

**AFRICAN DEVELOPMENT BANK (AfDB)**

**SOCIAL INVESTMENT FUND (SIF)**

**UNIVERSITY OF GHANA MEDICAL SCHOOL**

**UNIVERSITY OF GHANA BIOTECHNOLOGY CENTRE**

**UNIVERSITY OF GHANA NURSING AND MIDWIFERY SCHOOL**

**GHANA NEWS AGENCY (GNA)**

**MICROFINANCE AND SMALL LOANS CENTRE (MASLOC)**



# GOVERNMENT OF GHANA MINISTRY OF FINANCE

**POST COVID-19 SKILLS DEVELOPMENT  
AND PRODUCTIVITY ENHANCEMENT  
PROJECT (PSDPEP): CONSULTANCY  
SERVICES FOR ENVIRONMENTAL  
CLIMATE AND SOCIAL IMPACT  
ASSESSMENT (ESIA) – PREPARATION OF  
DRAFT FINAL ESIA REPORT**

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### List of Acronyms

AfDB	African Development Bank
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental And Social Management Plan
ESMU	Environmental and Social Monitoring Unit
EPA	Environmental Protection Agency
ESA	Environmental and Social Assessment
ESIA	Environmental and Social Impact Assessment
FC	Forestry Commission
FPMU	Funds and Procurement Management Unit
GoG	Government of Ghana
MES	Ministry of Environment and Science
MoE	Ministry of Education
SEA	Strategic Environmental Assessment
SIF	Social Investment Fund
WRC	Water Resources Commission

## Executive Summary

### Project Background

The government of Ghana through the Ministry of Finance have sought funding from the African Development Bank for the proposed Post Covid-19 Skills Development and Productivity Enhancement Project. The Social Investment Fund is the Coordinating Unit of the Project.

### Study Objectives

The principal objectives of the ESIA development are:

- To identify issues that may need to be evaluated as part-of the Impact Assessment stage.
- To identify likely impacts of the proposed Project on Physical, Biological/ Ecological and Socio-Economic/Socio–Cultural Environment of the project zone, to predict and evaluate these impacts and determine significance of these impacts to the technical and regulatory concerns.
- To propose appropriate mitigation measures that should be incorporated in the design of the project to minimize if not eliminate the adverse impacts.
- To assess the compliance status of the proposed activities with respect the Environmental and Social Regulation or Legislation of Ghana, District Assembly By–Laws, and AfDB Operational Safeguards.
- To develop a Provisional Environmental and Social Management Plan (PESMP) to provide an implementation mechanism for the environmental as well as social mitigation measures identified in the study.
- To detect adverse effects in time for correction through Monitory Program.
- To identify alternatives to be evaluated at Impact Assessment Stage with the main purpose of focusing the environmental and social assessment on reasonable and feasible alternatives examination.
- To conduct comprehensive stakeholder consultations as part of public participation process.

### Policy and Legal Framework

The relevant environmental regulatory obligations and guidelines to guide the ESIA development and the Contractor(s) for the Proposed Project are the following: Environmental Protection Act 490 (1994); National Building Regulation, 1996 (LI 163); The Local Government Act, 1993 (Act 462); The Constitution of the Republic of Ghana, 1992; [Land Use and Spatial Planning Authority Act, 2016 \(Act 925\)](#); The Criminal Code, 1960 (Act 29); Pesticides Control and Management Act, 1966 (Act 528); Energy Commission Act, 1997

(Act 541); Factories, Offices and Shop Act, 1970 (Act 328); National Museums Decree, 1969, NLCD 387 ; Water Resources Commission Act, 1996 (Act 552); Fire Protection Act (1994) and Fire Protection Regulations, 2004 (LI 724); [Lands Act, 2020 \(Act 1036\)](#); State Lands Regulations, 1962 (LI 230); National Development Planning Act, 1994 (Act 479); Food and Drugs Act, 1992 (P.N.D.C.L. 305 B).

