposal of residual wastes.

For each project phase, the potentially affected environmental media are identified, and the nature of the effects is qualitatively and, where possible, quantitatively described. These include impacts on air quality, soil, water resources, vegetation, wildlife, noise environment, land use, socio-economic systems, and community health and safety.

The schedule of proposed activities also includes estimated labour levels, timelines, and equipment requirements.

To facilitate the impact analysis, individual activities are mapped against their interactions with environmental and social components. However, two cross-cutting areas are emphasized across all phases of the project:

- Wastes and Emissions Handling – covering solid wastes (e.g., packaging, construction debris), e-waste (from equipment replacement), hazardous materials (e.g., batteries, fuels, lubricants), and gaseous/particulate emissions during construction and operation.
- Health and Safety Considerations – encompassing occupational health for workers (e.g., exposure to heights, electrical risks, and equipment handling) and public health for host communities (e.g., noise, security-related disturbances, and electromagnetic exposure concerns).

5.2.2 Preliminary Identification and Screening

In line with recommended impact assessment approaches (FMEnv, 1995; UNEP, 1996; Canter, 1996; DPR 2002, Lohani *et al*., 1997) the first level of impact assessment involves the preliminary identification and screening of potential environmental impacts by anticipating activity-environment interactions. This requires a thorough understanding of the project activities (project description), the project setting (the environmental and social characteristics), and the interaction with environmental components. A modified Leopold matrix (Leopold, 1971) was used for the identification and screening. The matrix arrays project activities against environmental (biophysical, social and health) components, and supports a methodical, comprehensive, and objective identification of the impacts that each distinct project activity may have on the biophysical, social, and health components.

Impact identification is based on Wathern (1988), who defines an impact as "having both spatial and temporal components and can be described as the change in an environmental parameter over a specified period within a defined area, resulting from a particular activity compared with the situation which would have occurred had the activity not been initiated".

To further guide the identification and screening of impacts using the matrix, established environmental impact indicators or indices are developed for each of the environmental

interaction categories. Impact indicators are the observable or measurable parameters of each environmental component that can be directly or indirectly linked to changes in environmental conditions. **Error! Reference source not found.** gives the specific environmental components and sub-elements used and a description of the indicators.

The integrated impact assessment is conducted with consideration of environmental, social and health elements and has therefore utilized procedures specific to each element where applicable. For example, the health aspects considered procedures of Samuel *et al*. (1998) and Commonwealth of Australia (2001) in the approach. In general, though, the impact identification and assessment methodology has integrated the procedures into a single approach.

Table 5.1: Environmental, Social and Health Components and Impact Indicators

Components	Impact Indicators
Biophysical	
Geology	Changes to geology, geomorphology, topography
Soil	Changes to physical and chemical properties and soil ecology
Surface Water	Changes to water quality indices, (physicochemical properties, hydrocarbons, metals and hydrobiology); Introduction of exotic species, changes in habitat quality, abundance, diversity; Effluent discharge
Hydrobiology and Fisheries	Changes in water quality, changes in fisheries productivity
Vegetation	Changes to vegetation population, health, species abundance and diversity and impact on endangered and economic species, food chain effects
Wildlife	Changes to wildlife assemblages, impact on endangered and economic species, food chain effects
Air	Emissions of NO_x, SO_x, PM, CO, VOC, greenhouse gases (CO_2, CH_4, and N_2O), ozone and changes to ground level concentrations of pollutants
Vibration and Noise	Change in noise or vibration levels at sensitive receptors
Aesthetics	Physical presence of facilities, increased night time light
Groundwater	Contamination of shallow or deep groundwater resources, change in ground water resources
Social	
Population	Changes in population indices, total population, gender ratio, age distribution
Infrastructure	Improvement or pressure on existing urban/rural infrastructure including waste handling facilities
Macro and Micro economy	Change in macro and micro economy, employment, standard of living, occupation
Social and Cultural Structure	Disruption in local authority and governance structure; change in social behaviours; intra and inter-ethnic clashes;
Physical and Economic Displacement	Permanent physical displacement from residence as a result of project land take, or activities; permanent or temporary displacement from land or water-based livelihood activities; partial or whole severance from social and cultural networks
Cultural and Archaeological resources	Physical disturbance of shrines, burial grounds, archaeological resources or other desecration
Transportation	Alteration in means of transportation or ability to move efficiently
Education	Change in primary, secondary and tertiary education school enrolment and attendance
Health Determinants	

Pollution Related Health Effects	Increase in concentration of, and exposure to non-ionizing radiation, air pollutants of concern (NOx, SOx, VOC, CO, PM), contamination of surface waters and potable ground water, increased vibration and noise beyond regulatory limits, increased night time light beyond acceptable limits.
Communicable and Non-Communicable Diseases	Change in incidence of communicable and non-communicable diseases or disease-causing factors
Morbidity and Mortality	Change in health of workers and of general public, change in security of the area
Nutritional status	Changes to nutritional status
Health Care/Recreational Facilities	Changes in availability of and access to health care and recreational facilities
Psychosocial factors	Drug use/abuse, communal violence, crime, suicide, depression and prostitution; changing expectations of quality of life
Fertility	Changes to fertility levels, changes in birth rates
Accidents/Fires/Explosions	Changes to rate of occurrence and severity of accidents/fires/explosions

Modified Leopold Matrix Screening

The modified Leopold impact matrix (Table 5.2) consists of a horizontal list of biophysical and social environment components that could be affected by the proposed project activities versus a vertical list of project activities, which represent environmental aspects, or "sources of impact," associated with each sub project phase. Environmental aspects are elements of an activity that can or will interact with the biophysical, social and health conditions within the area of influence.

Entries in the matrix cells represent the nature and ***preliminary*** ranking of the severity of the impact. Ranking of the severity is based on the following scale and symbols:

- Major: 2
- Minor:1
- Negligible or no effect: - (*a dash*)
- Positive: +

For this preliminary impact assessment stage, the impacts are defined as follows:

- A **Major impact** is one that would affect a large (higher than 40%) amount of a resource and or have a relatively large footprint and persist for a long time or is irreversible.
- A **Minor impact** is one that could either affect a large (as defined above) or moderate (less than 40%) amount of an affected resource, has a mid to long term effect (1 to 10 years) but is most likely reversible.
- A **Negligible impact** is one that may occur but based on experience, available scientific information and expert knowledge will have no measurable effect on the environmental component.
- A **Positive** impact is one that adds a measurable benefit to the immediate and larger project environment including its social, cultural and health dimensions.

All number entries denote negative impacts. Cells with both positive sign (+) and numbers indicate that the specific activity and environment interaction will potentially result in both a positive and negative impact.

All potential impacts, whether likely or unlikely, are also considered at this stage. The likelihood of an impact is further assessed in the *detailed* impact evaluation. The identification and screening of impacts has relied on the following:

- Available knowledge of the project activities;
- Documented impacts of similar projects in similar environments;
- Consultation with experts;
- Discussions with project personnel; and
- Professional judgment.

Spatial boundaries of interactions were decided based on map overlays, specialist knowledge and documented experience of the specific activity-environment interaction.

5.2.3 Detailed Assessment of Impacts

The preliminary identification and screening of environmental impacts resulted in a group of focus impacts (impacts ranked 1 and 2), which were further assessed in terms of severity and significance. Impact severity and significance criteria used at this next stage relied on a number of resources and tools including the following:

- Federal Ministry of Environment (FMEnv) EIA Guidelines;
- Overlaying project components on maps of existing conditions to identify potential impact areas and issues;
- Environmental Baseline Studies conducted specifically for this project;
- Consultation with Nigerian experts and residents;
- Experience from similar projects in Nigeria and worldwide;
- Discussion with design contractors and project engineers;
- Published and unpublished documents (such as *The World Bank Environmental Assessment Sourcebook*, relevant IFC Performance Standards, and other authoritative texts on performing environmental impact assessments) providing guidance on performing impact analysis for industrial development activities;
- UNEP EIA Training Resources Manual (1996); and
- European Commission Guidance on EIA/EIS Review (*European Commission, 2001*).

The impact assessment approach applied to the Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution Project also incorporates additional impact quantification steps.

Table 5.1: Screening Matrix for Potential Impacts (Biophysical and Social Impacts)

PROJECT PHASES AND ACTIVITIES	Biophysical Impact Indicators											Social Impact Indicators							
	Geology / Topography	Soil	Surface Water	Hydrobiology and Fisheries	Vegetation	Wildlife	Air /Radiation	Vibration and Noise	Aesthetics	Groundwater	Sediments	Population	Infrastructure	Macro and micro economy	Social and Cultural Structure	Physical and Economic Displacement	Cultural and Archaeological	Transportation	Education
Clearing and Site Excavation Activities																			
Physical Presence of Workers, Equipment and Materials on Site	-	1	1	-	-	-	-	1	-	1	-	1	1	1	1	2	1	1	1
Transportation of Workers and Materials	-	-	1	1	-	-	1	-	-	-	-	-	-	+, 1	-	+, 1	-	1	-
Site Clearing	-	1	1	1	2	2	1	1	-	-	-	-	-	+	1	1	1	1	-
Excavation	2	-	2	2	-	-	1	1	-	-	2	-	-	2	-	2	-	1	-
Wastes and Emissions Handling and Disposal	2	1	2	2	2	1	1	1	-	-	2	-	1	2	-	2	-	-	-
Onsite Construction Works																			
Physical Presence of Workers, Equipment and Materials on site	-	-	1	1	-	-	1	1	-	1	1	1	1	+, 1	1	1	1	-	1
Transportation of Workers and Materials	-	-	1	1	-	-	1	1	-	-	-	-	-	+, 1	-	1	-	1	-
Wastes and Emissions Handling and Disposal	-	1	1	1	-	-	1	-	-	1	1	-	-	+, -	-	-	-	-	-
Construction Activities																			

Table 5.1: Screening Matrix for Potential Impacts (Biophysical and Social Impacts)

PROJECT PHASES AND ACTIVITIES	Biophysical Impact Indicators											Social Impact Indicators							
	Geology / Topography	Soil	Surface Water	Hydrobiology and Fisheries	Vegetation	Wildlife	Air /Radiation	Vibration and Noise	Aesthetics	Groundwater	Sediments	Population	Infrastructure	Macro and micro economy	Social and Cultural Structure	Physical and Economic Displacement	Cultural and Archaeological	Transportation	Education
Tower Construction	1	1	-	-	2	-	1	1	-	-	-	-	-	+, 1	-	1	1	1	1
Civil Works	-	-	1	1	-	-	1	1	-	1	-	-	-	+, 1	-	-	-	-	1
Installation, Hook Up and Commissioning																			
Operations																			
Equipment Operations	-	-	-	-	-	-	2	2	2	1	1	-	+	+	-	+	-	-	+
Wastes and Emissions Handling and Disposal	-	-	1	1	-	-	2	2	-	-	-	-	1	+	-	-	-	-	-
Decommissioning																			
Removal of Installed Facilities	1	1	1	1	1	-	1	1	-	1	1	-	-	+, 1	-	+,1	-	+, 1	-
Wastes and Emissions Handling and Disposal	-	1	1	1	-	-	1	1	-	1	1	-	-	+, 1	-	+,1	-	-	-

5.2.3.1 Impact Severity Evaluation

During detailed assessment, five criteria were used to assess the severity of the environmental (biophysical, social, and health) impacts that were not screened out in the earlier steps.

The severity criteria set forth in this section are applicable to all types of impacts identified, including impacts that can be expected from the project and impacts resulting from emergencies. Several types of potential consequences (or impacts) were considered for all project stages where applicable:

- Biological and physical environment
- Social environment
- Health and Safety of the public or workers

The detailed assessment of impacts involved evaluating the potential effects of project activities on the impact indicators but in greater detail. Impacts were assessed as to whether they are positive (beneficial) or negative (detrimental). Only negative impacts were given detailed assessment.

5.2.3.2 Evaluation Criteria

Five impact severity evaluation criteria were applied in this study: Magnitude, Duration, Frequency, Areal Extent, and Sensitivity of the Receptor. Within these five criteria, impacts were also evaluated as to whether they might result in cumulative effects or indirect (secondary) effects. The overall impact evaluation considers not only the potential severity of the impact but also the likelihood of its occurrence.

Note that characterization of an impact includes the criteria for negligible. This would be applied when an impact characteristic either does not apply or when it is so low so as not to be noticed. In general, impact effects need to be observed to pass the initial screening but negligible is used in some instances and a negligible rating would be considered in deriving the overall impact severity. The term is omitted from the impact assessment matrix table that follow this section, but the criteria are described in the preceding text.

The following describes the severity rating criteria.

Magnitude

Magnitude is defined as the quantitative intensity of the impact, and can be measured as the percentage of a resource or a population within the area of influence that may be affected by an impact. The definitions of “high,” “medium” and “low” with respect to magnitude may vary depending upon the specific receptor. The magnitude of an impact is characterized as follows:

- High - large amount of the resource or population is affected; easily observable and measurable effect
- Medium - moderate amount of the resource or population is affected; generally measurable and observable effect
- Low – small amount of the resource or population is affected; low magnitude impact may be within the range of normal variation of background conditions
- Negligible – amount of resource or population affected is unnoticeable or immeasurably small

Magnitude may also be defined with respect to quantitative or semi-quantitative criteria, if available and applicable, (e.g., level of noise as decibels). The magnitude of an impact is characterized as follows:

- High – greater than the quantitative or semi-quantitative criteria
- Medium – at the quantitative or semi-quantitative criteria
- Low – less than the quantitative or semi-quantitative criteria
- Negligible – impact not detected or at background conditions

Duration

Duration is defined as the time that is estimated for a population or resource to return to baseline conditions (i.e., before the impact). The duration is calculated from the time the impact begins, which may coincide with the start of the activity that causes the impact. The duration of an impact is characterized as follows:

- High – long-term impact (recovery would not occur within ten years)
- Medium – moderate-term impact (recovery time between one year and ten years)
- Low – short-term impact (recovery time within or less than one year)
- Negligible – impact or recovery time is very short or immediate

Characterization of the duration of an impact as low, medium, or high includes consideration of the degree of reversibility of the impact. Impacts for which the duration is classified as high, as defined above, are considered irreversible impacts.

Frequency

Frequency is defined as the number of times an impact is expected to occur over the life of the project. The frequency of an impact is characterized as follows:

- High – impact will occur continuously throughout the life of the project (e.g., continuous process wastewater discharge)
- Medium – impact will occur intermittently over the life of the project (e.g., blow down, flaring and venting)
- Low - impact will occur rarely or a very limited number of times (e.g., construction impacts)

There is no “negligible” category for frequency because impacts with no frequency would not occur, and were screened out.

Extent

Areal Extent refers to the potential geographic range of an impact, and may be quantified in units of area affected (e.g., hectares). The areal extent is characterized as follows:

- High – impact has influence well beyond the project environment to the regional or even global environment
- Medium – impact limited to the general vicinity of the project site or study area
- Low – impact limited to the immediate area of the activity or occurrence
- Negligible – impact limited to a very small part of the activity area

Sensitivity

Sensitivity refers to economic, social, and/or environmental/ecological relevance of the receptor, including the intrinsic sensitivity of the resource, reliance on the receptor by people

for sustenance, livelihood, cultural significance or economic activity, and to the importance of direct impacts to persons associated with the resource.

The sensitivity criterion also refers to potential impacts to Environmentally Sensitive Areas (ESAs) and impacts on species, including loss of endangered species, effects of introduction of invasive species, and similar environmental/ecological impacts. The intrinsic sensitivities of a receptor species and actions that alter the function of the receptor are also considered. Sensitivity is characterized as follows:

- High – receptor is of high economic, social, and/or environmental relevance and or has an intrinsic sensitivity (including vulnerability and exposure) to the specific impact (e.g., fresh water resources and mangroves).
- Medium – receptor is of moderate economic, social, and/or environmental relevance and is not particularly vulnerable and/or exposed to the impact.
- Low – receptor is of low economic, social, and/or environmental relevance and is not vulnerable and/or exposed to the specific impact.
- Negligible – receptor is not of economic, social, and/or environmental relevance or is not sensitive to impact.

5.2.3.3 Impact Significance

The following section describes the method by which the overall impact severity rating and associated impact significance is derived.

Impact Severity Rating

To reach an overall impact severity rating for each impact assessed, the five impact severity criteria above are aggregated using impact severity matrices. Aggregation is at three levels. First, magnitude and areal extent are combined to arrive at a rating for the Impact Quantum while duration and frequency are aggregated to give the overall Temporal Effects. Impact Quantum and Temporal Effects are then combined and their resulting aggregate assessed in terms of sensitivity to arrive at the overall impact severity. Table 5.3, Table 5.4, and Table 5.5 show the aggregation process.

Impact Likelihood

To further assess the significance of the severity associated with each potential negative impact identified in the previous section, a likelihood criterion is applied to each negative impact. The likelihood criteria are used to determine whether negative impacts can be prevented or mitigated or if they are unavoidable.

It should be noted that the likelihood criteria are applied to the likelihood of the impact occurring and not of the activity occurring. Thus the overall severity rating (significance) of a negative environmental impact is a function of its severity as earlier defined and the likelihood of occurrence as defined in the table. For example, a moderate impact that has a high likelihood of occurrence would be more severe than a major impact with a very low likelihood of occurrence. Assigning a significance ranking and a likelihood ranking to each impact allows for semi-quantitative evaluation of the severity of the impact. The colour coded impact severity matrix presented in (Table 5.6) illustrates the application of the impact severity and likelihood. The likelihood ranking is placed in the y-axis and the impact

significance ranking in the x-axis. The colour codes are also used in the text discussing each impact assessed using this method.

Overall Impact Significance

The overall impact significance level is indicated by the position on the impact significance matrix. For example, impacts placed within the red boxes have a high likelihood of occurrence and serious consequence; thus they have a high significance rating. These high-significance impacts become high priority for further evaluation or management action (e.g., design change or mitigation). Impacts in the yellow category are moderate impacts, with medium priority; impacts in green boxes are lower priority. Impacts identified by the white boxes indicate positive or beneficial impacts. The criteria and severity matrix set forth in this section are applicable to all the types of events and impacts identified.

The criteria are summarized in Table 5.3.

Table 5.3: Impact Assessment of Spatial Effects

SPATIAL EFFECTS			
Magnitude	**Areal Extent**		
	Low	**Medium**	**High**
Low	Low	Medium	Medium
Medium	Low	Medium	High
High	Medium	High	High

Table 5.4: Impact Assessment of Temporal Effects

TEMPORAL EFFECTS			
Frequency	**Duration**		
	Low	**Medium**	**High**
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

Table 5.5: Impact Assessment of Combined Spatial and Temporal Effects

COMBINED SPATIAL AND TEMPORAL EFFECTS			
TEMPORAL EFFECTS	**SPATIAL EFFECTS**		
	Low	**Medium**	**High**
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

Table 5.6: Overall Impact Assessment Severity (Combined Spatial and Temporal Effects and Sensitivity)

IMPACT ASSESSMENT AND SENSITIVITY			
SENSITIVITY	**COMBINED SPATIAL AND TEMPORAL EFFECTS**		
	Low	**Medium**	**High**
Low	Minor	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

Table 5.7: Overall Impact Significance

OVERALL SIGNIFICANCE				
LIKELIHOOD	**SEVERITY**			
	Positive	**Minor**	**Moderate**	**Major**
Low	BENEFICIAL	LOW	LOW	MODERATE
Medium	BENEFICIAL	LOW	MODERATE	HIGH
High	BENEFICIAL	MODERATE	HIGH	HIGH

Table 5.8: Summary of Impact Severity						
	SPATIAL EFFECTS		TEMPORAL EFFECTS		SENSITIVITY	LIKELIHOOD
	Magnitude	Areal Extent	Frequency	Duration	Receptor	Likelihood
High	Large amount of resource or population affected; easily measurable; or greater than the quantitative or semi-quantitative criteria	Impact to the national, regional, or global environment	Impact will occur continuously throughout the life of the project	Impact is long-term; recovery would not occur within ten years	Receptor is of high economic, social, and/or environmental relevance; has very high intrinsic sensitivity	Impact is likely to occur during normal operations (i.e., greater than 70% likelihood of occurring or has been known to result routinely, though not necessarily in all similar circumstances)
Medium	Moderate amount of resource or population affected; generally measurable or observable; or at the quantitative or semi-quantitative criteria	Impact to the general vicinity of the project site or study area	Impact will occur intermittently over the life of the project	Impact is moderate-term and recovery will occur between one year and ten years	Receptor is of moderate economic, social, and/or environmental relevance; has moderate intrinsic sensitivity	Impact could occur infrequently during construction or normal operations, but could occur more readily if safeguards and controls breakdown (i.e., between approximately 20% to 70% likelihood of occurring or impact has been known to result in similar circumstances)
Low	Small amount of resource or population affected; or less than the quantitative or semi-quantitative criteria; may be in the range of normal	Impact limited to the immediate vicinity of the activity or occurrence	Impact will rarely occur or will occur on a limited number or occasions	Impact is short-term and recovery will occur in less than one year	Receptor is of low economic, social, and/or environmental relevance; has low intrinsic sensitivity.	Impact highly unlikely, given the controls in place (i.e., between approximately 2% to 20% likelihood of occurring or impact has been known to result, but only very rarely, in similar circumstances
Negligible	Amount of resource or population affected is unnoticeable or immeasurably small; or impact not detected or at background conditions	Impact limited to a very small part of the activity area	Impact never occurs or impact is not possible	Impact is very short term and recovery is nearly immediate	Receptor is not of economic, social, and/or environmental relevance; has no sensitivity to impact	Impact has approximately less than 2% likelihood of occurring; impact unknown to have previously occurred in similar circumstances

5.2.4 Project Associated and Potential Impacts

The associated (i.e., known) and potential impacts discussed in the following sections are those activity–environment interactions in the impact matrix that have been scored as significant (entries of "1", "2", or "+") and were therefore not screened out during preliminary evaluation.

For clarity and to avoid repetition, the detailed discussion of impacts is presented under project phases and key activities. Impact identification prefixes have been assigned to each impact discussion for ease of reference. Impacts are grouped into two major phases:

Pre-Operations Impacts

These are impacts that occur prior to the commissioning and operation of the surveillance system. Project activities under pre-operations include:

- **PP** = Physical Presence of Workers, Equipment, and Machinery
- **TR** = Transportation of Materials and Workers to Site
- **SC** = Site Clearing and Preparation
- **CS** = Civil and Structural Works (mast foundations, shelters, and control rooms)
- **EI** = Equipment Installation (cameras, masts, solar units, batteries, and communication hardware)
- **IC** = Integration and Commissioning of Surveillance Systems
- **WE** = Wastes and Emissions Handling and Disposal

Operations Impacts

These are impacts that arise during the functional lifespan of the surveillance infrastructure. Project activities under this phase include:

- **OM** = Operations and Routine Maintenance
- **VS** = Video Surveillance Activities (monitoring, data storage, and transmission)
- **PS** = Power Supply and Backup Systems (solar arrays, batteries, and auxiliary generators)
- **WE** = Wastes and Emissions Handling and Disposal (including e-waste from equipment replacement)

Cross-Cutting Beneficial and Health Impacts

Beneficial (positive) and health-related impacts are considered in the context of the entire project, spanning both pre-operations and operations phases. Their prefixes are:

- **B** = Beneficial Impacts (e.g., job creation, enhanced security, improved local commerce, and infrastructure development)
- **H** = Health Impacts (e.g., occupational health risks, community health and safety concerns, and improved security-related wellbeing)

Other project–environment interactions and associated or potential negative impacts that are peculiar to individual activities are discussed under the relevant project activity headings.

The following sections and tables present the identified positive and negative impacts of the Prison Security Video Surveillance Solution Project activities. Positive impacts largely relate to increased employment opportunities, enhanced security, deterrence of crimes, and improved socio-economic stability. Negative impacts are mainly linked to construction disturbances, waste generation, occupational hazards, and potential community concerns.

5.3 Project Beneficial (Positive) Impacts

The Prison Security Video Surveillance Solution Project will generate a range of beneficial impacts within the host environment. Most of these positive impacts will affect the social, economic, and health characteristics of the communities and surrounding regions.

5.3.1 Increase in Income from Transportation (B1)

During project implementation, the movement of workers, surveillance equipment, and construction materials to and from correctional facilities across the country will generate increased demand for transportation services. Local transport operators including commercial drivers, motorcycle riders, and small logistics companies are expected to benefit directly from this increased activity. Over 90% of transport services will be provided by Nigerian-owned operators, thereby supporting local economies. This will not only create direct income for drivers and vehicle owners but also generate indirect benefits for mechanics, fuel vendors, food sellers, and other allied service providers around prison host communities.

5.3.2 Increase in Income from Employment (B2)

The project will create significant employment opportunities for Nigerians during the construction, installation, and operational phases of the surveillance system in correctional facilities. Employment opportunities will span across skilled, semi-skilled, and unskilled categories, including civil works (foundation and mast erection), ICT and surveillance technology support, equipment installation, electrical works, and security services. Priority will be given to local labour and contractors from host communities, while expatriates will be engaged only for specialized technical expertise. In addition to direct employment, the project is expected to stimulate indirect jobs such as catering, petty trading, supply of construction materials, and other support services. Long-term operational employment will also be sustained for system monitoring, maintenance, and security staff, ensuring continued socio-economic benefits for correctional host communities.

5.3.3 Project-Supporting Income Generating Service Activities (B3)

The project will stimulate diverse support services and small-scale enterprises around correctional facilities where surveillance systems are to be deployed. Local businesses are expected to benefit by providing goods and services such as catering for workers, temporary accommodation, cleaning, security outsourcing, and waste management. Additional opportunities will emerge in transport support, ICT-related services, and the supply of construction materials. These activities will boost local commerce, create employment, and strengthen economic linkages between correctional host communities and adjoining towns.

5.3.4 Increased Trading of Local and National Materials (B4)

The implementation of the surveillance project within correctional facilities will require large volumes of raw materials, equipment, and consumables. Construction inputs such as cement, sand, gravel, electrical fittings, steel, batteries, and solar units will be sourced primarily from local and national suppliers. Furthermore, consumables such as food, office materials, and basic supplies for contractors and workers will be procured from nearby markets and urban centers. The influx of personnel and increased demand for goods will stimulate commercial activity and significantly expand trading opportunities around prison host communities.

5.3.5 Skills Acquisition and Training for Workers from Local Communities (B5)

The project will provide opportunities for workers recruited from prison host communities to acquire valuable vocational skills and technical training. Capacity development will focus on equipment installation, electrical works, ICT system maintenance, solar power operations, and workplace health and safety practices. These skills will not only enhance employability but also empower local workers to participate in future infrastructure, security, and ICT-driven projects beyond the life cycle of this initiative.

5.3.6 Enhanced Security and Protection of Correctional Facilities (B6)

The most significant positive impact of the project is the improved protection of Nigeria's correctional facilities through advanced surveillance systems. The deployment of high-definition cameras, intelligent monitoring platforms, and real-time data integration will strengthen prison perimeter monitoring, reduce the risks of jailbreaks, and deter external security threats. This will enhance the operational safety of correctional centers, safeguard prison staff and inmates, and boost national confidence in Nigeria's correctional infrastructure. Host communities will also benefit from a safer environment and increased stability in adjoining areas.

5.3.7 Improved Quality of Life (B7)

Improving security and creating socio-economic opportunities, the project will significantly enhance the quality of life in prison host communities. Safer environments, more stable livelihoods, and increased commercial activities will reduce poverty and social vulnerability. In addition, indirect benefits such as improved access roads, better utility services, and community-focused social investments arising from the project's presence will foster inclusive growth and sustainable development in correctional host areas.

5.3.8 Better Social Inclusion (B8)

Correctional host communities often face marginalization due to limited visibility in national development priorities. This project will help bridge such gaps by integrating these communities into national security and ICT networks. Strengthened surveillance and improved safety will foster an enabling environment for investment, attract new business opportunities, and promote stronger collaboration between government institutions and local populations. This will, in turn, encourage social inclusion, gender participation, and community trust in national security initiatives.

Table 5.9: Summary of Positive and Negative Impacts of the Prison Security Video Surveillance Solution

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance
B1	All Phases	Positive Impact	Increased income from transportation of workers, equipment, and materials to surveillance sites.	Beneficial
B2	All Phases	Positive Impact	Employment generation for skilled, semi-skilled, and unskilled workers during construction, installation, and operations.	Beneficial
B3	All Phases	Positive Impact	Opportunities for income-generating support services (catering, security, accommodation, waste management, etc.).	Beneficial
B4	All Phases	Positive Impact	Increased trading of local and national construction materials, ICT equipment, and consumables.	Beneficial
B5	All Phases	Positive Impact	Skills acquisition and technical training in ICT, surveillance systems, solar power, and electrical works.	Beneficial
B6	Operations	Positive Impact	Enhanced security at prisons	Beneficial
B7	Operations	Positive Impact	Improved quality of life from safer communities, stable commerce, and social development.	Beneficial
B8	All Phases	Positive Impact	Better social inclusion by integrating Prison host communities into national infrastructure and development.	Beneficial
PP1	Pre-Operations – Physical Presence of Workers/Equipment	Social	Pressure on existing infrastructure (roads, housing, utilities).	Moderate
PP2	Pre-Operations – Physical Presence	Economic	Temporary inflation, disruption of local trade patterns.	Moderate
PP3	Pre-Operations – Physical Presence	Socio-cultural	Impacts on local customs, community relations, and security perception.	Moderate
SC1	Pre-Operations – Site Clearing and Excavation	Biophysical	Loss of vegetation, soil disturbance, and habitat alteration.	Moderate
SC2	Pre-Operations – Site Clearing	Biophysical	Noise, dust, and vibration from earthworks and equipment.	Low
SC3	Pre-Operations – Site Clearing	Social	Possible land acquisition, displacement of small farms/structures.	Moderate
EI1	Pre-Operations – Equipment	Biophysical	Temporary visual intrusion from towers/masts.	Low

	Installation			
EI2	Pre-Operations – Equipment Installation	Biophysical	Risk of soil and water contamination from fuel, lubricants, and chemicals.	Moderate
WE1	Pre-Operations – Waste and Emissions	Pollution	Generation of solid wastes (packaging, scrap metal, plastics).	Moderate
WE2	All Phases – Waste and Emissions	Pollution	E-waste and hazardous waste from batteries, solar panels, and electronic parts.	Moderate
OM1	Operations – Surveillance Activities	Biophysical	Visual impacts of camera masts/towers on landscape.	Low
OM2	Operations – Surveillance Activities	Health	Concerns over electromagnetic exposure from communication equipment.	Low
OM3	Operations – Power Systems	Pollution	Minor air/noise emissions from backup generators.	Low
OM4	Operations – Maintenance	Pollution	Waste generation from faulty/obsolete surveillance equipment.	Moderate
H1	All Phases	Health	Risks from poor sanitation, solid waste, and dust exposure.	Moderate
H2	Pre-Operations / Operations	Health	Communicable diseases linked to labour influx (HIV, malaria, etc.).	Moderate
H3	Pre-Operations / Operations	Health	Occupational accidents (heights, electrocution, machinery).	High
H4	Operations	Health	Road safety risks from increased traffic and transport of equipment.	Moderate
H5	Operations	Health	Psychosocial stress in communities due to heightened military/security presence.	Low
CM1	All Phases	Cumulative	Land take for multiple surveillance sites at Prison	Low
CM2	All Phases	Cumulative	Increased pressure on transport systems, housing, and services.	Moderate
D1	Decommissioning	Social	Loss of jobs and income from project activities.	Moderate
D2	Decommissioning	Biophysical	Risks from improper dismantling and disposal of towers, batteries, and e-waste.	Moderate
D3	Decommissioning	Biophysical	Land restoration and remediation challenges after dismantling.	Moderate

5.4 Project Negative Impacts

5.4.1 Impacts Associated with Physical Presence of Workers and Equipment (PP)

During construction and installation, temporary base camps will be established near selected prison facilities to support site preparation, mast erection, equipment installation, and associated civil works. These camps will include prefabricated shelters, storage facilities, and small workshops. While some workers will reside within the camps, others will be accommodated in nearby host communities and towns. Inevitably, the project will attract an influx of job seekers and camp followers, drawn by the prospects of employment and increased commercial activities. This may place additional pressure on local resources, infrastructure, and social services in already vulnerable prison host communities.

5.4.1.1 Impact on Infrastructure (PP1)

The mobilization of workers and job seekers during the pre-operation phase will place significant pressure on existing infrastructure around prison facilities. Housing demand is expected to rise sharply, with many local residents leasing accommodation to migrants, which may cause temporary rental inflation. Increased traffic from construction vehicles and worker movements will intensify wear on already poor road networks, while limited health facilities, schools, and markets may become overstretched.

For this surveillance project, pre-operation activities are projected to engage between 250 and 300 workers across various prison facilities, though not all will be present at once. It is anticipated that for every direct worker, at least one dependent or job seeker may migrate into the area, leading to a potential influx of 500–600 people. With 70–80% of the workforce expected to be migrants, host communities could experience population increases of up to 5%, particularly in smaller prison host towns with populations between 1,000–10,000 people.

- Magnitude of Impact: Medium
- Areal Extent: Low – confined to prison host communities and adjoining settlements
- Frequency: Medium – intermittent during construction and installation
- Duration: Long-term – as some migrants may remain post-project, sustaining pressure on infrastructure
- Sensitivity of Receptor: Medium – due to weak infrastructure and low community resilience
- Impact Severity: Moderate
- Impact Likelihood: Medium
- Overall Impact Significance: Moderate

5.4.1.2 Impact on Micro and Macro Economy (PP2)

The physical presence of workers and job seekers during site preparation, mast foundation works, and installation will stimulate both micro and macroeconomic activity in prison host communities. Increased demand for food, accommodation, healthcare, transport, and general supplies will create income opportunities for traders, artisans, transport operators, and service providers. Local recruitment of labour will inject disposable income into rural economies, providing a temporary boost to household welfare.

At the macroeconomic level, national suppliers of construction materials, ICT equipment, and energy systems (e.g., solar panels, batteries, generators) will also benefit, enhancing backward linkages to Nigeria's manufacturing and service sectors.

However, risks include:

- Short-term inflationary pressures on essential commodities, particularly food, fuel, and medicine.
- Disproportionate effects on vulnerable groups not directly employed by the project.
- A potential "boom–bust" cycle: once installation ends, many temporary jobs and income flows will cease.
- Areal Extent: Low – confined to prison host communities
- Frequency: Medium – recurring throughout the 12–14-month construction/installation phase
- Duration: Medium – with residual effects persisting post-construction
- Sensitivity of Receptor: High – due to low-income levels and vulnerability to price shocks
- Impact Severity: Moderate
- Impact Likelihood: Medium
- Overall Impact Significance: Moderate

5.4.1.3 Social and Cultural Structure (PP3)

The influx of male-dominated migrant workers may alter the gender balance and social fabric of prison host communities. Increased disposable income among workers may fuel social issues such as prostitution, petty crime, and substance abuse. This raises risks of sexually transmitted diseases (STDs), including HIV/AIDS, and could erode traditional community value systems.

The emergence of new income streams among migrant workers may challenge traditional authority structures, while disparities between organized worker camps (with electricity, water, sanitation) and local rudimentary housing could foster resentment or social tension.

- Magnitude of Impact: Low
- Areal Extent: Low – confined to prison host communities
- Frequency: Medium – intermittent during construction
- Duration: Long-term – as social changes may persist
- Sensitivity of Receptor: Medium – fragile community structures and low resilience
- Impact Severity: Moderate
- Impact Likelihood: Medium
- Overall Impact Significance: Medium

5.4.1.4 Cultural and Archaeological Resources (PP4)

In some prison host communities, shrines, sacred groves, and burial grounds retain high cultural and spiritual value. The influx of non-local workers and construction activities may pose risks of inadvertent cultural insensitivity or accidental disturbance of undocumented cultural or archaeological sites. Any such incident may provoke mistrust, conflict, or social resistance to the project.

- Magnitude of Impact: Low
- Areal Extent: Low – localized to prison host communities with cultural resources
- Frequency: Intermittent
- Duration: High – damage to sacred sites is irreversible
- Sensitivity of Receptor: High – due to spiritual/cultural significance

- Impact Severity: Moderate
- Impact Likelihood: Low
- Overall Impact Significance: Low

5.4.1.5 Impact on Education (PP5)

Employment opportunities offering higher wages than local alternatives may attract school-aged youths, particularly in secondary schools, to abandon studies in favour of temporary project jobs. This could undermine already weak educational systems in many prison host towns, where schools are overcrowded and under-resourced.