### **Study Methodology by Tasks**

The study methodology and approach involved the adoption of task specific assignments and activities such as: field inspection and trekking; environmental and social sampling and analysis; terrestrial and aquatic studies; land use studies; socio-economic and socio-cultural studies; use of environmental features checklist; use of socio-economic and socio-cultural field survey questionnaire.

### **Project Activities Description**

The activities implemented under the project include new construction and rehabilitation at **three** institutions. These include construction and rehabilitation of infrastructure/facilities for teaching and learning such as ICT laboratories, Science and Technologies production units, pharmaceutical production research and diagnostic laboratories, offices, lecture rooms, libraries and others will be rehabilitated and climate-proofed. In addition, climate-proofed rehabilitation of 4 GNA structures in Accra, Northern Belt (Tamale), the Middle Belt (Kumasi), and the Coastal Belt (Takoradi). The proposed project has three components, namely:

***Component 1- Strengthening the health system- climate resilient infrastructure rehabilitation and procurement of equipment.*** This component will support the recovery of Ghana’s health system from the impacts of the COVID-19 pandemic by improving of the capacity of the University of Ghana to train additional health workers to respond to COVID-19 and future environmentally induced pandemics enhance capacity for testing, diagnosis, and treatment in the system. At the University of Ghana, infrastructure including teaching and learning facilities such as ICT laboratories, Science and Technologies production units, pharmaceutical production research and diagnostic laboratories, offices, lecture rooms, libraries and others will be rehabilitated. In addition, Climate-proofed rehabilitation of 4 GNA structures in Accra, Northern Belt (Tamale), the Middle Belt (Kumasi), and the Coastal Belt (Takoradi).

***Component 2- Rebuilding youths` and women`s livelihoods through entrepreneurship and employment creation.***

This component will support the rebuilding of livelihood and sources of income among youths and women for them to recover from the socioeconomic and climate related shocks or impacts of the COVID-19 pandemic on individuals, households, and enterprises, especially SMEs. It is aimed at improving access to technical and climate-resilient skills training and sustainable green climate finance for youths, women, and SMEs. The project will support the construction of 2 to 4 technical skills training centres at Nsoatre (Bono

Region), St. John's at Nandom (Upper West Region), Otaakrom (Atwima Mponua District in Rural Ashanti Region), and Abetifi (Kwahu-East District in the Eastern Region).

**Component 3- Project Management:** this component aims to provide technical and administrative support for the implementation of project activities under the two components above.

### **Identification and Analysis of Project Alternatives**

The description and evaluation of each option was at the level of detail sufficient to permit a comparative assessment of the alternatives discussed. Alternative options considered were the following: no-development option; alternate technologies; alternate architectural designs; and alternative sites. The various alternatives and the rationale for either dismissing or carrying through were based on the purpose and need for the proposed action, considering environmental, social, and economic cost implications. The final selected options were based on environmental features checklist for site selection which led to the following benchmarks: (i) sites free of all physical impediments, obstacles and encumbrances that could stall project implementation schedules with resultant delays (ii) sites devoid of land litigations and resultant legal actions at the law courts that could hold back the project work plan (iii) sites situated outside "bushfire prone" zones to forestall any incidence of bush fire effects on the Proposal during the operational phase (iv) sites located away from low-lying wetlands typically receptive to flooding and flood prone conditions and flash-flood incidence (v) sites acceptable to the Metropolitan/Municipal/District Assemblies and the Land Use and Spatial Planning Authority (formerly Town and Country Planning as specially demarcated and appropriately zoned areas for the project.

### **Environmental, Climate and Social Baseline Conditions**

The prevailing baseline data gathering have been disclosed for **Physical Environment** (location and size, climate, topography, geology and soils, surface hydrology and drainage systems, air quality, dust and odour, noise levels); **Biological/Ecological Environment** (flora, fauna and animal migration routes); **Socio-Economic/Socio-Cultural Environment** (demography and settlement pattern, culture, ethnicity and religion, economy and employment, agriculture, education provision, healthcare delivery, historical, cultural and heritage resources, utilities and infrastructure, transportation, vulnerable group, gender equity and mainstreaming, urbanizing problem, tourism and recreation). Within the demarcated institutional boundaries, there were no physical evidence of cultural and heritage resources presence. However, during the excavation works any chance find will trigger the contractor(s) Chance Find Procedures.