- Magnitude of Impact: Low
- Areal Extent: Low – confined to prison host communities
- Frequency: Low
- Duration: High – education dropouts may be permanent
- Sensitivity of Receptor: Medium – fragile education systems
- Impact Severity: Moderate
- Impact Likelihood: Low
- Overall Impact Significance: Low

5.4.1.6 Impact on Groundwater Quality (PP6)

Many prison host communities rely on shallow wells and boreholes for drinking water. Poor management of fuels, lubricants, sewage, or cement residues during site works could contaminate groundwater, posing risks to human health and livelihoods.

- Magnitude of Impact: Low
- Areal Extent: Low – confined to host communities near prisons
- Frequency: Medium – possible during construction
- Duration: High – groundwater contamination is persistent
- Sensitivity of Receptor: High – heavy reliance on groundwater
- Impact Severity: Moderate
- Impact Likelihood: Medium
- Overall Impact Significance: Moderate

5.4.1.7 Impact on Transportation (TR1)

Transport of equipment, steel masts, batteries, and construction materials to prison facilities will increase vehicular traffic along narrow community roads, raising risks of accidents, congestion, and damage to access routes.

- Magnitude of Impact: Medium
- Areal Extent: Low – localized to prison access roads
- Frequency: Medium – intermittent during construction
- Duration: Low – temporary
- Sensitivity of Receptor: Medium – poor existing road infrastructure
- Impact Severity: Minor
- Impact Likelihood: Medium
- Overall Impact Significance: Low

5.4.2 Impacts of Site Clearing / Preparation Activities (SC)

Site clearing for surveillance installations at correctional facilities will involve:

- Removal of vegetation and topsoil.
- Ground levelling and excavation.
- Construction of access routes and drainage.
- Clearing of laydown yards and temporary storage areas.

These works will cause:

- Loss of vegetation cover and ecological resources.
- Soil erosion and reduced fertility.
- Displacement of smallholder farms or economic trees.
- Dust emissions and biomass waste generation.
- **Impact Significance:** Moderate

5.4.3 Onsite Construction Activities (CR)

The onsite construction phase within prison facilities will involve a range of civil, mechanical, and electrical activities necessary to establish surveillance infrastructure. These activities will occur inside prison premises or at designated perimeter zones and include mast erection, equipment shelter construction, underground and overhead cabling, installation of solar and backup power systems, and site finishing.

Key anticipated impacts include:

1. **Noise and Vibration:**
    - Generated by excavation, mast erection, concrete mixing, welding, and generator use.
    - Likely to disturb inmates, correctional staff, and nearby residents.
    - Short-term displacement of fauna in surrounding host communities.
2. **Dust and Air Quality Issues:**
    - Excavation, cement mixing, and movement of heavy vehicles will release particulate matter.
    - May cause temporary respiratory irritation, particularly for vulnerable groups (children, elderly, inmates with health conditions).
3. **Waste Generation (Solid, Liquid, Hazardous):**
    - Solid waste: scrap metal, packaging, defective parts, debris.
    - Liquid waste: wastewater, cement slurry, lubricants.
    - Hazardous waste: batteries, used oil, electronic waste (faulty ICT components).
    - Improper handling could contaminate soil, water, or prison environments.
4. **Occupational Health and Safety Risks:**
    - Mast climbing, welding, electrical installations, and lifting of heavy components pose risks of falls, electrocution, burns, and struck-by injuries.
    - Strict adherence to HSE protocols will be essential.
5. **Short-Term Community Access Disruptions:**
    - Movement of construction vehicles may restrict local access roads leading to prisons.
    - Temporary congestion expected during equipment delivery.

6. **Visual and Aesthetic Effects:**
    - Steel towers and shelters may alter the visual landscape of prison host communities, though significance is considered moderate.

Impact Assessment:

- Magnitude of Impact: Low–Medium (localized, site-specific).
- Areal Extent: Low (confined to correctional premises and immediate host communities).
- Frequency: Medium (intermittent throughout the construction phase).
- Duration: Medium (until construction is completed).
- Sensitivity of Receptors: Medium (prison environments are sensitive due to security and social stability).
- Overall Impact Severity: Low–Moderate.
- Impact Likelihood: High (construction is certain to occur).
- Overall Impact Significance: Low–Moderate

5.4.4 Installation Impacts (IN)

The installation phase will involve the assembly, mounting, and integration of surveillance infrastructure within correctional facilities. This includes fixing surveillance cameras, cabling (underground and overhead), solar systems with battery banks, ICT equipment, and security fencing. Although the physical footprint of installation is relatively small, it introduces several short-term but notable impacts:

Key anticipated impacts include:

1. **Localized Soil Disturbance**
    - Minor excavation for mast foundations, underground cabling, and equipment shelters may disturb topsoil and cause erosion if not stabilized.
    - Soil compaction from movement of installation machinery may temporarily reduce soil permeability.
2. **Air and Noise Emissions**
    - Welding, drilling, generator use, and vehicle movements will generate dust, fumes, and noise.
    - Noise could disturb inmates, staff, and surrounding host communities.
    - Impacts are short-term and reversible after installation.
3. **Waste Generation**
    - Solid waste: packaging, cable offcuts, defective ICT parts, cement bags, and metallic scraps.
    - Hazardous waste: spent batteries, oils, and solvents if poorly managed.
    - Poor disposal practices could contaminate soil or groundwater within prison premises.
4. **Visual Intrusion**
    - Erection of surveillance towers and solar panels will alter the physical landscape of correctional facilities.
    - Towers may create moderate visual impacts, especially in urban prisons where aesthetics matter.
5. **Occupational Hazards**

- High-risk activities such as mast climbing, welding, and electrical works pose dangers of falls, electrocution, burns, and struck-by accidents.
- Risks are elevated due to confined prison environments where space is limited and security restrictions apply.

Impact Assessment:

- Magnitude of Impact: Medium (localized but significant for sensitive receptors).
- Areal Extent: Low (confined within prison boundaries).
- Frequency: Medium (intermittent throughout installation period).
- Duration: Low–Medium (short-term but effects like visual intrusion remain long-term).
- Sensitivity of Receptors: High (prison environments are highly sensitive due to security and confined populations).
- Overall Impact Severity: Moderate.
- Impact Likelihood: High (installation is certain to occur).
- Overall Impact Significance: Moderate

5.4.7 Wastes and Emissions (WE)

The construction, installation, and operational phases of the project will generate a variety of wastes and emissions that, if not properly managed, could adversely affect environmental quality and human health within prison host communities.

Key Waste and Emission Streams

- **Air Emissions:** Exhaust from vehicles, heavy-duty trucks, and standby generators will release greenhouse gases (GHGs), particulates, and nitrogen oxides (NOx). These may contribute to localized air pollution, particularly in densely populated urban prison environments (e.g., Lagos, Abuja).
- **Solid Waste:** Scrap metal, wooden pallets, defective parts, and packaging materials (cartons, nylon) will be produced during mast erection and equipment installation. Poor disposal may litter the prison environment and surrounding host communities.
- **Liquid Waste:** Effluents from equipment washing, stormwater runoff, and domestic sewage from worker camps can pollute surface drains and groundwater if untreated.
- **Hazardous Waste:** Used batteries, waste oils, lubricants, and electronic waste (e-waste from faulty ICT components) pose serious risks if not collected and disposed of through certified channels. Leakage of acids and oils can contaminate soil and water sources.
- **Noise Emissions:** Machinery, welding, drilling, and power generators will temporarily elevate noise levels, disrupting prison operations, nearby residential communities, and wildlife in semi-rural prison sites.

Impact Characteristics

- Magnitude: Medium – due to the diverse waste streams and cumulative effects across multiple prison facilities.
- Areal Extent: Localized to prison premises and immediate host communities.
- Frequency: Continuous during construction and operation phases.
- Duration: Medium to long-term – depending on waste management practices and persistence of hazardous materials.

- Sensitivity of Receptor: High – since prisons and surrounding communities are vulnerable to poor waste management and pollution.

Overall Impact Significance: Moderate–High

5.4.8 Health Impacts (H)

The implementation of the surveillance project within prison facilities and host communities poses several direct and indirect health risks. These risks are associated with construction activities, worker influx, waste mismanagement, and the operation of surveillance equipment.

Key Health Risks

- **Respiratory and Waterborne Diseases:** Poor waste disposal, dust from site preparation, and potential contamination of groundwater/surface water from effluents or fuel spills may increase incidences of respiratory illnesses, diarrhoea, cholera, and typhoid among workers, inmates, and surrounding communities.
- **Communicable Diseases (HIV/AIDS, STDs, Malaria):** Influx of migrant workers and job seekers during construction heightens the risk of sexually transmitted diseases, particularly HIV/AIDS. In addition, stagnant water from poorly managed construction sites may promote mosquito breeding, increasing malaria prevalence.
- **Occupational Accidents:** Mast erection, welding, cabling, and electrical works pose significant safety hazards, including falls from heights, injuries from heavy equipment, and electrocution. Inadequate Personal Protective Equipment (PPE) use may worsen these risks.
- **Fire, Explosion, or Electrocution Hazards:** Storage and handling of diesel fuel, solar batteries, and electrical components within confined prison environments introduce risks of accidental fires, battery explosions, and electrocution, especially if safety standards are not enforced.

Impact Characteristics

- Magnitude: High – potential to affect both prison inmates and surrounding communities.
- Areal Extent: Medium – localized to prisons and adjoining settlements.
- Frequency: Medium to High – recurring through construction and operation phases.
- Duration: Medium to Long-term – depending on exposure and management.
- Sensitivity of Receptor: High – due to vulnerable populations (inmates, women, children, and healthcare-deficient communities).

Overall Impact Significance: High

5.5 Decommissioning Impacts

At the end of its operational lifecycle, the surveillance infrastructure within prison facilities will require a Decommissioning and Restoration Plan to ensure safe removal, disposal, and rehabilitation of affected sites.

Positive Impacts

- Land Restoration: Areas used for towers, shelters, and access routes may be restored for alternative institutional or community use (e.g., open space, agriculture, or utility infrastructure).
- Scrap Recycling: Steel masts, cabling, and other materials can be recycled, generating economic value and reducing environmental footprint.

- Temporary Employment: Local labour will be engaged for dismantling, waste management, transportation, and restoration activities, creating short-term job opportunities.

Negative Impacts

- Noise and Dust: Dismantling of masts, shelters, and generators will produce short-term noise and dust, affecting nearby prison staff, inmates, and host communities.
- Traffic Congestion: Movement of dismantled materials and equipment may temporarily strain local road networks.
- Hazardous Waste Risks: Improper disposal of solar batteries, oils, ICT equipment, or fuel residues could contaminate soil and water resources.
- Access Disruptions: Temporary blockages within prison premises and adjacent routes may affect daily activities, inmate logistics, and local mobility.

Impact Characteristics

- Magnitude: Low to Medium
- Areal Extent: Localized within prison facilities and adjoining host communities
- Frequency: Short-term, primarily during dismantling and transport
- Duration: Temporary and reversible with mitigation
- Sensitivity of Receptor: Medium – prisons and nearby settlements are sensitive to waste, dust, and access restrictions

Overall Impact Significance: Mostly short-term and reversible with proper mitigation measures

CHAPTER SIX

MITIGATION MEASURES

6.1 Introduction

Mitigation measures are actions designed to enhance the positive impacts of a project while minimizing or eliminating adverse environmental and social impacts. They are essential for ensuring that the project is implemented in a manner consistent with environmental sustainability, community well-being, and regulatory compliance.

For the Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution, mitigation measures will address the potential impacts identified in earlier chapters, covering biophysical, socio-economic, health, and occupational safety aspects. Depending on the nature of the impact, these measures may be integrated into the project design, pre-construction planning, construction and installation works, operational protocols, or decommissioning activities.

The mitigation approach will be implemented as a continuous process throughout the project life cycle, ensuring that risks are effectively managed at every stage from site selection and preparation, mast and shelter installation, power system integration, operations, to eventual decommissioning and site restoration.

This chapter therefore summarizes the key mitigation measures that will be applied to the surveillance project and its associated activities to assure environmental sustainability, regulatory compliance, and positive social outcomes.

6.2 Specific and General Mitigations

Specific mitigation measures have been identified during the course of this Environmental Impact Assessment (EIA) to reduce or eliminate the negative effects of impacts highlighted in Chapter 5. These measures are prioritized for impacts assessed as having high or medium overall significance (“HIGH” and “MODERATE”), but appropriate mitigations are also proposed for low significance (“LOW”) impacts in order to maintain them at acceptable levels and prevent escalation.

Specific Mitigation Measures are developed in response to the potential adverse effects associated with project design, site clearing, excavation, construction, installation, operation, and decommissioning activities. These measures are targeted, impact-specific, and aimed at reducing adverse effects to acceptable thresholds while, where possible, enhancing the project’s beneficial impacts. Following their application, the impacts are re-assessed and the residual impact levels presented to demonstrate their effectiveness.

In addition, the project design and execution philosophy for the Prison Security Video Surveillance Solution Project incorporates General Mitigation Measures. These are proactive measures embedded in the project standards, engineering specifications, and operating guidelines to ensure compliance with health, safety, environmental (HSE), and social performance objectives. They represent the project’s built-in safeguards, covering issues such as:

- Site selection criteria to minimize environmental and social disruption;

- Standardized procedures for waste management, emissions control, and noise suppression;
- Adherence to occupational health and safety (OHS) protocols for workers;
- Engagement of host communities to promote transparency and social acceptance;
- Implementation of best practices in construction and operational activities, in line with FMEnv, NESREA, and IFC/WB EHS Guidelines.

Because these general mitigations are already integral to the project plan, they were taken into account during the impact significance evaluation in Chapter 5. They are expected to substantially improve the environmental sustainability and social acceptability of the surveillance project across all its phases.

6.3 Implementation of Mitigations

Mitigation measures identified in this report are linked to specific project activities such as site clearing, excavation, construction, installation, operations, and decommissioning. In practice, however, they will be implemented through the integrated operational procedures and management systems of the Prison Security Video Surveillance Solution Project and its contractors. These systems are designed to ensure compliance with protective measures, statutory requirements, and international best practices.

Throughout this chapter, reference is made to specific plans and procedures that will address individual impacts and their mitigation measures. The overall framework for organizing and coordinating these plans is provided in the Environmental Management Plan (EMP), which is fully described in Chapter 7 of this report.

As part of its sustainability and security commitment, the Federal Ministry of Interior and the implementing agency for the surveillance project will require that all contractors and sub-contractors comply with obligations in a manner consistent with the project's Environmental, Social, Health, and Safety (ESHS) standards. Mitigation measures will therefore be enforced through contractual obligations, ensuring that compliance is mandatory across all phases of the project.

Each contractor will be required to prepare a site-specific Environmental Management Plan (EMP) aligned with this EIA and the overall project EMP. They will also be required to submit formal plans, procedures, and technical documentation to demonstrate adequate implementation of protective measures and mitigation requirements identified in this report.

Contractor Submissions (for approval prior to mobilization):

- Environmental Management Plan (EMP);
- Waste Management Plan;
- Emergency Response and Contingency Plan;
- Security and Access Control Plan.

Project-Level Plans to be Developed by the Implementing Agency:

- Influx Management Plan;
- Labour Management Plan (including worker Code of Conduct and job rules);
- Compensation and Livelihood Restoration Plan;
- Community Development Plan;
- Transportation and Journey Management Plan.

The Environmental Management Plan (EMP) presented in Chapter 7 will specify monitoring requirements, performance indicators, and reporting mechanisms to evaluate the effectiveness of mitigation measures. Where monitoring indicates that a mitigation measure is not achieving its intended outcome, the project management will review and adopt corrective or alternative measures to strengthen environmental and social protection.

Table 6.1: Summary of Impacts, Mitigations and Residual Impacts of the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Residual Impact
B1	All Phases	Positive	Increased income from transportation of workers, equipment, and materials.	Beneficial	Ministry of Interior (MoI) shall • Engage local transport contractors. • Train drivers on defensive driving & safety • Schedule heavy truck movements during off-peak hours. • Provide community sensitization on traffic safety.	Beneficial
B2	All Phases	Positive	Employment generation for skilled, semi-skilled, and unskilled workers.	Beneficial	Ministry of Interior (MoI) shall • Prioritize local labour recruitment. • Provide equal employment opportunities (gender/youth). • Ensure fair wages & contracts. • Establish skills transfer and apprenticeship programmes.	Beneficial
B3	All Phases	Positive	Opportunities for support services (catering, accommodation, etc.).	Beneficial	Ministry of Interior (MoI) shall • Contract local SMEs for catering & security • Establish transparent procurement process. • Provide training for SMEs to meet project standards. • Support waste/recycling businesses in host communities.	Beneficial
B4	All Phases	Positive	Increased trading of local and national materials and ICT equipment.	Beneficial	Ministry of Interior (MoI) shall • Source non-critical materials locally. • Partner with local cooperatives for supply chains. • Encourage fair pricing and trade standards. • Establish procurement monitoring to avoid elite capture.	Beneficial
B5	All Phases	Positive	Skills acquisition and training in ICT, surveillance, solar systems.	Beneficial	Ministry of Interior (MoI) shall • Provide structured ICT/electrical skills training. • Organize workshops on surveillance system maintenance. • Engage local institutions for vocational training. • Issue certification for workers after training.	Beneficial
B6	Operations	Positive	Enhanced security, deterrence of crime.	Beneficial	Ministry of Interior (MoI) shall • Integrate project with NSCDC operations. • Provide community awareness on surveillance benefits. • Establish complaint reporting system for citizens • Train security personnel in human rights compliance.	Beneficial
B7	Operations	Positive	Improved quality of life from safer communities and commerce.	Beneficial	Ministry of Interior (MoI) shall • Ensure regular security patrol integration. • Support social infrastructure projects (schools/clinics).	Beneficial

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Residual Impact
					• Establish feedback platforms for communities. • Promote inclusive community safety programmes.	
B8	All Phases	Positive	Better social inclusion by integrating host communities.	Beneficial	Ministry of Interior (MoI) shall • Prioritize community participation in decision-making. • Implement social outreach programmes. • Provide scholarships/skills support to youth. • Establish grievance redress and community liaison offices.	Beneficial
PP1	Pre-Operations – Physical Presence	Social	Pressure on existing infrastructure (roads, housing, utilities).	Moderate	Ministry of Interior (MoI) shall • Develop Influx Management Plan. • Provide closed workers' camps with amenities. • Prioritize local labour to reduce in-migration. • Support host communities with infrastructure upgrades.	Low
PP2	Pre-Operations – Physical Presence	Economic	Temporary inflation, disruption of trade.	Moderate	Ministry of Interior (MoI) shall • Monitor food/commodity prices. • Strengthen local cooperatives & microfinance groups. • Phase workforce demobilization to reduce boom-bust effects. • Encourage local entrepreneurship to stabilize supply.	Low
PP3	Pre-Operations – Physical Presence	Socio-cultural	Risks of prostitution, crime, social tensions.	Moderate	Ministry of Interior (MoI) shall • Conduct HIV/STD awareness campaigns. • Create local cultural orientation/induction programmes. • Employ female/youth workers where possible. • Support traditional institutions in conflict mediation.	Low
SC1	Pre-Operations – Site Clearing	Biophysical	Loss of vegetation, soil disturbance, habitat alteration.	Moderate	Ministry of Interior (MoI) shall • Restrict clearing to approved zones. • Stockpile and reuse topsoil. • Implement reforestation and landscaping. • Prohibit poaching or logging by project staff.	Low
SC2	Pre-Operations – Site Clearing	Biophysical	Noise, dust, vibration from equipment.	Low	Ministry of Interior (MoI) shall • Spray water to suppress dust. • Maintain silencers/mufflers on equipment. • Restrict noisy operations to daytime. • Provide PPE (earplugs, masks) to workers.	Low
SC3	Pre-Operations – Site Clearing	Social	Land acquisition, small farm displacement.	Moderate	Ministry of Interior (MoI) shall • Implement Compensation & Livelihood Plan.	Low

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Residual Impact
					• Provide training for alternative livelihoods. • Establish grievance redress system. • Ensure timely compensation before land take.	
EI1	Pre-Operations – Equipment Installation	Biophysical	Visual intrusion from towers/masts.	Low	Ministry of Interior (MoI) shall • Blend towers with natural colours. • Use existing disturbed areas for siting. • Plant trees as natural screen buffers. • Minimize lighting spill (down-lighting).	Low
EI2	Pre-Operations – Equipment Installation	Biophysical	Risk of soil/water contamination from fuel/chemicals.	Moderate	Ministry of Interior (MoI) shall • Store fuels in bunded areas. • Develop Spill Prevention & Response Plan. • Train staff in hazardous materials handling. • Conduct regular inspections of storage sites.	Low
WE1	Pre-Operations – Waste & Emissions	Pollution	Solid waste generation from packaging, metals, plastics.	Moderate	Ministry of Interior (MoI) shall • Develop Waste Management Plan. • Enforce segregation at source. • Engage licensed waste contractors. • Conduct regular audits of waste streams.	Low
WE2	All Phases – Waste & Emissions	Pollution	E-waste from batteries, solar panels, electronics.	Moderate	Ministry of Interior (MoI) shall • Develop E-Waste Policy. • Return faulty batteries to suppliers. • Contract certified recyclers. • Train workers on safe handling of e-waste.	Low
OM1	Operations – Surveillance	Biophysical	Visual impacts of masts/towers.	Low	Ministry of Interior (MoI) shall • Plant buffer vegetation. • Design towers to reduce glare. • Avoid siting towers near sacred landscapes. • Engage communities in siting decisions.	Low
OM2	Operations – Surveillance	Health	Concerns over electromagnetic exposure.	Low	Ministry of Interior (MoI) shall • Implement EMF Safety Program. • Set exposure monitoring equipment. • Restrict public access near antennas. • Rotate staff to limit exposure.	Low
OM3	Operations – Power Systems	Pollution	Minor emissions from backup generators.	Low	Ministry of Interior (MoI) shall • Use low-emission generators • Maintain equipment regularly.	Low

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Residual Impact
					• Install acoustic enclosures. • Monitor emissions against NESREA standards.	
OM4	Operations – Maintenance	Pollution	Waste generation from obsolete surveillance equipment.	Moderate	Ministry of Interior (MoI) shall • Establish E-Waste Collection Centres. • Contract approved disposal firms. • Train staff in safe dismantling of equipment. • Monitor disposal chain for compliance.	Low
H1	All Phases	Health	Sanitation, solid waste, dust exposure.	Moderate	Ministry of Interior (MoI) shall • Develop Contractor Sanitation Plans. • Provide mobile toilets and water supply. • Conduct hygiene awareness campaigns. • Regular health monitoring of workers.	Low
H2	Pre-Operations/Operations	Health	Communicable diseases from labour influx.	Moderate	Ministry of Interior (MoI) shall • Periodic STD & malaria campaigns. • Provide medical screening for workers. • Establish project clinic with first aid. • Collaborate with LGAs for health support.	Low
H3	Pre-Operations/Operations	Health	Occupational accidents (heights, electrocution, machinery).	High	Ministry of Interior (MoI) shall • Enforce OHS standards. • Provide PPE and training. • Develop Emergency Response Plans. • Conduct regular safety drills.	Moderate
H4	Operations	Health	Road safety risks from equipment transport.	Moderate	Ministry of Interior (MoI) shall • Develop Journey Management Plan. • Train drivers on defensive driving. • Install road signage in host communities. • Provide insurance for transport activities.	Low
H5	Operations	Health	Psychosocial stress from security presence.	Low	Ministry of Interior (MoI) shall • Implement community engagement forums. • Train security forces in human rights. • Provide grievance redress system. • Support community peacebuilding activities.	Low
CM1	All Phases	Cumulative	Land take for multiple surveillance sites.	Low	Ministry of Interior (MoI) shall • Advocate for land-use master planning. • Limit site footprint to minimum needed. • Rehabilitate land after use.	Low

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Residual Impact
					• Support conservation offsets (green belts).	
CM2	All Phases	Cumulative	Increased pressure on services, housing, transport.	Moderate	Ministry of Interior (MoI) shall • Collaborate with state gov't for infrastructure upgrades. • Develop Community Development Agreements. • Provide temporary housing for workers. • Monitor community wellbeing indicators.	Low
D1	Decommissioning	Social	Job and income losses.	Moderate	Ministry of Interior (MoI) shall • Develop worker exit programmes. • Provide retraining and reskilling schemes. • Support SME development in host communities. • Implement grievance mechanism for affected workers.	Low
D2	Decommissioning	Biophysical	Risks from improper dismantling & disposal.	Moderate	Ministry of Interior (MoI) shall • Develop Decommissioning & Disposal Plan. • Engage licensed waste contractors. • Train workers in safe dismantling. • Monitor disposal sites for compliance.	Low
D3	Decommissioning	Biophysical	Land restoration challenges.	Moderate	Ministry of Interior (MoI) shall • Restore sites with native vegetation. • Re-contour land to prevent erosion. • Monitor soil and water post-decommissioning • Partner with LGAs on restoration programs.	Low

CHAPTER SEVEN

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 Introduction

An Environmental Management Plan (EMP) is a structured programme used in the management of project operations to ensure environmental sustainability. Within an Environmental Impact Assessment (EIA), the EMP provides the procedures and processes to be incorporated into project activities to continuously measure, check, and improve compliance with, and effectiveness of, the mitigation measures recommended for minimizing or eliminating identified negative impacts throughout the project's life cycle. In addition, the EMP ensures compliance with statutory requirements and corporate environmental, health, and safety (EHS) policies guiding the operations of the proposed project.

For the Nigeria Internal Security Project Phase II – Proposed Nigeria Internal Security Project Phase II - Prison Security Video Surveillance Solution, the EMP will be implemented from the project planning stage through to decommissioning. During the planning phase, mechanisms for the effective implementation of mitigation measures will be put in place. During construction and operational phases, the EMP will serve as a monitoring tool to ensure compliance of environmental attributes with applicable national regulations and international standards.

This EMP has been developed to address all known project activities, including site preparation, civil works, installation of surveillance infrastructure, network integration, and operational activities. It takes into account the predicted impacts of the proposed project (as outlined in Chapter 5) and the prescribed mitigation measures (as detailed in Chapter 6).

The implementing authorities of the Nigeria Internal Security Project Phase II shall integrate this EMP into all stages of project activities to manage, monitor, and control potential impacts on the biophysical and socio-economic environment, as well as safeguard the health and safety of workers, communities, and security personnel. The EMP shall also ensure alignment with Nigerian regulatory frameworks (FMEnv, NESREA, where applicable) and relevant international standards, including the World Bank Environmental and Social Framework (ESF), IFC Performance Standards, and Equator Principles.

The EMP forms part of the broader Environmental and Social Management System (ESMS) for the project. It is designed to achieve compliance with Health, Safety, and Environmental (HSE) requirements, institutional responsibilities, and other international commitments. Specifically, the EMP establishes the linkages between:

- Each significant impact identified in the EIA (high or moderate significance);
- Relevant mitigation measures, including construction and operational controls;
- Monitoring approaches for verifying effectiveness and compliance;
- Regulatory requirements, institutional roles, and responsibilities; and
- Project-specific best practices, operational procedures, and work instructions.

Accordingly, this EMP applies to all phases and components of the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, ensuring that environmental, health, and social performance is safeguarded in line with both national and international obligations.

7.2 Policies

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is committed to implementing robust Health, Safety, and Environment (HSE) policies and sustainability commitments. These policies affirm the project proponent's dedication to conducting operations in a socially responsible, ethical, and transparent manner while protecting the health and safety of personnel, host communities, and the environment.

In its HSE Policy, the project has committed to:

- Integration of HSE in Operations: Incorporate health, safety, and environmental considerations into every aspect of project planning, design, construction, and operation, with clear objectives to drive continual improvement.
- Regulatory Compliance: Comply fully with all relevant Nigerian environmental, health, and safety laws, regulations, and guidelines, as well as applicable international standards (World Bank ESF, IFC Performance Standards, Equator Principles).
- Stakeholder Communication: Establish and maintain effective communication with contractors, host communities, government agencies, and other stakeholders on all health, safety, and environmental matters.
- Best Practices and Risk Management: Apply relevant standards, good engineering practices, and risk management principles to safeguard health, safety, and the environment, ensuring the reliability, integrity, and efficiency of surveillance facilities and installations.
- Leadership and Transparency: Demonstrate socially responsible leadership by striving for exemplary HSE performance and publicly reporting progress on sustainability commitments.
- Resource Conservation: Conserve project assets and natural resources, minimize emissions, discharges, and waste, and ensure efficient energy use throughout construction and operation phases.
- Hazard Identification and Risk Control: Identify actual or potential HSE hazards arising from project activities, conduct systematic risk assessments, and implement effective measures to mitigate risks.
- Systematic HSE Planning: Develop and implement a comprehensive HSE Management Plan, supported by prioritized procedures that collectively form a functional management system.
- Emergency Preparedness: Maintain adequate preparedness and response mechanisms to manage emergencies and incidents that may arise during project execution.
- Contractor and Subcontractor Compliance: Clearly communicate HSE requirements to contractors and subcontractors, ensuring that their activities align with the overarching HSE Policy and standards of the project.
- Compliance Assurance: Implement a robust compliance program, including periodic audits, inspections, and corrective actions, to ensure adherence to this policy.
- Resourcing and Capacity Building: Adequately allocate resources and build capacity for effective health, safety, and environmental management functions across all stages of the project.

The primary vehicles through which the Nigeria Internal Security Project Phase II will achieve these commitments are:

1. A comprehensive HSE Management System (HSE-MS) designed to integrate with the Environmental and Social Management System (ESMS) of the project.
2. Planning documents, including this Environmental Management Plan (EMP) and supporting operational and monitoring frameworks, which guide implementation, reporting, and compliance assurance.

7.3 Planning

7.3.1 Management Programme

This Environmental Management Plan (EMP) has been designed to meet the management programme requirements of the World Bank Environmental and Social Framework (ESF), IFC Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts), and Nigeria's national environmental regulations. The goal is to establish and implement a structured programme of mitigation and performance-improvement measures that address the identified environmental and social risks associated with the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution.

7.3.2 Environmental Management Plan

The primary objective of this EMP is to ensure full compliance with the project's HSE Policy, regulatory requirements, and mitigation commitments outlined in this EIA. The EMP outlines the specific actions, timelines, and responsibilities necessary to achieve these objectives.

The project adopts a systematic approach in line with ISO 14001: Environmental Management Systems to ensure effective planning, implementation, and continuous improvement. The EMP integrates policies, plans, and procedures while assigning clear roles and responsibilities across project actors.

This EMP provides overarching guidance and shall take precedence over contractors' Environmental Management Plans (C-EMPs). Engineering, Procurement, and Construction (EPC) Contractors will be required to prepare project-specific management plans that detail the what, where, and how of applying mitigation measures, monitoring their effectiveness, and reporting results.

The EMP incorporates several associated plans that provide detailed frameworks for compliance, including:

- HSE Management Plan (Safety Plan);
- Waste Management Plan;
- Emergency Preparedness and Response Plan;
- Influx Management Plan;
- Labour Management Plan (including Job Rules and Codes of Conduct);
- Community Relations and Development Plan; and
- Journey/Logistics Management Plan.

Other supporting plans that are linked to the EMP but broader in scope include:

- Health Management Plan; and
- Compliance and Permitting Plan.

7.3.2.1 EPC Contractor Management Plan(s)

EPC Contractors engaged to deliver the surveillance infrastructure will be required to:

- Comply with relevant Nigerian and international HSE legislation, regulations, and guidelines;
- Align their management systems with the overarching project HSE Management System; and
- Conform to the project's technical, quality, and environmental specifications.

As a contractual requirement, EPC Contractors must develop and submit specific HSE management plans covering:

- HSE Policy Statements, Programs, and Management Systems;
- HSE Organizational Structure and Responsibilities;
- HSE Procedures and Work Instructions;
- Employee HSE Training and Competency Development;
- Waste Management Plan;
- Emergency Response and Evacuation Plan;
- Land Transportation and Journey Management Plan;
- Hazardous Materials Management Plan; and
- Occupational Health, Industrial Hygiene, and Medical Protection Plans.

In addition, EPC Contractors must provide detailed documentation for:

- Implementation of mitigation and monitoring measures identified in the EIA/EMP;
- Local Content development strategies;
- Security Management and Protocols;
- Logistics and Material Handling; and
- Community Relations and Stakeholder Engagement.

All EPC Contractor plans must conform to the overarching EMP for the Nigeria Internal Security Project Phase II. Plans will be reviewed and approved by the project proponent before commencement of works. Contractors will be obligated to self-monitor compliance with their plans and provide regular monitoring reports.

The project proponent (and regulators where applicable) will conduct routine audits and inspections of EPC Contractors' operations. Contractors will be required to allocate adequate resources for HSE management, including ensuring sub-contractor compliance and maintaining an emergency stop-work mechanism to be triggered in case of significant environmental or safety risks.

7.4 Implementation

7.4.1 Management Organization

In line with Nigerian regulatory requirements and applicable international standards, the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution shall establish a dedicated HSE management organization. This structure clearly defines roles, responsibilities, and authority levels required to implement an effective HSE Management System. It also provides for the necessary training, communication pathways, and accountability mechanisms to ensure compliance with the Environmental Management Plan (EMP).

During the pre-construction and construction phases, all instructions and official communications relating to environmental and social issues shall follow the generic organogram presented in Figure 7-1. This organizational structure sets out lines of authority and communication among the project proponent, contractors, consultants, and regulators. It will be subject to review and adjustment as the project progresses.

The roles and responsibilities of each key actor in the implementation of this EMP are described in Table 7.1 and further elaborated below.

7.4.1.1 Project HSE Manager

The Project HSE Manager shall:

- Oversee the implementation, administration, and enforcement of the EMP within all project areas, including construction sites, surveillance installation locations, and support facilities.
- Ensure adherence to the conditions, responsibilities, and provisions contained in the EMP and associated plans.
- Regularly update the EMP to reflect monitoring results, lessons learned, and evolving best practices, as well as findings from the EIA.
- Ensure that EMP requirements are integrated into all project tender documents, and that prospective contractors commit to full compliance.
- Appoint an HSE Supervisor to continuously monitor implementation and ensure compliance with EMP provisions throughout construction and operation.
- Provide periodic reports to the Project Management Unit (PMU), Federal Ministry of Interior, and other oversight bodies on EMP implementation status, including compliance levels and corrective actions.
- Notify the project's management and regulatory authorities of the commencement of major construction or installation operations, including confirmation of EMP compliance arrangements.
- Be accountable to relevant regulatory authorities (e.g., FMEnv, NESREA, and state environmental agencies) for any contravention of the EIA Approval, Environmental Authorization, or non-compliance by contractors under their supervision.

The Project HSE Manager will work closely with the Construction/Installation Manager to ensure that all environmental, health, and safety issues are addressed during project execution.

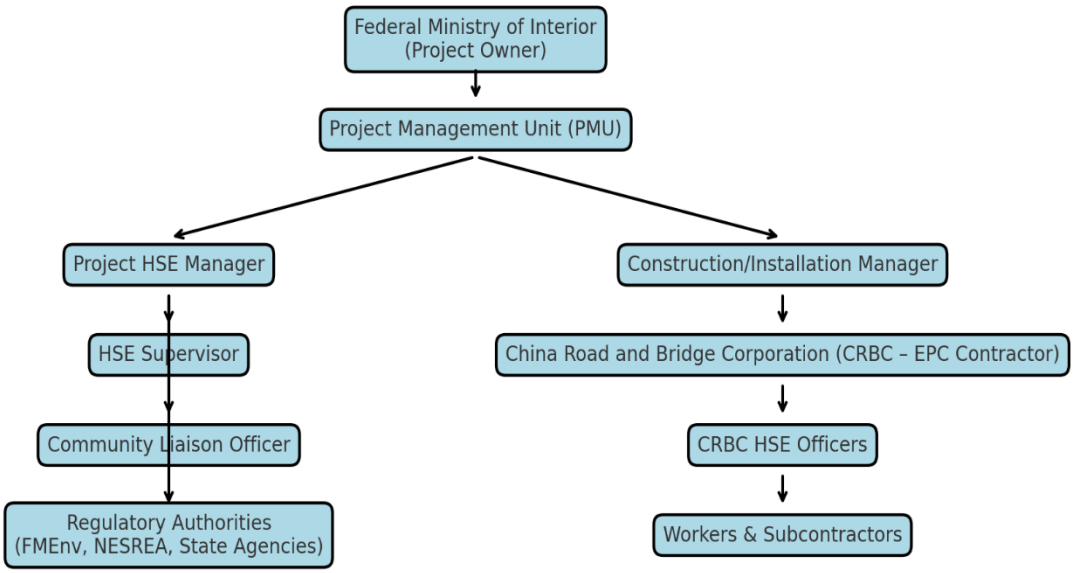

Figure 7-1: HSE Responsibility and Communication Organogram

7.4.1.2 Technical Advisory Committee

The role of the Technical Advisory Committee (TAC) will be to provide the Project Proponent with expert comments and input on the following:

- The contents of the EMP and the need for periodic review and updating;
- The design, installation, and construction of surveillance facilities;
- Compliance with the EMP and other regulatory permit conditions; and
- Documentation and reports produced as part of the EMP.