### **Identification of Potential Environmental and Social Impacts**

Kwaku Anim Boateng (Individual Consultant)

Consideration of impacts identification has been given by use of impact analysis criteria on the level of significance (high, moderate and minor) and whether the impacts are direct, beneficial or non-beneficial. As a result, the following impacts were identified: **Pre-Construction Phase Impacts** (survey works to determine the siting of facilities; work camp/site office organization; materials mobilization and transportation; removal of trees and vegetation; demolition of structures and removal of foundations; air and noise pollution); **Construction Phase Impacts** (air quality deterioration; noise and vibration effects; borrow pits generation; erosion and sedimentation; waste generation and disposal; water supplies; concrete batch plant waste; construction sites and offices creation; biodiversity loss; traffic nuisance; public, occupational health and safety; visual impairment and intrusion; history, archaeology and heritage resources; construction materials waste; hazardous solid waste stream; hazardous liquid waste stream; campus community access provision; fire prevention and control; biomedical waste generation; water and energy consumption; cumulative impacts and strategic considerations; influx population, compensation issues; green house (GHG) emissions); **Operation Phase Impacts** ( air and noise; waste generation disposal; traffic safety and security, public health and safety; visual impairment; hazardous waste; fire prevention and control; biomedical waste; influx population); **Non-Project Related Impacts** (disaster and extreme climate events) have also been identified.

### **Beneficial Impacts**

Consideration for beneficial impacts has been noted as human resource development, expansion of educational infrastructure, space utilization; employment generation and job creation, peri-urban income levels enhancement and peri-urban women lifestyle improvement.

### **Mitigation and Enhancement Measures**

All significant issues of potentially negative environmental and social concerns have been outlined with their respective, extensive, evaluation and assessment of their implications from the Proposal. Mitigation and enhancement measures have been given as planned strategy to minimize/prevent adverse environmental and social impacts for preconstruction, construction and operation-based activities. A summary of environmental and social impacts and mitigation measures have also been developed for those phases. Moreover, additional measures of enhancement strategies have been derived for weed control/potential introduction of invasive alien species, surface and ground water management, laboratory waste management, re-vegetation or restoration of vegetation cover.

There should be great concern for the management of waste from the laboratories researching and manufacturing vaccines for pandemics. Mitigation measures are called for. Certainly, these laboratories should develop biosafety protocols to be reviewed and

approved by Ghana EPA. There is also the critical need during construction phase, aside fire drills, assembly places should be constructed. Summary of Environmental and Social Impacts and Mitigation Measures for the project is indicated in matrix format.

**Summary of Environmental and Social Impacts and Mitigation Measures**

Potential Impact	Mitigation Measures	Significance	Source of Impact	Receptor	Responsibility
<b>PRE-CONSTRUCTION PERIOD</b>					
Survey Works	<ul style="list-style-type: none"> <li>Limited, localized opening of de-bush line</li> <li>Limited vegetation cover removal.</li> </ul>	Minor	De-bush line clearing	Land	Contractor(s)
Work Camp/Site office	<ul style="list-style-type: none"> <li>Provision of mobile toilet and sanitary facilities</li> <li>Daily collection of solid waste</li> <li>Selection of fairly flat location</li> <li>Removal of vegetation cover.</li> </ul> <p>Where involuntary resettlement, land acquisition, displacement becomes an issue, these measures will be adopted: (identify all affected properties in the RoW; hold consultation and engagement meetings with PAPs; mark out boundary reservation corridor; make payment of compensation monies to PAPs).</p>	Moderate	Vegetation cover removal waste generation	Air, water, land construction workers;	Contractor(s)
Removal of trees/vegetation	<ul style="list-style-type: none"> <li>Cutting and removal of large number of neem trees in Takoradi, Nsoatre, and Nandom as selected option.</li> <li>Removal and stockpiling of vegetation cover topsoil</li> </ul>	Moderate	Vegetation cover removal; trees cutting	Air, water, land, construction workers	Contractor(s)