The Committee shall function strictly as an advisory forum. It will not interfere with the administrative functions of the Project Management Unit (PMU) or the professional duties of staff, nor will it impair the ability of staff to implement policy decisions of the Project Owner (Federal Ministry of Interior). The Committee has no legal standing except as it relates to providing advisory comments on the EMP. The TAC may also be invited to form part of the Audit Committee during compliance reviews by the PMU.

7.4.1.3 The HSE Supervisor

The HSE Supervisor shall be appointed for the duration of all pre-construction and construction activities. The Supervisor will be responsible for monitoring, reviewing, and verifying compliance with the EMP by China Road and Bridge Corporation (CRBC – EPC Contractor) and subcontractors engaged on the project.

The HSE Supervisor shall:

- Visit the work sites regularly to ascertain compliance, attend contractor meetings, and participate in monthly site meetings with the project management team. The Supervisor should preferably reside on site or nearby during the implementation phase.
- Monitor and verify that the EMP is adhered to at all times and take corrective action if specifications are not followed.
- Ensure environmental impacts are minimized and mitigation measures effectively applied.
- Review and approve construction method statements together with the Consultants/Engineers Representative and the Technical Advisory Committee.
- Support the Contractor in finding environmentally responsible solutions to site challenges.
- Report on environmental issues at monthly site meetings and other relevant forums.
- Maintain a register of complaints and ensure community concerns are addressed promptly.
- Monitor contractor-led environmental awareness training for all new personnel, or directly deliver such training where required.
- Ensure compliance with all relevant environmental legislation.
- Compile and complete HSE performance checklists.
- Facilitate continuous environmental awareness among contractor personnel.

7.4.1.4 The Community Liaison Officer (CLO)

The Community Liaison Officer (CLO) shall:

- Serve as the main contact between host community representatives and the Project (through the HSE Supervisor, Construction Manager, and External Relations Directorate of the Ministry of Interior).

- Assist in resolving disputes between the Project, CRBC, subcontractors, and host communities.

7.4.1.5 The Contractor (China Road and Bridge Corporation – CRBC)

CRBC, as the EPC Contractor, shall ensure that:

- A dedicated person responsible for HSE matters is appointed on site.
- All employees, subcontractors, and vendors comply with the provisions of the EMP.
- The HSE Supervisor is notified of the anticipated programme of works, including details of activities to be undertaken.
- All requisite information, as required under the EMP, is submitted for approval prior to commencement of activities.
- All incidents, accidents, and non-compliance issues are reported promptly to the HSE Supervisor, along with corrective or remedial actions taken.
- Any complaints received are communicated to the HSE Supervisor.
- All personnel on site are provided with adequate HSE awareness and training.

7.4.1.6 Consultants / Construction Manager

The Consultants / Construction Manager shall:

- Ensure that all pre-construction and construction activities are executed in accordance with contract specifications and environmental requirements.
- Support the HSE Supervisor in ensuring CRBC's compliance with EMP provisions.

Table 7.1: EMP Roles and Responsibilities

Position	Responsibility
Federal Ministry of Interior / Project Management Unit (PMU)	Oversee and coordinate all project activities; ultimately responsible for HSE performance during the construction and installation phases.
Project HSE Manager	Ensure that the Project and all its contractors operate in full compliance with applicable regulatory environmental requirements and the project's HSE Management System (HSE-MS); provide technical support to line management in fulfilling HSE responsibilities.
HSE Supervisor	Assume ownership of HSE issues. Ensure that environmental regulatory requirements are met and that mitigation measures recommended in the EIA are properly implemented. Conduct regular site visits to monitor HSE compliance and supervise third-party HSE performance audits.
Community Liaison Officer (CLO)	Act as the primary liaison between the project and host communities/regulators; ensure contractor compliance with labour and community relations protocols. Manage community engagement, compensation, and land acquisition issues. Monitor, report, and support resolution of community concerns throughout the project cycle.

7.4.2 Training

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution shall identify, plan, monitor, and document all HSE training needs for personnel whose activities may have significant environmental or social impacts. The Project recognizes that it is critical for employees and contractors, at all relevant levels, to be fully aware of the Project's

environmental, social, and health policies; the potential impacts of their activities; and their roles and responsibilities in achieving conformance with established procedures and regulatory requirements.

This will be achieved through a structured and formalized HSE training programme. Training will be mandatory for all project personnel and contractors, and will emphasize:

- Environmental and social impacts that may arise from project-related activities;
- The importance of complying with EIA and EMP requirements to minimize or prevent impacts; and
- Individual roles and responsibilities for maintaining compliance, including responsibilities related to change management and emergency response.

The Project HSE Manager shall coordinate all training activities, maintain employee training records, and ensure that records are regularly monitored and reviewed. The HSE Manager will also periodically verify staff competency through discussions, direct observation, and field performance assessments.

Employees tasked with site inspections and compliance monitoring will undergo specialized training, drawing on external professional resources where necessary. Training will be coordinated by the HSE Manager and/or Community Liaison Officer prior to the commencement of site activities. Upon successful completion of training and once deemed competent, trained staff will be permitted to train additional personnel (train-the-trainer approach).

Similarly, the Project shall require that China Road and Bridge Corporation (CRBC – EPC Contractor) and any subcontractors implement structured HSE training programmes for their personnel. Each contractor is responsible for ensuring that:

- All site workers receive HSE induction and awareness training before commencing activities;
- Additional training needs are identified and provided to maintain competency; and
- Training records are maintained and available for review by the HSE Supervisor and Project Management Unit (PMU).

7.4.3 Communication

The Project HSE Manager shall be responsible for communication with regulatory authorities, while the Community Liaison Officer (CLO) shall handle interactions with host communities and the general public. The Project's Community Relations Plan will provide formal written procedures to ensure that all such communications are documented, transparent, and traceable.

With regard to HSE issues, the Managing Director of the Project Management Unit (PMU), Federal Ministry of Interior will oversee the dissemination of information necessary to mitigate project impacts. This will be achieved through coordinated public notifications (e.g., town hall meetings, press/media announcements, and public notices) and continuous stakeholder engagement.

The Project HSE Manager shall be the designated point of contact for all formal communication with regulatory authorities such as FMEnv, NESREA, and relevant State Environmental Protection Agencies. The Managing Director will be kept informed of such communications, and all pertinent information arising from these interactions will be disseminated to China Road and Bridge Corporation (CRBC – EPC Contractor) and other contractors for appropriate action.

Project communication will also occur across different levels of the PMU, CRBC, subcontractors, and federal/state regulatory authorities during project execution. These meetings may be scheduled to accommodate field visits, review work progress, or address emerging HSE concerns. Discussions are expected to focus on areas of concern, environmental and social performance (based on audits and field monitoring reports), and coordination of upcoming work plans. While CRBC's HSE staff may interact informally with regulatory representatives on routine matters, formal communications shall always be channeled through the Project HSE Manager.

7.4.4 Documentation

The Project Management Unit (PMU), Federal Ministry of Interior shall establish and maintain a formal procedure for the control of all Health, Safety, and Environment (HSE) documentation. This includes plans (e.g., the Environmental Management Plan), associated procedures, checklists, forms, monitoring reports, and other related deliverables.

The document control procedure shall describe the processes the PMU and the China Road and Bridge Corporation (CRBC – EPC Contractor) will employ for official communication of both hardcopy and electronic document submissions.

The PMU shall appoint a Document Control Manager, a senior member of staff responsible for:

- Maintaining a master register of all applicable HSE documents, including the EMP and associated plans;
- Ensuring that the register is accessible and communicated to relevant stakeholders;
- Coordinating with the Project HSE Manager to ensure document revisions are promptly disseminated; and
- Ensuring that updated documents are issued to affected parties and properly integrated into their organizational processes.

The Project HSE Manager shall be responsible for:

- Notifying relevant stakeholders (including CRBC and subcontractors) of any updates or revisions to HSE documents;
- Issuing revised copies and ensuring receipt/acknowledgment; and
- Following up to confirm that changes have been incorporated into contractor and project-level activities.

CRBC shall be required to establish and maintain its own system for HSE document control, which will be consistent with the overarching project procedure. These systems must be described in their Contractor HSE Management Plans and Site-Specific HSE Plans, and will be subject to review and approval by the PMU.

7.5 Environmental Management System (EMS)

According to ISO 14001, an Environmental Management System (EMS) is that part of the overall management framework which includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the Environmental Policy. An EMS therefore requires that an organization have in place a clear Environmental Policy supported by health, safety, and social safeguards.

For the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, a combined Health, Safety, Environment, and Social (HSES) Policy has been adopted. The EMS

provides the framework to achieve continual improvement in environmental and social performance, regulatory compliance, and sustainable development outcomes.

The Project EMS ensures that:

- All operations are consistent with Nigeria's environmental regulatory requirements (FMEnv, NESREA, and State EPAs), as well as international standards (ISO 14001, IFC Performance Standards, and World Bank ESF).
- Responsibilities and accountability for HSE performance are clearly defined.
- Adequate procedures, practices, and resources are allocated to effectively manage risks.
- Monitoring, audits, and reviews are conducted to ensure continual improvement.

The EMS includes a hierarchy of key policies, supporting documents, and programs/plans designed to assure robust HSE performance:

A. Primary Documents

- Health & Safety Policy
- Environmental Policy
- Driving and Road Safety Policy
- Harassment, Violence & Abuse Policy
- Alcohol, Drug & Substance Abuse Policy
- Contractor's HSE Policy (CRBC and subcontractors)
- Management of Change Policy

B. Primary Supporting Documents

- HSE-MS Manual (Project-level)
- Contractor's HSE Manual (CRBC and subcontractors)
- Employees' HSE Handbook
- Office HSE Manual (PMU)

C. Programs & Plans

- Short Service Employees (SSE) Induction Program
- Hazard Communication Program
- Lock-Out/Tag-Out (LOTO) Program
- Waste Management Plan
- Commitment, Training, Targets & Recognition Program
- Incident Investigation and Reporting Program
- Emergency Preparedness & Response Plan
- Behaviour-Based Safety Program
- Inspection, Audit & Compliance Program
- Journey and Transport Management Program
- Alcohol, Drug, and Smoking Control Program
- Risk Assessment & Management Program
- Ergonomics & Workplace Safety Program

7.6 Environmental Monitoring Plan

An Environmental Monitoring Plan (EMP-Mon) provides a structured schedule for the collection and analysis of environmental data through a series of systematic and repetitive measurements. According to UNEP (1996), three main types of environmental monitoring are recognized within the EIA framework:

- **Baseline Monitoring:** Measurements of environmental and social parameters during the pre-project period to establish reference conditions.
- **Effects Monitoring:** Measurements of environmental and social parameters during project construction, installation, and operational phases to detect changes attributable to project activities.
- **Compliance Monitoring:** Periodic or continuous measurement of environmental parameters and emissions/discharges to ensure compliance with regulatory standards and project commitments. Compliance monitoring is further subdivided into:
    - **Mitigation Measures Monitoring:** Verification that prescribed mitigation measures identified in the EIA are being effectively implemented.
    - **Regulatory Compliance Monitoring:** Comparison of monitoring results with statutory requirements, occupational health standards, and environmental benchmarks.

For the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution, the Project Management Unit (PMU) shall adopt a comprehensive monitoring schedule covering both effects monitoring and compliance monitoring throughout project implementation.

Baseline environmental and social conditions have already been established and documented in Chapter 4 of this report, and therefore are not repeated in this section.

The monitoring schedule prescribed by this EIA shall be implemented as the Post-EIA Monitoring Programme, under the supervision of the Project HSE Manager in collaboration with the Federal Ministry of Environment (FMEnv), NESREA, relevant State Environmental Agencies, and China Road and Bridge Corporation (CRBC – EPC Contractor).

7.6.1 Objectives of Post-EIA Environmental Monitoring

The Post-EIA Environmental Monitoring Plan for the Nigeria Internal Security Project Phase II has the broad objective of determining whether environmental or social changes occur as a result of excavation, site preparation, construction, installation, and operational activities. The monitoring plan also serves as an early warning system for detecting unanticipated adverse impacts or changes in impact trends.

Specific objectives are to:

- Verify the effectiveness of proposed mitigation measures;
- Ensure that project activities (pre-construction, construction, and operation) are carried out in accordance with prescribed mitigation measures and regulatory compliance procedures; and
- Provide an early warning mechanism such that prompt corrective actions can be taken whenever an impact indicator approaches a critical threshold.

Impact indicators will be defined in terms of carrying capacity, threshold levels, and regulatory enforcement standards. Implementation of this Post-EIA Monitoring Programme will enable the Project Management Unit (PMU) and China Road and Bridge Corporation (CRBC – EPC Contractor) to manage and control the timing, location, and level of impacts, while also generating empirical cause-and-effect data to validate predictive models of project–impact relationships.

7.6.2 Scope of the Environmental Monitoring Plan

The Environmental Monitoring Plan will cover two key categories of monitoring:

a. **Compliance Monitoring**

- Monitoring of mitigation measures during site preparation and construction.
- Monitoring of mitigation measures during operations, including equipment performance standards.

b. **Effects Monitoring**

- Sampling and analysis of discharges and affected environmental components during site preparation, construction, and operations.

The monitoring programme will establish parameters for each environmental and socioeconomic component likely to be affected by the project, including:

- Air quality
- Noise and vibration
- Water quality (surface and groundwater)
- Hydrology
- Hydrobiology and fisheries
- Vegetation and wildlife
- Soil and sediment quality
- Waste management practices
- Traffic and transport impacts
- Occupational health and safety
- Public health and safety
- Socioeconomic impacts

Based on predicted impacts and prescribed mitigation measures, this programme is considered adequate for the project.

7.6.2.1 Proposed Environmental Monitoring Programme

Across all project phases, regular data collection, audits, inspections, and monitoring will be required for each impact category at pre-determined frequencies. Monitoring schedules will be based on statutory requirements and project-specific post-EIA monitoring provisions.

Monitoring results will be reported to the Federal Ministry of Environment (FMEnv) and other relevant regulatory agencies as stipulated in approval conditions. Internal audits will be conducted by the Project HSE Manager, while external audits will be carried out by Nigerian regulators.

Monitoring frequencies may be daily, weekly, quarterly, semi-annual, annual, biennial, or continuous, depending on the parameter and regulatory requirements.

The monitoring programme will follow both Nigerian regulatory standards and the World Bank's Environmental Performance Monitoring and Supervision Guidelines (Update to the Environmental Assessment Sourcebook No. 14, 1996, and subsequent updates). For each affected environmental or social component, the programme will define:

- Monitoring objectives;
- Parameters to be measured, methods employed, sampling locations, frequency, and thresholds;
- Institutional responsibilities and timelines;
- Reporting requirements; and
- Costs and financing provisions.

7.6.2.2 Monitoring Schedule and Parameters

The Post-EIA Monitoring Programme developed for the project will include both compliance and effects monitoring. Table 7.2 (to follow) summarizes the recommended mitigation, monitoring, and training measures for each environmental resource.

After the first six months of project operations, the monitoring programme will be reviewed. Frequencies may be adjusted depending on observed trends for example, parameters consistently found below thresholds may be monitored less frequently or excluded. While the PMU will retain overall responsibility for monitoring, specific monitoring activities may be outsourced to qualified and certified contractors. Nonetheless, accountability for compliance with Regulatory Monitoring and Post-EIA Monitoring obligations will remain with the PMU.

Monitoring reports shall be submitted periodically to the FMEnv, NESREA, and other regulators in accordance with the conditions of the EIA approval.

7.6.2.3 Regulatory Approval Process

The Project shall incorporate procedures to ensure that all necessary regulatory approvals are obtained prior to site activities. Specifically:

- The FMEnv EIA approval is a mandatory requirement before the commencement of any on-site construction or installation.
- Where applicable, permits from NESREA, State Environmental Protection Agencies, and other competent authorities shall also be obtained.
- CRBC and subcontractors will be required to operate strictly within the limits of these approvals and permits.

The PMU will coordinate with regulatory bodies to ensure timely submissions, approvals, and compliance reporting throughout the project life cycle.

Table 7.2: Summary of Impacts, Mitigations, Effects Monitoring Requirements and Residual Impacts

Impact ID	Project Phase / Activity	Impact Category	Description of Environmental / Social Impact	Impact Significance	Mitigation Measures	Effects and Mitigation Compliance Monitoring	Monitoring Frequency	Responsible Party	Residual Impact
B1	All Phases	Positive	Increased income from transportation of workers, equipment, and materials.	Beneficial	Engage local transport contractors; driver training; schedule off-peak truck movements; traffic safety sensitization.	Review driver training records; transport contractor engagement reports; road safety statistics.	Quarterly	MoI/PMU, CRBC Logistics Unit	Beneficial
B2	All Phases	Positive	Employment generation for skilled, semi-skilled, and unskilled workers.	Beneficial	Prioritize local labour; equal opportunities; fair wages; skills transfer/apprenticeships.	Check % of local hires; audit employment contracts; gender/youth recruitment statistics.	Monthly	MoI/PMU, CRBC HR	Beneficial
B3	All Phases	Positive	Opportunities for SMEs (catering, accommodation, security).	Beneficial	Contract SMEs; transparent procurement; SME training; recycling businesses support.	Monitor SME contracts; procurement audit; SME capacity-building records.	Semi-annual	MoI/PMU Procurement, CRBC	Beneficial
B4	All Phases	Positive	Increased trading of local/national materials and ICT equipment.	Beneficial	Source non-critical materials locally; cooperative supply chains; fair pricing; procurement monitoring.	Procurement audit; cooperative participation review; fair pricing checks.	Quarterly	MoI/PMU, CRBC Procurement	Beneficial
B5	All Phases	Positive	Skills acquisition and training in ICT, surveillance, solar.	Beneficial	Structured training; workshops; vocational institutions engagement; certification.	Training attendance; certification records; skills audit.	Semi-annual	MoI/PMU Training Unit, CRBC	Beneficial
B6	Operations	Positive	Enhanced security, deterrence of crime.	Beneficial	Integrate with NSCDC; community awareness; complaint system; human rights training.	Security reports; awareness campaigns; complaint logs;	Quarterly	MoI/PMU, Security Agencies	Beneficial

						training records.			
B7	Operations	Positive	Improved quality of life from safer commerce.	Beneficial	Patrol integration; social infrastructure; feedback platforms; inclusive safety programmes.	Patrol schedules; infrastructure investment logs; feedback reports.	Annual	MoI/PMU, NSCDC, CRBC	Beneficial
B8	All Phases	Positive	Better social inclusion for host communities.	Beneficial	Community participation; outreach; scholarships; grievance redress.	Review participation records; scholarships awarded; grievances resolved.	Semi-annual	MoI/PMU, CLO, CRBC	Beneficial
PP1	Pre-Operations – Physical Presence	Social	Pressure on infrastructure (roads, housing, utilities).	Moderate	Influx Mgmt Plan; workers' camps; prioritize locals; support host infrastructure.	Inspect camp facilities; check local hire %; monitor service demand.	Monthly	MoI/PMU, CRBC HSE Supervisor	Low
PP2	Pre-Operations – Physical Presence	Economic	Temporary inflation, trade disruption.	Moderate	Monitor prices; strengthen cooperatives; phase demobilization; encourage entrepreneurship.	Price monitoring surveys; cooperative activity reports; entrepreneurship support review.	Quarterly	MoI/PMU, CRBC, Local Gov't	Low
PP3	Pre-Operations – Physical Presence	Socio-cultural	Prostitution, crime, social tensions.	Moderate	HIV/STD awareness; cultural induction; female/youth hiring; support traditional mediation.	Records of awareness campaigns; social audit; community liaison logs.	Quarterly	MoI/PMU, CLO, CRBC HR	Low
SC1	Pre-Operations – Site Clearing	Biophysical	Loss of vegetation, soil disturbance, habitat alteration.	Moderate	Restrict clearing; reuse topsoil; reforestation; ban poaching/logging.	Site inspection; reforestation audit; soil stockpile monitoring.	Weekly	CRBC HSE, PMU HSE	Low
SC2	Pre-Operations – Site Clearing	Biophysical	Noise, dust, vibration.	Low	Water spraying; equipment silencers; daytime limits; PPE for workers.	Dust/noise monitoring; PPE inspection; equipment	Weekly	CRBC HSE	Low

						records.			
SC3	Pre-Operations – Site Clearing	Social	Land acquisition, farm displacement.	Moderate	Compensation & Livelihood Plan; alternative training; grievance redress; timely payments.	Compensation records; grievance logs; livelihood training reports.	Quarterly	MoI/PMU, CLO	Low
EI1	Pre-Operations – Equipment Installation	Biophysical	Visual intrusion from towers/masts.	Low	Natural colours; use disturbed areas; plant buffers; minimize lighting.	Visual inspections; community feedback on siting.	Annual	CRBC HSE, PMU	Low
EI2	Pre-Operations – Equipment Installation	Biophysical	Soil/water contamination from fuel/chemicals.	Moderate	Bunded storage; Spill Plan; hazardous materials training; inspections.	Check bunded areas; spill drill records; water sampling.	Monthly	CRBC HSE, PMU	Low
WE1	Pre-Operations – Waste & Emissions	Pollution	Solid waste (packaging, metals, plastics).	Moderate	Waste Mgmt Plan; segregation; licensed contractors; audits.	Waste audits; contractor licenses; segregation checks.	Monthly	CRBC Waste Unit, PMU	Low
WE2	All Phases – Waste & Emissions	Pollution	E-waste (batteries, solar panels, electronics).	Moderate	E-Waste Policy; return batteries; recyclers; staff training.	Audit recycler certification; e-waste logs; staff training records.	Quarterly	MoI/PMU, CRBC Waste Mgmt	Low
OM1	Operations – Surveillance	Biophysical	Visual impacts of masts/towers.	Low	Plant buffers; reduce glare; avoid sacred sites; community siting input.	Site inspection; community consultation reports.	Annual	CRBC HSE, CLO	Low
OM2	Operations – Surveillance	Health	Electromagnetic exposure.	Low	EMF Safety Program; exposure monitors; restricted access; staff rotation.	EMF monitoring results; signage inspection; staff schedules.	Semi-annual	CRBC HSE, NESREA	Low
OM3	Operations – Power Systems	Pollution	Minor emissions from backup generators.	Low	Low-emission gensets; regular maintenance; acoustic enclosures; emission monitoring.	Emission monitoring; equipment records.	Quarterly	CRBC HSE, NESREA	Low
OM4	Operations – Maintenance	Pollution	Waste from obsolete surveillance equipment.	Moderate	E-Waste Collection Centres; approved disposal; safe dismantling; disposal	Disposal audit; dismantling training records; disposal chain	Semi-annual	CRBC HSE, MoI/PMU	Low

					monitoring.	checks.			
H1	All Phases	Health	Sanitation, solid waste, dust.	Moderate	Sanitation Plan; mobile toilets; hygiene campaigns; health monitoring.	Sanitation inspections; health audit reports.	Monthly	CRBC HSE, PMU	Low
H2	Pre-Operations/Operations	Health	Communicable diseases (labour influx).	Moderate	STD & malaria campaigns; medical screening; clinic/first aid; LGA collaboration.	Medical records; campaign logs; clinic service data.	Quarterly	CRBC HSE, Local Health Depts.	Low
H3	Pre-Operations/Operations	Health	Accidents (heights, electrocution, machinery).	High	Enforce OHS; PPE; Emergency Plans; drills.	Daily PPE checks; accident records; emergency drill reports.	Daily / Quarterly	CRBC HSE, PMU HSE	Moderate
H4	Operations	Health	Road safety risks (equipment transport).	Moderate	Journey Mgmt Plan; driver training; road signage; insurance.	Transport safety audits; driver records; signage inspection.	Monthly	CRBC Logistics, PMU	Low
H5	Operations	Health	Psychosocial stress from security presence.	Low	Community forums; human rights training; grievance system; peacebuilding.	Forum records; grievance logs; security training reports.	Semi-annual	MoI/PMU, CLO	Low
CM1	All Phases	Cumulative	Land take for surveillance sites.	Low	Land-use master planning; minimize footprint; land rehab; conservation offsets.	Land audits; rehabilitation inspections.	Annual	MoI/PMU, CRBC	Low
CM2	All Phases	Cumulative	Pressure on services, housing, transport.	Moderate	Work with gov't for infrastructure; CDAs; temporary housing; monitor wellbeing.	CDA records; community wellbeing indicators.	Annual	MoI/PMU, State Gov't, CLO	Low
D1	Decommissioning	Social	Job and income losses.	Moderate	Exit programmes; retraining; SME support; grievance mechanism.	Worker retraining records; grievance reports; SME support data.	Once-off / During decommissioning	MoI/PMU, CRBC HR	Low
D2	Decommissioning	Biophysical	Improper dismantling & disposal.	Moderate	Decommissioning Plan; licensed contractors; safe dismantling; disposal monitoring.	Site inspections; contractor license checks; disposal site	Weekly (during decommissioning)	PMU, CRBC, Regulators	Low

						audits.			
D3	Decommissioning	Biophysical	Land restoration challenges.	Moderate	Restore with native vegetation; re-contour land; post-restoration monitoring; LGA partnership.	Soil/water monitoring; vegetation growth checks; restoration audits.	Annual (3 yrs post-closure)	MoI/PMU, CRBC, LGA	Low

7.7 Emergency Response Planning Requirements

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution has incorporated critical safety measures into the engineering design of its surveillance and communication infrastructure to minimize risks of hazards, incidents, near misses, or accidents. Despite these preventive measures, the potential for emergencies remains due to human error, equipment malfunction, natural events, or deliberate acts of sabotage.

Therefore, it is essential to establish sound, cost-effective, and well-coordinated emergency response and contingency plans that can be promptly activated to reduce risks to human life, the environment, project assets, and host communities. These contingency plans shall cover all project facilities, installation sites, support services, transport routes, and ancillary operations.

The Project Management Unit (PMU), in collaboration with the China Road and Bridge Corporation (CRBC – EPC Contractor), shall implement international best practices in emergency preparedness and response. These procedures will:

- Ensure prompt detection, containment, and mitigation of leaks, spills, fires, structural failures, or other emergency situations;
- Provide clear lines of communication and responsibilities for emergency actions;
- Build confidence among regulators, security agencies, host communities, and the general public regarding the safety of project operations;
- Protect project personnel, contractors, and communities from unnecessary risks; and
- Minimize potential environmental and social consequences of accidents through rapid response, evacuation protocols, and coordination with security agencies (NIS, NSCDC, Police, and State Emergency Services).

The Emergency Response Plan (ERP) will include:

- Hazard Identification and Risk Assessment (HIRA) for all project phases;
- Emergency Command and Control Structure, defining responsibilities of PMU, CRBC, contractors, and community representatives;
- Notification and Communication Procedures with regulators, host communities, and first responders;
- Evacuation, Rescue, and Medical Response Protocols;
- Training and Simulation Drills for project staff, contractors, and security agencies; and
- Post-Incident Reporting, Review, and Corrective Action Procedures to ensure continuous improvement.

7.8 Checking and Corrective Action

The objective of the inspection and monitoring activities outlined in this section is to verify compliance with the Environmental Management Plan (EMP). These inspection and monitoring procedures will also be reflected in the Contractor's HSE procedures.

The China Road and Bridge Corporation (CRBC – EPC Contractor) will be responsible for implementing the environmental and social commitments of the Project Management Unit (PMU), Federal Ministry of Interior in the field on a daily basis. Auditing of inspection and monitoring activities by both CRBC and the PMU provides the mechanism to ensure compliance with regulatory requirements as well as the Project's own HSE standards and commitments.

The inspection activities described in this EMP refer to qualitative monitoring (e.g., visual inspections of construction sites, camps, and equipment). The monitoring activities described in

this EMP refer to effects and compliance monitoring, which are largely empirical, such as measurements of air quality, water quality, noise, and waste management indicators.

7.8.1 Inspection

- Inspections shall be conducted daily by CRBC's HSE Department across all active project sites.
- Findings from inspection and monitoring activities shall be documented and made available to the PMU HSE Supervisor on a weekly basis, or more frequently if required by the PMU HSE Manager.
- The inspections will include compliance checks on mitigation measures, worker safety practices, equipment maintenance, and environmental safeguards.

7.8.2 Monitoring

Monitoring will be carried out to:

- Ensure compliance with FMEnv, NESREA, and State EPA regulatory requirements.
- Evaluate the effectiveness of mitigation measures and operational controls.
- Track progress against the commitments outlined in Table 7.2 (Summary of Impacts, Mitigation, and Monitoring).

The Post-EIA Monitoring Programme developed for this project, as discussed in Section 7.6, provides the framework for monitoring all significant environmental and social impacts identified in the EIA.

7.8.3 Remediation Plans after Decommissioning

Remediation planning is incorporated into the overall project lifecycle to ensure that the environment is restored to its original or near-original condition during temporary or permanent closure of project facilities. This ensures that:

- Environmental degradation is minimized;
- Land is returned to productive or safe use; and
- Community safety and social stability are maintained after project closure.

The useful life of the surveillance infrastructure is estimated at 20 years, after which decommissioning and remediation shall be implemented.

Activities to be carried out during the decommissioning phase will include:

- Safe dismantling of surveillance towers, equipment, and ancillary infrastructure;
- Removal of all structures and restoration of affected land;
- Environmentally sound disposal or recycling of obsolete materials (including e-waste, metals, and construction debris).

The choice of remediation strategy will depend on the prevailing biophysical and social conditions at the time of decommissioning and the nature of impacts identified. Restoration will include land re-contouring, re-vegetation with native species, and monitoring of soil and water quality until the site is certified rehabilitated by regulators.

7.9 Mitigation Measures and Monitoring Implementation Budget

The costs associated with the implementation of mitigation measures, training, and environmental/social monitoring activities identified in Table 7.2 have been incorporated into the overall budget for the Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution.

These budget provisions will cover:

- Implementation of environmental and social mitigation measures;
- Capacity building and training of project staff, contractors, and community representatives;
- Environmental and social monitoring (baseline, compliance, and effects monitoring);
- Regulatory compliance audits; and
- Emergency preparedness and response measures.

The Project Management Unit (PMU), Federal Ministry of Interior, in collaboration with the China Road and Bridge Corporation (CRBC – EPC Contractor), shall ensure that adequate financial resources are allocated for EMP implementation. Costs will be refined and adjusted during project execution phases (pre-construction, construction, operations, and decommissioning) to reflect prevailing market realities and regulatory requirements at the time of implementation.

Where necessary, special provisions for unforeseen impacts or additional regulatory requirements shall also be included in contingency allocations.

CHAPTER EIGHT

DECOMMISSIONING AND ABANDONEMENT

8.1 Introduction

The Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution is designed for an operational lifespan of 20–30 years, after which decommissioning and abandonment may be required. This stage marks the end of the system's useful life and requires safe dismantling, reuse, or disposal of surveillance towers, ICT infrastructure, solar systems, and associated facilities in compliance with Federal Ministry of Environment (FMEnv), NESREA, and international best practices.

Decommissioning may also occur earlier if facilities (e.g., towers, cameras, solar systems, ICT servers, or control rooms within prison premises) become obsolete, uneconomical, or if the Project Management Unit (PMU) under the Federal Ministry of Interior deems discontinuation necessary. Planning for decommissioning will begin at least five years before closure to ensure safety, environmental sustainability, and community acceptance.

8.1.1 Refurbishment and Re-use

Where possible, surveillance towers, cameras, ICT servers, and monitoring equipment will be refurbished and redeployed either within the Nigerian Correctional Service (NCoS) or to other government security institutions. This approach supports a circular economy model, reduces waste, and maximizes the lifespan of project assets.

8.1.2 Scrapping

Steel masts, batteries, and obsolete ICT/electronic components will be dismantled and recycled. Only certified recycling contractors will be engaged to ensure compliance with FMEnv/NESREA e-waste regulations and environmental safety.

8.1.3 Offsite Waste Disposal

Electronic waste such as cameras, servers, solar batteries, storage units, and cabling that cannot be reused will be transferred to licensed hazardous waste facilities. Only certified waste handlers will be engaged, applying approved treatment technologies to prevent contamination of prison host communities.

8.1.4 Remediation and Re-vegetation

Decommissioned sites within prison environments will be rehabilitated to ensure safe and beneficial reuse. Activities will include:

- Soil and groundwater monitoring to identify and remediate contamination from oils, batteries, or fuel storage.
- Removal or stabilization of mast foundations to eliminate physical hazards.
- Restoration of prison yards and access routes used during construction.
- Re-vegetation of disturbed areas with grasses and tree species suitable for prison environments.

The Decommissioning and Abandonment Plan (DAP) will define:

- Facilities and equipment to be dismantled.
- Methods for reuse, recycling, or safe disposal.
- Procedures for engaging prison authorities, host communities, and regulators.

- Measures to mitigate environmental, social, and occupational risks.
- Post-decommissioning monitoring and land-use protocols.

8.2 Stakeholder Consultation for Decommissioning

The decommissioning phase will be undertaken in close consultation with:

- Prison authorities (Nigerian Correctional Service, NCoS).
- Host communities and traditional leaders surrounding correctional centers.
- Federal and State regulators (FMEnv, NESREA, State Environmental Protection Agencies).
- Security agencies (NIS, NSCDC, Nigeria Police Force, NEMA/SEMA).
- NGOs and civil society organizations concerned with human rights, waste management, and prison welfare.

The Decommissioning Task Force will include representatives of the PMU, EPC Contractors, regulatory agencies, NCoS officials, and local stakeholders to ensure transparency, accountability, and community support.

8.3 Wind-down Operations

As facilities approach closure, the PMU will implement a structured wind-down plan that will include:

- Gradual deactivation of surveillance systems to minimize security risks.
- Workforce rationalisation and redeployment, prioritizing retraining of staff for alternative ICT/security roles.
- Skill's re-training and livelihood support for workers and contractors affected by closure.
- Early notification to prison management, staff, and host communities to facilitate transition.

8.4 Decommissioning of Facilities

At project closure, all surveillance-related infrastructure within prison facilities will be safely dismantled.

Key measures include:

- Air Emissions Control: Dust suppression during dismantling of towers and shelters.
- Noise Management: Limiting demolition noise to daytime hours, with PPE for workers.
- Waste Handling: Segregation into recyclable, inert, and hazardous streams; strict handling of e-waste (batteries, solar cells, electronics).
- Site Restoration: Stabilization or removal of tower bases, restoration of prison grounds, and conversion of cleared areas into functional spaces.
- Reuse/Recycling of Equipment: ICT devices and solar units may be redeployed in other correctional centers; prefabricated shelters could be repurposed into offices, clinics, or classrooms.
- Soil Remediation: Any contaminated soils (e.g., from oils or batteries) will be cleaned, monitored, and certified safe before site handover.

8.5 Reporting

Upon completion, the Federal Ministry of Interior (PMU) will prepare and submit a Post-Decommissioning Report to FMEnv and NESREA. The report will include:

- Facilities dismantled and methods applied.
- Scope of decommissioning (partial or full).
- Records of stakeholder consultation and engagement.
- Quantities of recovered, recycled, or disposed materials.
- Waste management strategies used (including hazardous waste).
- Site rehabilitation outcomes and monitoring results.
- Any post-decommissioning restrictions or land-use guidance for prison host communities.

CHAPTER NINE

CONCLUSION AND RECOMMENDATION

The Environmental Impact Assessment (EIA) Study for the Proposed Nigeria Internal Security Project Phase II – Prison Security Video Surveillance Solution has comprehensively assessed the potential environmental, health, safety, and socio-economic impacts of the project. The findings demonstrate that the project is environmentally feasible and socially beneficial, with the capacity to significantly enhance the safety and security of correctional centres across the country.