	<ul style="list-style-type: none"> <li>• New trees to be promptly planted</li> </ul>				
Air Pollution	<ul style="list-style-type: none"> <li>• Fugitive emissions, localized.</li> <li>• Dust generation, limited.</li> <li>• Site clearance, limited.</li> </ul>	Minor	Site clearance; vegetation cover removal	Air, construction workers	Contractor(s)
Demolition of structures	<ul style="list-style-type: none"> <li>• Reuse salvageable materials.</li> <li>• Conduct asbestos and lead-bases point survey.</li> <li>• Use health and safety controls.</li> </ul>	Moderate -Minor	Demolition activities;	Air, land water, construction workers	Contractor(s)
<b>CONSTRUCTION PERIOD</b>					
Air Quality Deterioration	<ul style="list-style-type: none"> <li>• Construction vehicles maintenance.</li> <li>• Watering of exposed surfaces.</li> <li>• Cover vehicles carrying spoil and construction material.</li> <li>• Install and maintain equipment mufflers.</li> </ul>	Minor	Dust nuisance	Air, Flora, Project Residents, Construction Workers	SIF/Contractor(s)
Noise and Vibration	<ul style="list-style-type: none"> <li>• Install sound control devices.</li> <li>• Switch-off idling machines.</li> <li>• Provide earplugs to workers.</li> </ul>	Minor	Noise nuisance	Air, Fauna, Project Residents, Construction Workers.	SIF/Contractor(s)
Borrow Pits Generation	<ul style="list-style-type: none"> <li>• Access vector ecology in work areas.</li> <li>• Employ adequate drainage.</li> <li>• Fill methodology to avoid creating mosquito habitats.</li> <li>• Where land acquisition, displacement may be issues to mitigate as well, if material is not sourced from certified companies, contractor(s) will</li> </ul>	Moderate –Major	Stagnant pool or depressions suited to mosquito breeding	Land, Project Residents around borrow areas construction workers	SIF/ Borrow Areas Population Contractor(s)



	operate Borrow Pits Management Plan.				
Erosion and Sedimentation	<ul style="list-style-type: none"> <li>No major earthworks during the rainy season.</li> <li>Limit vegetation cover removal.</li> <li>Use adequate drainage structures.</li> </ul>	Moderate – Major	Erosion, siltation and land slip from cuts slopes, grubbing, and vegetation removal.	Land, Water Bodies, Aquatic Fauna	SIF/Contractor(s)
Waste Generation and Disposal	<ul style="list-style-type: none"> <li>Minimize waste generation.</li> <li>Segregate waste for re-use;</li> <li>Provide waste bins;</li> <li>Develop waste disposal policy.</li> <li>Contract certified firms for collection, transport and disposal of harmful, hazardous wastes.</li> </ul>	Moderate -Major	Excavated spoil, building materials, oil, lubricants	Land, Water bodies, Aquatic Fauna, Constriction workers, campus residents	SIF/Contractor(s)
Concrete Batch Plant	<ul style="list-style-type: none"> <li>Reuse concrete products.</li> <li>Prevent dumping of concrete waste.</li> <li>Segregate areas into ‘clean’ and ‘dirty’ sections</li> </ul>	Minor	Concrete mixing and resultant contamination	Land, water-bodies, Aquatic fauna; construction workers	SIF/Contractor(s)
Construction Camps and Offices Creation	<ul style="list-style-type: none"> <li>Carefully site, construct and manage construction camps.</li> <li>Control erosion and dust.</li> <li>Plan and carry out post-construction site clean-up.</li> <li>Provision of mobile toilet and sanitary facilities</li> <li>Daily collection of solid waste</li> <li>Selection of fairly flat location</li> <li>Removal of vegetation cover.</li> </ul>	Moderate	Environmental and social disruption caused by construction camps	Land water bodies, Air, Aquatic fauna, campus residents, construction workers.	SIF/Contractor(s)

Biodiversity Loss (Fauna and Flora)	<ul style="list-style-type: none"> <li>• Control all clearing activities.</li> <li>• Minimize number of trees to be felled.</li> <li>• Reduce potential impact on flora and fauna.</li> <li>• Replace and plant more trees, hedges, etc.</li> <li>• Avoid use of invasive plant species to revegetate cleared areas.</li> </ul>	Moderate	Clearing, destruction and decimation of fauna habitat and food resources	Land, plant and animals, Aquatic Fauna	SIF/Contractor(s)
Traffic Nuisance	<ul style="list-style-type: none"> <li>• Develop and implement traffic management plan</li> <li>• Set and enforce speed limits.</li> <li>• Regulate transport of toxic materials.</li> <li>• Reduce accident risks by safe driving speeds.</li> </ul>	Moderate	Accidents risks associated with vehicular traffic	Project residents, construction workers and public	SIF/Contractor(s)
Public Occupational Health and Safety	<ul style="list-style-type: none"> <li>• Use of PPE by workforce.</li> <li>• Collect and recycle lubricants and streams of waste.</li> <li>• Take precaution to avoid accidental spills.</li> <li>• Carry out periodic toolbox meetings.</li> <li>• Setup health education, malaria prevention programs.</li> <li>• Install first aid boxes</li> <li>• Maintain sanitation and hygiene at campsite and active working/construction areas</li> </ul>	Major	Creation of diseases vectors affecting humans, plants, and animals.	Project resident's construction workers public.	SIF/Contractor(s)

Visual Impairment	<ul style="list-style-type: none"> <li>• Fence in project sites and open spaces to prevent visual intrusion.</li> <li>• Water all exposed areas.</li> <li>• Ensure that new developments are culturally sound, environmentally appropriate and aesthetically acceptable.</li> </ul>	Moderate	Aesthetic impact of areas development; visually offensive structures	Architectural aesthetics of the skyline	SIF/Contractor(s)
Construction Materials Waste	<ul style="list-style-type: none"> <li>• Implement on-site recycling system.</li> <li>• Reuse recycled demolition materials</li> <li>• Remove at regular intervals, all solid waste not recyclable for special disposal.</li> </ul>	Moderate	Environmental effects of construction materials waste	Land, Air and Water; Humans, plant and animals	SIF/Contractor(s)
Hazardous Solid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous solid waste material inventory</li> <li>• Collect and store hazardous materials in temporary hazardous waste storage.</li> <li>• Protect all hazardous waste from rainy events.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous solid waste stream	Land, Air, Water, plant, animals, humans	SIF/Contractor(s)/ Ghana EPA
Hazardous Liquid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous liquid waste stream inventory.</li> <li>• Follow waste management plan for hazardous liquid waste stream.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous liquid waste stream	Land, Air Water, Plant, Animals, Humans	SIF/Contractor(s)/ Ghana EPA

Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide five extinguishers, fire alarms, smoke detectors.</li> <li>• Treat all wires as live wires.</li> <li>• Train selected personnel for Fire Prevention and Fighting Techniques.</li> <li>• Organize periodic fire drills.</li> <li>• Establish fire assembly places</li> </ul>	Moderate	Areas of eminent fire suppression and spontaneous combustion	Assets, properties, humans, plants, animals	SIF/Contractor(s)/ Fire Station, Ghana National Fire Service
Influx Population Surge	<ul style="list-style-type: none"> <li>• Develop a labor management plan.</li> <li>• Educate workforce on social harmony.</li> <li>• Establish positive relation between workers and local residents.</li> <li>• Avoid child labor.</li> </ul>	Minor – Moderate	Creating of social disharmony between local and workforce	Project Residents, Local populations Construction Workforce	SIF/Contractor(s), District/Metropolitan Assemblies
Green House Gas (GHG) Emissions	<ul style="list-style-type: none"> <li>• Service construction vehicles, machinery and equipment regularly.</li> <li>• Capture GHG missions for mobile construction vehicles.</li> </ul>	Unknown	Mobile and stationary equipment and machines	Plants, Animals, Humans	SIF/Contractor(s)/ Ministry of Health
<b>OPERATION PERIOD</b>					
Air and Noise	<ul style="list-style-type: none"> <li>• Monitor periodically ambient areas.</li> <li>• Provide barriers in front of sensitive receptors.</li> <li>• Enforce Ghana EPA guidelines for air and noise emissions.</li> </ul>	Minor	Traffic flow noise and air pollution	Air, project residents, plants and animals.	SIF/Contractor(s)
Waste Generation Disposal	<ul style="list-style-type: none"> <li>• Recycle all surplus solid waste and demolition waste.</li> </ul>	Moderate	Dismantling of work camp and site offices	Land water bodies, aquatic fauna,	SIF/Contractor(s)