The study highlights several positive outcomes, including:

- Strengthened prison security and improved capacity to prevent jailbreaks, vandalism, and other security breaches.
- Creation of direct and indirect employment opportunities during construction, installation, and operation phases.
- Capacity building and skills transfer in areas such as ICT, surveillance operations, electrical installations, and solar power systems.
- Promotion of local enterprise development through demand for catering, accommodation, transport, and construction materials within host communities.
- Indirect contributions to improved community safety, social cohesion, and local economic resilience.

At the same time, the EIA identified potential negative impacts that require careful management. These include localized land disturbance within prison premises, waste generation (solid, liquid, and hazardous including e-waste), noise and vibration during construction, possible pressure on community infrastructure from worker influx, and occupational health and safety risks during mast erection, welding, and electrical works.

To mitigate these risks, a comprehensive Environmental Management Plan (EMP) has been developed. The EMP provides practical measures covering waste and hazardous material management, erosion and drainage control, occupational health and safety (OHS), emergency response, influx management, and continuous stakeholder engagement. When fully and consistently implemented, these measures will ensure that residual impacts remain low to moderate and within regulatory limits, while maximizing project benefits.

It is recommended that the Federal Ministry of Interior (MoI), working in close collaboration with the Nigerian Correctional Service (NCoS) and the EPC Contractor, ensures:

1. Strict implementation of the EMP across all prison sites.
2. Regular monitoring, audits, and reporting in line with FMEnv, NESREA, and other regulatory requirements.
3. Inclusive stakeholder engagement, ensuring that prison host communities, traditional institutions, women, youth, and vulnerable groups are adequately consulted and integrated into project benefits.
4. Effective CSR interventions in priority areas such as potable water, healthcare, education, and livelihood support for host communities.
5. Sustainability planning, including capacity building for prison staff on ICT and surveillance management, as well as early preparation of a Decommissioning and Abandonment Plan (DAP) to ensure safe closure and reuse of facilities.

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APPENDIX 1

DETAILED LABORATORY METHODS

Temperature, pH and Conductivity of Soil Samples

20.0 g of fresh soil sample were weighed into a 50ml beaker and 20ml of distilled water added to the beaker. The mixture was thoroughly stirred and allowed to stand for 30minutes and the WTW multi-meter probes were then inserted to ensure the above parameters.

Particle Size Distribution of Soil Samples

Particle size distribution (PSD) was determined using the hydrometer method followed by sieving recommended for soil samples containing less than 35% fine particles i.e. clays and silts. The test method is based on the BS 1377 (Part 2; 1990) which is in accordance with the Dutch RAW and ASTM D422.

Total Microbial Count (Water and Soil Sample)

Indirect cell counts on water and soil samples were carried out to determine the total indirect microbial population. The test methods used are the ASTM D5465-93:

Determining Microbial Colony counts from Water Analyzed by Plating Methods, and APHA 907: Standard Plate Count

Total microbial colonies were calculated as follows:

Plate Count (cfu/ml) = (No. of colonies on plate) × (dilution factor)

Phosphate – Phosphorus in Soil Samples

Phosphate – phosphorus in soil samples were determined using UV/Visible spectrophotometer. The Stannous Chloride Reduction Method, based on the method described in the Chemical Analysis of Ecological Matter (2nd edition) and APHA 4500 PD, were applied.

Phosphate – phosphorus content of soil samples were calculated as follows:

$$\text{Phosphate –Phosphorus (mg/kg)} = \frac{C\ (mg/l) \times Solution\ Volume\ (l)}{Aliquot \times Sample\ Weight\ (g)}$$

Where C = mg phosphorus obtained from calibration graph using the UV/Visible spectrophotometer and Vision software version 3.

1000 = Conversion factor to kg

Phosphate – Phosphorus in Water Sample

The phosphate-phosphorus (PO_4^{3-} - P) content of water sample was determined by spectrophotometry based on APHA 4500-PD using Helios Zita UV/Vis Spectrophotometer (Thermo Scientific). Phosphate (mg/l) content was calculated as follows.

$$PO_4^{3-}\ (mg/l) = \frac{\text{mg } PO_4^{3-} \text{ (in approximately 104ml final volume)}}{\text{Sample volume (ml)}}$$

Sulphate – Sulphur in Water Sample

The APHA 4500 – SO_4^{2-} -E method (Visible Light Method) described in the Standard Method for Examination of Water and Wastewater was used to determine the sulphate (SO_4^{2-}) content of water sample. SO_4^{2-} was calculated as follows:

$$SO_4^{2-}\ (mg/l) = \frac{\text{mg/l } SO_4^{2-} \text{ in sample} - SO_4^{2-} \text{ in reagent blank}}{\text{Sample volume (ml)}}$$

Nitrate – Nitrogen in Soil Samples

The Brucine Colorimetric method in accordance with CAEM and USEPA 352.1 was used to determine the nitrate-nitrogen (NO_3^- -N) content of soil samples. NO_3^- was calculated as follows:

$$NO_3^-\ (mg/kg) = \frac{\text{mg } (NO_3^-) \text{ from calibration graph Volume of extractant}}{\text{Volume of extract (ml) Sample weight (g)}}$$

Nitrate - Nitrogen in Water Sample

The test method used to determine the nitrate-nitrogen content of water sample is the Brucine Colorimetric method in accordance with EPA 352.1. Nitrate-nitrogen (NO_3^- -N) content of water sample was calculated as follows:

NO_3^- (mg/l) = (mg/l NO_3^- in sample from calibration graph) – (mg NO_3^- in reagent blank)

Cations in Water Sample

Basic cations in water samples were determined using GBC Avanta Atomic Absorption Spectrophotometer (AAS). AAS measurements were carried out in accordance with the procedures described below.

Na, Mg and K: APHA 3111B (21st edition) / ASTM D3561

Ca: APHA 3111D (21st edition) / ASTM

D3561 APHA 3111D (21st edition) / ASTM D3561

Cation contents were calculated as follow Cation concentrations (mg/l) = $\frac{C \times Y}{X}$

Where C = Concentration of cation determined from calibration curve (mg/l) Y = Final volume made-up (ml)
X = Volume of sample (ml)

Metals in Soil Samples

Heavy metal contents of soil samples were determined using x-ray fluorescence spectrometer in accordance with USEPA 6200. Samples were oven dried at 110°C, unwanted material removed and samples reduced to <2µm diameter by crushing. Crushed samples were further powdered because of the in homogeneity of soil samples. The powder was processed into pressed pellets, transferred to clean prolene foil and then into a sample vial and labeled, ready for elemental analyses.

Results are calculated automatically by the software as the sample name, method, job, sample mass, sample diameter, sample type, sample state and prolene foil sizes has been computed in the software.

Heavy Metals in Water Samples

Heavy metal content of water samples was determined using GBC Avanta Atomic Absorption Spectrophotometer (AAS). AAS measurement of heavy metal content in water sample was carried out following the procedures indicated below:

Cd, Zn, Cu, Ni and Pb: APHA 3111B (20th

edition) V: APHA 303C (15th

edition)

Cr: APHA 311C

Results were calculated as follows:

Metal concentration (mg/l) = $\frac{C \times Y}{X}$

Biochemical Oxygen Demand in Water

The respirometric method as described in APHA 5210D was used in water analysis based on manufacturer's instructions, reaction vessel type and volume, and instrument operating characteristics. The Biochemical Oxygen Demand (BOD) values were read from the equipment.

Chemical Oxygen Demand in Water

The titrimetric method of analysis was applied using APHA 5220D standard

method. The Chemical Oxygen Dem O) is thus:

and (C - D, -- calculate -

COD as mg O_2 /l = $\frac{(A - B) \times M \times 8000}{\text{Volume of sample, ml}}$

Where: A = ml titrant used for blank
B = ml FAS used for
sample M = molarity of
titrant, and
8 = equivalent weight of
oxygen 1000 = conversion
factor to litre

Quality Assurance

A quality assurance (QA) plan that covered all aspects of the baseline study was adopted. The plan covered sample collection, handling, laboratory analysis and data (results) management as described below:

Sample Collection/Handling

Generally, samples were collected in accordance with the recommendations contained in Federal Ministry of Environment guidelines and standards. *In-situ* measurement of unstable physic-chemical parameters e.g. pH, temperature, dissolved oxygen and turbidity was carried out to assure reliability and integrity of the results. All field

instruments were cleaned and re-calibrated after each use. Other QA measures adopted during sample collection have been discussed earlier.

Sample chain of custody forms were used for logging and tracking of samples from the point of collection in the field to the laboratory where analysis were carried out. Samples were preserved in accordance with the recommendations contained in the Federal Ministry of Environment guidelines and standards.

Laboratory Analysis

Quality Assurance (QA) measures adopted for laboratory analysis are in accordance with Federal Ministry of Environment recommendations and included collection and analysis of duplicate samples to establish analytical precision, and analysis of spiked and blank samples to determine analytical accuracy. Blank analyses were also used to establish analysis. Other QA measures adopted are:

- only adequately trained personnel were used at all phases of the study,
- written analytical standard operating procedures were followed during analysis, and
- routine auditing and checking of analysis results, including control solutions and mid-point standards were introduced into every batch or ten samples as applicable, and
- analysis for which deviation of these quality control/mid-point standards are outside 90 to 110% of expected value were repeated.

Data Management

Data management involved recording and transmitting of analytical results into standard data spreadsheets. Processing/calculation of results were done following written standard operating procedures. Final results were issued only after a general QA check and validation had been done.

Sample Handling, Tracking, Transportation

Prior to sampling and storage, an indelible label shall be attached to the containers identifying each sample. The label contained the following information:

- sample code;
- name and location of site;
- date and time of sampling;
- location of sampling;
- sample name and number;
- name of sampling personnel;
- type of sample; and

- type of preservative, if any.

All samples collected in the field were adequately labeled and recorded in the field notebook. Collected sub-samples were preserved in accordance with standard work instructions.
Prior to departure from filed, inventory of the samples collected were taken and sample IDs and all necessary information recorded in chain of custody forms.

Prior to departure, all samples transferred into well-protected coolers fortified with ice cubes, sealed and adequately labeled for transfer to the laboratory. Upon arrival of the samples in our laboratory, the information on the chain of custody was cross-checked to confirm appropriate and adequate recording. Physical counts of the samples were carried out. Upon confirmation of correctness of all information and deliverables, the samples were received in accordance with sample procedure and stored appropriately.
The detailed sample handling procedure as contained in the work instruction and implemented to this field exercise is presented in the table below.

Sample Handling Protocol

Determination	Minimum Sample Vol.	Container	Preservative	Container Pre-treatment
Water				
Temp., pH, Conductivity	Measure on site. Collect 2L for check in the lab.	Plastic or glass	Cool	Rinsed with distilled water
Heavy Metals	1.0l	Plastic or glass	Add conc. HNO_3 to pH <2	Rinsed with 1+1HNO_3
Sulphide	2.0l	Plastic or glass	Cool, 4^oC	Rinsed with distilled water
Hydrocarbon (THC, oil and grease)	1.0l 1.0l	Wide mouthed glass bottles	H_2SO_4 to pH <2, & cool	Rinsed with solvent
COD	100ml	Plastic or glass	Add H_2SO_4 to pH <2, & cool	-
Microbiology (HUF, HUB, etc)	200ml	Wide mouthed glass bottles	Cool	Sterilized
TPH	1.0l	Glass	Cool	Rinsed with solvent
Sediment / Soil				

Total hydrocarbon content	100g	Glass	Cool	Rinsed with solvent
Heavy metals	100g	Plastic	Cool	Rinsed with 1+1HNO_3
Microbiology (HUF, HUB, etc)	50g	Plastic or glass	Cool	Sterilized

Sample Handling

Chain of custody forms were used for logging and tracking of samples from the point of collection in the field to the laboratory where analyses were carried out. Samples were preserved in accordance with FMEnv recommended procedures.

Laboratory Analyses

Quality Assurance and Quality Control (QA/QC) measures adopted for laboratory analysis were in line with standard practice and included collection and analysis of duplicate samples to establish analytical precision. Other QA/QC measures adopted include:

- only adequately trained personnel were used at all phases of the study;
- written analytical standard operating procedures were followed during analyses;
- routine auditing and checking of analyses results were carried out.

Data Management

Standard data spreadsheets were used for recording and transmitting analytical results. Presentation of results was carried out following written standard operating procedures. Final results were issued only after a general QA/QC check and validation had been carried out.

APPENDIX II

QUESTIONNAIRE/STRUCTURED INTERVIEW/FOCUS GROUP DISCUSSION FOR SOCIAL IMPACT ASSESSMENT (SIA)

1. Name of community ……..……
2. Language(s) spoken……
3a Local Government Area/State……
3b Estimate the population of the community……

DEMOGRAPHIC DATA

4. Sex:..……..……
5. Age Last Birthday……
6. What is your religion……
7. Ethnic Group: ……
8. Marital Status……

   Single [ ]
   Married [ ]
   Separated [ ]
   Divorced [ ]
   Widowed [ ]

8(b) If married, how many wives do you have: ……

9. Family Size (no. of children)

   Small (1 – 3)
   Average (4 – 6)
   Large (above 6)

10. What is your highest educational qualification?

WASC/SSCE level	[ ]	Diploma level	[ ]
Degree level	[ ]	Masters/Ph.D.	[ ]
Primary School	[ ]	None at all	[ ]

11. How many people in your household with:
    - Secondary Education [ ]
    - Post-Secondary Education [ ]
12. What is your occupation? ……
13 What is your average monthly income?

Below N10,000 [ ]
N10,001 – 20000 [ ]
N20,001 – 50,000 [ ]
N50,001 – 80,000 [ ]
Above N80,000 [ ]

14. Age Distribution/Composition of your household (including parents)

	Male	Female
No. of persons 0-15	[ ]	[ ]
No. of persons 16 – 24	[ ]	[ ]
No. of persons 25 – 34	[ ]	[ ]
No. of persons 35 – 50	[ ]	[ ]
No. of persons above 51	[ ]	[ ]

15. In your household, how many persons are:

	Male	Female
-Students/Apprentice	[ ]	[ ]
-Business/Contractor	[ ]	[ ]
-Technicians	[ ]	[ ]
-Farming/Fishing/Hunting	[ ]	[ ]
-Civil Servants	[ ]	[ ]
-Full housewives	[ ]	[ ]
-Unemployed	[ ]	[ ]
-Others	[ ]	[ ]

On the average, how many persons live in a room here? ……

17. SOCIAL INFRASTRUCTURE

Please complete the table on social infrastructure below:

Facility	Provided by Government	Provided by NGC	Provided by Others (specify)
Tarred Roads			
Electricity			
Portable Water			
Markets			
Primary Schools			
Secondary Schools			

Facility	Provided by Government	Provided by NGC	Provided by Others (specify)
Town Hall			
Health Centres			
Police Station			
Waste Disposal System			

ECONOMIC DATA

18. Which type of house do you live in? ……

19. Are you a tenant or Landlord?……

20. How is land owned here?

By individuals [ ] By community [ ]

21. How do you acquire land in this area?

Purchase [ ] Inheritance [ ]

Lease [ ] Rent [ ]

22. Which industries exist in your community that offer people jobs (FGD)

…… ……...

…… ……

23. What types of crops are grown here?

....

....

POLITICAL ORGANISATION

24. Who is the head of this community? (FGD)……..

25. Describe the political structure of the community? (FGD)

.....……

.....……

26. How are disputes settled in this community? (FGD)

.....……

.....……

CULTURAL VALUES/LIFESTYLE

27. Please name the totem/animals you forbid in your community here

…… ……

…… ……

28. Name the traditional festivals you celebrate here.

…… ……

…… ……

29. Name the gods/deities worshipped in the community.

…… ……

…… ……

30. List names of the shrines/traditional place of worship in this community.

…… ……

…… ……

31. In the past five years, has any of these shrines been moved or destroyed? Yes or No. Give reasons: ……

……

SOCIAL/ENVIRONMENTAL PROBLEMS

32. Tick main environmental problems in this community

- Pollution
- Rainstorm/flooding
- Erosion
- Soil infertility
- Pest attack/invasion
- Water salinity
- Traffic congestion

33. Please list the diseases that are common in this area

…… …… ……

…… …… ……

……

34. Which crimes occur here frequently (please list them)

…… …… ……

…… …… ……

…… …… ……

COMMUNITY CONCERNS

35. What do you think are lacking in the community that you would want provided? (Please list them)

…… …… ……

…… …… ……
…… …… ……

HEALTH SURVEY (HIA)

A. List the names of available health institutions in your area.

…….
…….
…….
…….
…….

B. Assess the cost of goods and services in your locality

(a) Cheap (b) Moderate (c) Expensive

C. LIFE STYLE/HEALTH BEHAVIOURAL CHARACTERISTICS

1. Common food types taken in the community

……
……

2. Meal (24 hour recall)

	Fat	Protein	Carbohydrate	Minerals	Others
Yesterday morning					
Between Meals					
Yesterday Afternoon					
Between Meals					
Yesterday Evening					

3. During the last 4 weeks, how often have you had drinks containing alcohol? Would you say:
   - Every day
   - At least once a week
   - Less than once a week
   - None at all (don't take alcohol)

Units of alcohol

- 1 pint – 1 bottle of beer – 2 units
- 1 glass of wine – 1 unit
- 1 shot of brandy – 1 unit.

4. Smoking (Yes/No) If yes, how many sticks per day? ……
5. Sanitation: Any existing household regular clean-up exercise?……how often….
   Any existing community regular clean-up exercise?… how often….
6. Use of Tobacco (Yes/No)
7. Exercises (Yes/No) (a) Type……. (b) How often…….
   (c) Duration of walks per day…….
   (d) How many hours per day/week:……..

D. COMMON HEALTH HAZARDS IN THE COMMUNITY

During the last 12 months, have you been admitted into a hospital on account of any ill health? (Yes/No)

2. If yes, for which of the following:
   * Infectious disease (list common conditions, such as malaria, RTI, Diarrhoea, TB, AIDS, etc.)
   * Injuries/Accidents (Yes/No)
   * Others (specify):……
3. List all illness episodes in the last 12 months:
   ……
   ……

4. Which of the following diseases/health conditions in your opinion poses the greatest Health threat to your community (Score 1-5) 1 = least threat; 5 = highest threat:

	1	2	3	4	5
Malaria					
Respiratory tract infectious					
Diarrhoea disease					
Skin disease					
Injuries/accidents					
Sexually Transmitted diseases					
Others (specify)					

NB: Tick the correct box

5. How many people on the average died in your community within the last 12 months: Adults …….. Under 5……..less than one year……..