	<ul style="list-style-type: none"> <li>Decommission camp sites/offices adequately and dispose of waste properly in a lawful manner.</li> </ul>			construction workers, campus residents.	
Traffic Safety and Security	<ul style="list-style-type: none"> <li>Maintain diversion signs with reflective materials.</li> <li>Provide adequate number of signage.</li> <li>Prohibition of unnecessary honking of horns by motorists cyclists.</li> </ul>	Minor	Traffic flow from vehicular traffic	Animals, humans (project residents, neighborhood residents)	SIF/Contractor(s)
Public Health and Safety	<ul style="list-style-type: none"> <li>Cover all stagnant pools and ponds from breeding mosquitoes.</li> <li>Educate project populations on HIV/AIDS/Malaria Presentation.</li> <li>Ensure safe traffic control signs.</li> </ul>	Moderate	Vehicular traffic flow stagnant water pools or ponds	Land, Animals and Humans	SIF /Contractor(s)
Visual Impairment	<ul style="list-style-type: none"> <li>Ensure that new developments are culturally appropriate, environmentally sound and aesthetically acceptable.</li> <li>Note observation and feedback from campus residents, government agencies, NGOs.</li> </ul>	Minor	Visually Offensive Structures	Legon Campus skyline	SIF /Contractor(s)

Hazardous waste	<ul style="list-style-type: none"> <li>• Hazardous waste storage and disposal in a lawful manner.</li> <li>• Monitor areas of hazardous waste storage of concern by regulatory agencies.</li> <li>• For vaccine research and development/manufacture, develop biosafety protocols to cover the entire lifecycle including waste generation, collection, transport and disposal.</li> </ul>	Moderate – Major	Environmental effects of hazardous waste stream	Land, water, air, plants, animals and humans	SIF /Contractor(s)
Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide all weather access to the new buildings without obstruction.</li> <li>• Satisfy functionality of fire extinguishers, fire alarms, smoke detectors, etc.</li> <li>• Organize periodic fire drills. Establish fire assembly places.</li> </ul>	Moderate - Major	Areas of spontaneous fire combustion incidence	Land, assets, properties, air, water, plants, animals, humans	SIF/Contractor(s)
Influx Population	<ul style="list-style-type: none"> <li>• Conduct Epidemiological studies to track new infections in the project populations.</li> </ul>	Minor	Disease spread in the project communities	Air, water, land plants animals, humans	SIF/Contractor(s)

**Source: Individual Consultant Data Records**

### **Environmental, Climate and Social Management Plan (ECSMP)**

The Environmental, Climate and Social Management Plan (ECSMP) presents the implementation schedule of the proposed mitigation measures to both environmental, climate and social impacts as well as planning for long-term monitoring activities. The ECSMP also includes the associated environmental, climate and social costs needed to implement the recommended mitigation measures. Implementation of the ECSMP has been disclosed with the development of construction specific ECSMP by the contractor(s).

Kwaku Anim Boateng (Individual Consultant)

Institutional arrangement for monitoring has been disclosed at the national level and district/municipal assembly's level. Moreover, capacity development training plan has been created. The breakdown of the estimated costs for putting the ECSMP into operation has been depicted, with the total estimated cost for the use of the ECSMP (excluding any potential RAP implementation costs) during project period is at **USD 573,500.00**.

### **Disaster Management Plan**

This section outlines prevention action, reporting procedures, communication system, disaster committee formation and functions.

### **Decommissioning and Emergency Response Plan**

This section discusses decommissioning of structures and site reclamation steps. But the emergency response plan deals with purpose and objectives; responsibilities; emergency and fire response team; monitoring of fire detection and protection systems; testing, inspection and maintenance; portable extinguishers; fire detection alarms; fire/emergency doors; emergency response actions; emergency procedure for bulk oil spills; emergency procedures for fire outbreaks.

### **Principal Issues Arising from the Scoping Phase**

Significant concerns which emerged as principal issues arising from the field studies have been disclosed as sustainability plan issues addressed by SIF, good infrastructure design, site location and layout issues, maintenance regime of facilities, considering environment and climate change factors.

### **Stakeholders Participation Strategy**

Disclosure on how the consultation program will be carried out with relevant stakeholders has been highlighted in this document. Consideration has been given to Stakeholder's participation Strategy, Strategic Objectives for Environmental and Social Education, Methods of Dissemination for Environmental and Social Education, Summary of Affected Individuals and Group Consultations. Key issues which emerged out of the stakeholder's consultation process were the following: project site accessibility during wet and dry periods; demolition of existing old, dilapidated structures; effective drainage systems to channel runoffs and flash floods; felling or cutting down of large numbers of trees; air pollution; noise and vibration effects; erosion and siltation of low-lying landscape during precipitation events; gender-based violence against sexual exploitation and abuse.

### **Site Management Roles and Responsibilities to Management Procedures**

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The organizational and staffing structures identifying the personnel (by job title and name) and relevant institutions to be assigned for ESIA implementation issues addressed with responsibilities assignment to the Project is shown in a matrix format in this document. The identified relevant stakeholders include: Project Environmental and Social Coordinator; Project Manager (Contractor); Project Manager (Consultant); Client (SIF); Ghana Health Services; Electricity Company of Ghana (ECG); Environmental Protection Agency (EPA); Forestry Commission (FC); School Organizations; Project Community; Opinion Leaders; NGOs; SIF Environmental and Social Assessment Unit; Policy Planning and Monitoring and Evaluation Units of SIF; External Consultants or NGOs.

### **Monitoring and Control**

The monitoring and control program facilitates the predictions of potential impacts accuracy, prescribed mitigation measures appropriateness and management of strategic plans accuracy. Moreover, the monitoring and control plan gives an early warning system by revealing unforeseen impacts and call for additional corrective measures. Extensive coverage has been given to the monitoring and control program for various environmental and social components in a matrix format for preconstruction, construction and operation phases. Five key parameters which will be monitored include the following: **air quality** – total suspended particulate (TSP); suspended particulate matter (SPM); respiratory particulate matter (RPM); NO<sub>x</sub>; SO<sub>2</sub>; CO; **ground and surface water quality** – suspended solids (SS); biological oxygen demand (BOD); dissolved oxygen (DO); conductivity; faecal coliform; oil and grease; **ambient noise levels** – inside and periphery of construction site for L10; L90; Leq; **soils** – lead; pH; oil and grease; **waste generation and disposal** – hazardous and non-hazardous waste; biosafety protocols – implementation at the laboratories during the operation phase.

### **Conclusions**

Conclusions have been drawn from lessons learnt from similar projects, operationalization of the ECSMP, beneficial and non-beneficial environmental and social requirements and project implementation merits and demerits. The nature of the civil works under the project will cause moderate to minor negative, significant impacts. Where the potential impacts are high and significant a set of controllable, mitigation, management and monitoring measures have been prescribed. Most of the project impacts will be localized because of moderate to minor-scale activities. The implementation of the project has been recommended with its accompanying ECSMP and Monitoring and Control plans. All the campus populations, project neighbourhood residents and future generations need this Program to enhance educational and accompanying infrastructural facilities to ensure their socio-economic development in the future.

### **Recommendations**

Recommendations have been made on the need for ensuring sustainability plan issues addressed, good infrastructure design, records keeping and documentation, awareness creation, training and capacity building, information, education and communication.