6. What in your opinion is the most important cause of death in the community?
   (a) Amongst children under one year…….
   (b) Amongst children under 5 years ……..
   (c) Amongst adults…….
   (d) Death during child birth:……

E IMMUNISATION STATUS

1. Have you received any of the following vaccines?

	YES	NO
DPT		
BGG		
Oral Polio Vaccine (OPV)		
Typhoid		
Yellow fever		
Tetanus Toxoid		
Small pox		
Hepatitis Vaccine		
Others (specify)		

F. COMMUNITY HEALTH NEEDS

1. What in your opinion are the most important health needs of your community? (Score in order of priority 1-5)
   1 = least need, 5 = highest need

	1	2	3	4	5
Safe Drinking Water					
Food					
Health services/Clinics					
Electricity					
Good toilet system					
Waste disposal					
Others (specify)					

N.B: Tick the correct box

2. In order of preference, what do you think should be done to improve the health services in your community?

(i)……

(ii) ……

3. What health problems do you think may arise because of the central power plant projects in your community?

(i)……

(ii) ……

4. In order of preference, what do you think should be done to minimize these anticipated health problems?

(i)…… (ii) ……

G. PERSONAL/HYGIENE PRACTICES

1. Source of water
   - Tap
   - Well
   - River
   - Stream
   - Rainwater
2. Distance from source of water
   - Within household
   - < I km
   - 1 – 2 km
   - 3 – 4 km
   - > 5 km

3. Nos of Baths/day/week
4. Brushing teeth

   Do you use
   - Toothbrush
   - Chewing stick
   - Others (specify)

5. Frequency of mouth cleaning/day

6. Do you wash your hands after using the toilet
   - Always
   - Sometimes
   - None

7. Type of Toilet
   - Water closet
   - Bush
   - Bucket
   - River/Stream
   - Public toilet
   - Others (specify)

8. Method of Refuse Disposal you practice:
   - Open dumping
   - Landfill
   - Bagging/dust bin
   - Composting
   - Incineration
   - Others (specify)

H. KAP RELATING TO COMMON HEALTH CONDITION

1. Have you heard about these diseases? (Yes/ No)
   - Hypertension
   - Diabetes
   - Typhoid
   - Malaria
   - Respiratory Infection
   - Epilepsies
   - Diarrhoea Disease
   - Sexually transmitted illness
   - HIV/AIDS
   - Tuberculosis
2. Do they occur in your community? (Yes/No)

3. What causes this illness?
   - Spiritual
   - Germs/parasites
   - Food/drink
   - Overeating/under eating
   - Blood transfusion
   - Sexual contacts

- Poor sanitary condition

4. Are these diseases transmissible from person to person? (Yes/No)

5. If yes, how?
   - Spiritual
   - Hugging/Kissing/sharing of plates/spoon
   - Living in the same house
   - Sexual contact
6. Are these diseases prevalence (Yes/No)
   - Do you know anybody with these illnesses? Yes/No
   - Can you stay in the same house with persons with these illnesses
   - Can you share food/drinks/the same room with such persons
   - If you have these illnesses, where will you seek treatment?

APPENDIX III

FIELD WORK METHODOLOGY

Sample collection and handling were done in accordance to FMEnv. guidelines and standards as highlighted in the following paragraph:

Preparation for field work - In the preparation for fieldwork, glassware to be used were washed with detergent solutions, rinsed with tap water, then soaked in 1:3 nitric acid solutions for 24 hours to remove organic materials, washed again with tap water and rinsed with distilled water. Plastic containers were washed with detergents, rinsed with tap water, followed by distilled water. After drying, all the containers were rinsed with acetone to remove organic materials, and rinsed with distilled water.

Handling of Samples - Aluminium foils were used to contain soils. Water sampling equipment was rinsed with portions of the water to be sampled. Composite samples per sampling point were taken with thoroughly cleansed containers. Sterile wide-mouth polypropylene and Pyrex glass sample bottles were used. Samples for oil and grease were collected in clean and dry glass-stoppered bottles and were usually not completely filled to avoid losing oil when the stopper was inserted.

A permanent label was attached to each sample container and reflected specific sample identification details like project name, date, sample matrix, sampling point, sample number, depth, as the case was.

As samples could be subject to microbial degradation and transformation, they were therefore analysed at minimum time after collection. Since storage was necessary for water samples to analyse Physico- chemical parameters, they were stored in ice-chest as a cooling device and transported to the laboratory where they were refrigerated at 4^0C. Samples for heavy metal analyses were preserved with 1:1 nitric acid and oil and grease with 1 ml of 1:1 H_2SO_4 as soon as they were collected. Adherence to good preservation procedures ensured that errors were not introduced into the analytical process.

Inspectors and Statutory Regulators

One representative each from the Federal and State Ministries of Environment, were present throughout the duration of the fieldwork. Their function was to ensure that environmental samples were collected and preserved (where necessary) according to recommended procedures and practices for environmental data collection as per industry guidelines and standards (Nigeria and international). Two representatives from the project proponent were also part of the EIA data gathering team.

Quality Control/Quality Assurance (QC/QA)

QC/QA programmes cover all aspects of the study, including sample collection and handling, laboratory analyses, generation of data and coding, data storage and treatment as well as report preparation. The quality assurance programmes used by the consultant in its fieldwork and laboratory analyses are in accordance with recommendations by FMEnv.

QA/QC for Laboratory analysis and generation of data

Possible sources of error in laboratory analysis include contamination of reagents and materials, lack of sensitivity of equipment, lack of calibrations, poor data entry and interpretation. Glassware and other containers to be used for each analysis were thoroughly cleansed as appropriate for each parameter. All glassware used for oil and grease determination was pre-rinsed with Analar grade xylene. Glassware for determination of metals were pre-soaked in dilute nitric acid and then rinsed well with distilled water.

All reagents and chemicals of high purity (mostly Analar grade) were used. Freshly distilled water prepared in our laboratory was used for all dilutions.

The various instruments and equipment for measuring physico-chemical parameters were used while in good working condition. Periodic control checks were usually carried out on such instruments/equipment and performance records maintained. The United States National Bureau of Standards (NBS) certified mass standards were used to check the laboratory balances. The pH meters were calibrated using HACH commercial buffer standards. Using appropriate colour standards of diluted potassium dichromate or potassium permanganate solutions frequently checked the wavelength settings and sensitivities of the absorption spectrophotometer.

For analytical determination requiring the use of calibration curves, such curves were plotted using standard solutions prepared from analytical grade reagents. Records of such calibration curves were maintained and frequent re-calibration checks were carried out. Analytical blanks were incorporated per specific batches of samples to compensate for the sample preparation and determination steps. All the analyses were replicated and the means reported.

Chain of samples custody procedure

There is a Master register for all samples taken to the laboratory. Following registration of the sample, a SAMPLE DATA SHEET containing pertinent information on the sample was opened for each sample. The information includes:

- Sample reference number,
- Nature or type of sample,
- Site of collection,
- Date and time of collection,
- Mode of preservation (depends on nature of material) and analytical data from the field and results of laboratory analyses of representative samples.

Appropriate methods were used in storing the remaining stock materials and sub samples. Samples for storage were kept in labelled compartments on shelves in a storage room. Samples sent to other cooperating laboratories were recorded in the Master Register, accompanied by essential data pertaining to the sample material and appropriate custody transfer forms were filled.

Evaluation of results

Raw data obtained from the instrumental measurement were used in calculating the concentrations of the various parameters, using standardized formulae. All such calculations were crosschecked. Outlying values were deleted from the replicate data before calculation of mean concentrations. A quick identification of results, which deviate from the normal trend, was usually done. Some of the relationships used to evaluate the results include cation-anion balance. The sum of the anion concentration in meq/1 should be equal to the sum of the cations concentration also in meq/1. Differences within 5% are acceptable.

$$\% \text{ Difference} = \frac{(\text{cations}) \text{ min us } (\text{anions})}{(\text{cations}) \text{ plus } (\text{anions})}$$

The above check on ionic balance was carried out. Also, calculated and observed conductivity measurements and IDS data are compared, to check reliability and accuracy of data.

Air Quality

The objective of air sampling and analysis is to adequately characterize air pollution for the region of interest at minimum expenditure of time and money. Moreover, the characterization is usually based on the intended use of the data and this use includes the following:

a) checking adherence to air quality standards;

b) observing pollution trends and relating any changes to emission variations;

c) developing and evaluating abatement strategies;

d) assessing health effects or plant damage which may have arisen from exposure to air pollutants (this will normally include geographic and temporal distributions);

e) developing and applying a warning system for prevention of undesired air pollution episodes; and

f) Developing and testing pollutant diffusion models.

Sampling Scheme

Measurements are made with a group of instruments, which are moved from one fixed measuring point to another in a predetermined manner. These measurements are then related to meteorological data made at the same time or obtained from a synoptic meteorological station. Because of the nature of our group of instruments, this second scheme was adopted. An advantage of this scheme is that a large area was covered with a minimum of instruments. The data obtained fulfils the main objectives of characterizing air quality and checking adherence to air quality standards.

Sampling Locations

These sampling stations are presented in the air project coordinate table and air quality map. and cover the entire study area where activities are expected to take place. The selection of sites for monitoring took into consideration the reproducibility of results and the following environmental factors.

1. Accessibility of site,
2. Availability of suitable open space,
3. Wind direction (up wind and downwind) and
4. Areas with minimal local influence from vehicular movement.

Sample Collection

The World Health Organisation (WHO) has selected methods of Analysing air pollutants. These methods are based on those adopted by the WHO, (1986). The Federal Ministry of Environment Formerly Federal Environmental Protection Agency (FEPA) in Nigeria has adopted these methods for the purpose of surveillance and monitoring air pollutants pending the development of her standard methods. These methods, as listed below, were used in this study.

Table 1: Standard methods for measurement of air quality parameters

S/N	Parameters	Measurement methods
1	Suspended Particulate Matter (SPM)	High Volume Air Sampler.
3	Sulphur oxide (SO_2)	Portable SO_2 Monitor
4	Carbon monoxide (CO)	Portable Carbon monoxide (CO) Monitor
5	Hydrogen sulphide (H_2S)	Portable Hydrogen sulphide (H_2S) Monitor
6	Ammonia gas (NH_3)	Ammonia gas (NH_3) Monitor
7	Nitrogen oxide (NO_2)	Portable Nitrogen oxide (NO_2) Monitor
8	Volatile Organic Carbon (VOC)	Portable VOC/CH_4 Monitor

Supporting Measurements

The following supporting measurements were made:

(i) Wind direction and Speed

(ii) Air temperature

(iii) Relative humidity

Care was taken to avoid undue interference from any 'external' gaseous emission source while sampling.

Noise Measurement

Standard methods and techniques were adopted for the measurement of noise levels at the sites. Measurements were made using the precision Sound Level Meter (Bruel & Kjaer) Type 2203 and octave Band Filter (B&K) Type 1613 attached to the former. The meter was held with the microphone facing the noise source and at least 1m away from any reflecting surface. Measurement minimum noise levels, (L_{min}), maximum noise level (L_{max}) as well as noise exposure levels, (L_{exp}) were recorded between the hours of 9am and 4pm on hourly basis. These methods and techniques were consistent with those of ISO and International Electro Technical Commission (IEC, 1993).

Geology / Hydrogeology

Geology and Aquifer Parameters

Surface geological mapping was achieved using available maps, reports and data. In addition, bearing and pacing method was used in the field. This exercise was made possible with the aid of compass – clinometer and existing roads that served as traverses. The subsurface geological studies were carried out using drill log data from borings, existing report and literature.

Static water level (SWL) measurements were made with water level recorder (Type KLT-Du). This measurement guided the determination of groundwater flow direction.

The hydraulic conductivity (k) was estimated using the result of the grain size analyses by applying the Hazen's formula:

$$K = Cd^2 \quad 1$$

where d_{10} (mm) corresponds to 10% cumulative weight passing and C is coefficient which have a value of 1.0, K hydraulic conductivity (cm/sec).

Vegetation and Wildlife

The materials used for the field work include secateur polythene bags, large jute bags, laundry pen, labelling tapes, specimen bottles, 70% ethanol, formal acetic acid (FAA), hand lens, improvised hook and measuring/calibrated tapes.

Sampling for diversity and abundance was carried out in blocks of 5 and $50m^2$ each. Direct species counts were taken within the sampling blocks, which also served as quadrants. Leaf and stem materials were taken in specimen bottles containing 70% ethanol, fixative stain solution and formal acetic acid (FAA) for laboratory histochemical analysis.

Plants were examined in vivo for signs and evidence of environmentally induced stress as well as disease conditions. General health condition of the vegetation was visually evaluated. Plant materials that could not be identified (on-site) were taken for identification with taxonomic keys and flora in the laboratory. Information on wildlife was obtained by either direct sighting of animals concerned or from hunters in the different communities. Wildlife species inventory for the different faunal zones is essential in order to provide the basic information needed in EIA work. Furthermore, such information is necessary for the identification of some species of local and global concern which is at the brink of extinction; and such animals are listed as 'Vulnerable' or 'Endangered' in the IUCN Red List.

Waste Management

The various sources of wastes generated and the local waste disposal techniques in the project area were identified. This included identification of local waste management techniques and/or the ultimate destination of wastes.

Table 2: Summary of the Field Data Collection Procedures

Environmental components	Methods
Meteorology	Literature survey, field studies with rain gauge, Thermograph, Wind vane, EXTECH INSTRUMENTS-Hygro-Thermometer+Infra-Red Thermometer, Model No. RH 101
Air Quality **Noise**	Portable Gas Monitors for gases, USEPA High-Volume sampler for SPM. Altair5X, Sound Level Meter (Bruel & Kjaer) Type 2203 and octave B and Filter (B&K) Type 1613.

Vegetation	Transects, Quadrats, key informant interviews, Focus Group Discussion (FGD), Questionnaires and Direct observations
Land use/cover	Observations, interviews and sample collections. Environmental baseline survey (EBS) by remote sensing (satellite imagery interpretation), Direct physical observations
Fauna (Wildlife) Amphibians, Reptiles, Birds, Mammals	Direct observations, key informant interviews, Focus Group Discussions (FGD)
Geology and Hydrogeology	Boreholes sampling and measurements
Surface water/ Hydrodynamics	Observations, water sampler, current meter, pH meter, DO meter, sediment grab, TDS meter, Turbid meter and conductivity meter
Soil Quality	Soil samples with an auger and description of each sample with Munsell colours chart.
Microbiology	Collection of water samples with Hydro bios water sampler into sterile McCartney bottles; Soil samples with soil auger into aluminium foil Sediments samples with van Veen grab sampler into aluminium foil.
Waste Management	Physical examination, inventorisation and walk-through survey

Consultations

First Level Consultation

Consultation formed an important aspect of the execution of the fieldwork for the EIA. The steps involved in the consultation process include:

i. Direct meeting with communities in their respective locations, and
ii. Discussion with community opinion leaders during Focus Group Discussions (FGD).

Scoping Workshop

In line with policy of consultation with stakeholders and relevant authorities in all its activities, the scope of the EIA project was discussed between the proponents, consultants, and the regulators. The purpose was to identify the issues and concerns of stakeholders regarding the

project and to develop a term of reference for execution of the EIA. Other objectives of the consultation were:

- Educating and enlightening identified stakeholders (communities, government agencies, community based organizations (CBOs) etc.), on the need for their involvement in conducting the study and to assist the project team in articulating the concerns of the communities as well as those of their immediate environment;
- Building trust and confidence that would enhance the capacities of the identified stakeholders through participation in the project.
- Forming and promoting partnership with identified stakeholders through networking, information sharing and participation in consultation exercises.

Meeting with Communities

Direct meeting with community leaders within their localities formed a key element of data gathering. The purpose of such meetings was to intimate the communities of the project. Further to inform them on the need for the study, solicit their views and obtain their permission and co-operation during the data gathering exercises in their respective communities.

Consultation meetings involved free discussion with the community leaders after the normal customary respects and pleasantries have been observed. At each meeting, there was an understanding that immediate community would provide representatives to be employed as field assistants. These assistants are continually interviewed during the field work and also assist the consultants in related community data acquisition.

Second Level Consultation

The identified community stakeholders were informed of their expected participation during the commencement of fieldwork. At each field location, the study team met with community leaders, the women leader and the youth leader to discuss the objectives of the study. This rapport helped in securing the social license to conduct baseline studies in these communities. Consultation with other stakeholders is ongoing and shall be sustained throughout the duration of the project.

Socio-Economic Survey

The socio-economic survey adopted a combination of several data collection techniques to achieve the objectives of the study. A combination of the following methods was adopted at varying degrees

for the different communities. These include;

a. Questionnaire interview
b. Focus group discussion
c. Key informants information
d. Participant observation and estimation.

Data collected on various socio-economic parameters from all the communities were also analyzed using different appropriate tools. Some of these analytical techniques are presented below:

The questionnaire survey involved sampling households within the community using a set of questionnaire. Information gathered from the survey was presented in charts and pictures as appropriate, to give a picture of the base line situation in the area.

Environmental Health Survey

This study consisted of walk through surveys using prepared check list of environmental health issues such as general level of sanitation, waste disposal practices, water supply and the availability of health and health related facilities. The main issues assessed included:

i. Types and quality of housing
ii. Sources of water
iii. Type of sewage disposal methods and facilities
iv. Methods of refuse disposal and general physical environmental cleanliness.
v. Health facilities available
vi. Environment- Health interplay factors

The data generated were processed, presented in tables and charts, and further analyzed.

Epidemiological Survey

The study was designed for a cross section of the inhabitants.

Sample Size

A sample size of 5% of the total population of the study communities based on the 2006 national census Figures was used in the study. These Figures have been adjusted to 2020 using a projection of an annual growth rate of 3.2%.

Selection of Study Subjects

The multistage sampling technique was adopted in each settlement to select the study population. In the absence of streets, households were randomly selected.

All the inhabitants in the selected houses were then administered questionnaires until the required sample size was met. A sample of the questionnaire is provided in Appendix.

Focus Group Discussions and Interviews

Focus group discussions were held in each of the study communities. The following focus groups were identified:

- Adult males
- Adult females and
- Youths

Oral Interviews were also conducted. Those interviewed were mostly health personnel and community opinion leaders. The questions were related to the following:

- ❖ The health facilities available in the community
- ❖ The common diseases in the community
- ❖ Their health concerns related to the project
- ❖ Their health expectations from the project