Kwaku Anim Boateng (Individual Consultant)



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## **1.0 Introduction**

The government of Ghana through the Ministry of Finance have sought funding from the African Development Bank for the proposed Post Covid-19 Recovery Program on Skills, Research, and Productivity Project. The Social Investment Fund is the Coordinating Unit of the Project

### **1.1 Purpose and Need for Environmental and Social Assessment Study**

The proposed project aims to provide support for climate-resilient socio-economic recovery and the protection of jobs and businesses and contribute to the rebuilding of the health system in Ghana. Moreover, the proposed project will strengthen resources and capacities of small and medium enterprises especially women and youth, built relevant medium and high-level skills in TVET and STEM and enhance linkages between research, policy, and private sector growth in the pharmaceuticals industry. Finally, the proposed project will contribute to Ghana's post-COVID-19 recovery in the health sector through climate-resilient infrastructure improvements and skills development in higher education institutions and the restoration of livelihoods and income and employment opportunities through entrepreneurship and jobs among youth and women.

Fundamentally, the Proposal requires that an Environmental and Social Assessment (ESA) study be undertaken. More specifically, as part of the developmental procedures an Environmental and Social Impact Assessment (ESIA) is to be prepared before [the Project is submitted to the Board](#). Therefore, SIF is committed to achieving and maintaining environmental and social standards, such that any environmental and social impacts resulting from the construction and operation of the Project are minimized or reduced to the barest acceptable levels. Moreover, in consonance with the preservation and conservation of the immediate environment of the project sites, the SIF is also committed to working with all the project communities and project stakeholders (including Ghana EPA and AfDB), right from project conceptualization through project implementation stages.

Finally, to obtain the “Environmental Permits” and “Funding Approvals” of the proposed Post Covid-19 Recovery Program on skills, research and Productivity project, the Social Investment Fund, must carry out an Environmental, Climate and Social Impact Assessment (ESIA), which will have to comply with the Environmental Protection Agency (EPA) of Ghana guidelines and other statutory environmental and social laws of Ghana as well as the Integrated Safeguards System (ISS) and Climate Safeguard System (CSS) of African Development Bank (AfDB).

### **1.2 ESIA Requirement**

The Environmental and Social Impact Assessment (ESIA) is legislated in Ghana through LI 1652 Environmental Assessment Regulations, 1999.

This legislation falls under the responsibility of the Ministry of Science and Technology and Innovation (MESTI) under whom the Environmental Protection Agency (EPA) is the regulatory body. Schedule 2 of the Regulation lists all undertakings for which an ESIA is mandatory. Within section 13 (e) of the schedule, the PRSTRP project is identified as one such undertaking. An ESIA will therefore be undertaken for the proposed project development.

### **1.3 Scoping Exercise or Issues Identification**

Once this proposed project has been defined, the first activity to be performed as part of the ESIA process is to identify those issues which are of significant concern and which will need to be studied in detail. Those issues which are of little or no importance and which can be effectively ignored will be screened out.

For the proposed development, the scoping exercise involves the registration of the Project with EPA, using form EA1 (which is yet to be accomplished by the SIF), field visits to the project location and consultation with all relevant stakeholders. Here, the main objective is to identify and direct the ESIA study on the potential environmental, social, health and safety impacts to focus only on the significant and key issues.

Prior to the submission of the detailed ESIA of the project, the findings of the scoping exercise in the Inception Report will be presented to the Client, EPA and Project Financiers for comments. This Inception Report incorporates Ghana EPA Performance Guidelines for scoping exercise conduction.

### **1.4 Scoping Objectives**

The primary scoping objectives of the Proposal are as follows:

- Information gathering on the proposed type of development and its likely environmental, social, health and safety impacts.
- Assessment of project site and surrounding areas of land use pattern and susceptibility to change by the proposed development.
- Consultation and engagement of local communities, institutions, and agencies as stakeholders to determine the environmental, social, health and safety issues of most concern which should be included in the ESIA study.
- Policy, legal and administrative framework relevant to Ghana government policies, regulations, and laws, including African Development Bank (AfDB) operational standards, governing the Proposed Project.

- Draft Terms of Reference (ToR) for the ESIA study.

### **1.5 ESIA Study Objectives**

The main objective of this assignment is to conduct an Environmental, Climate and Social Impact Assessment Studies for the Post Covid-19 Recovery Program on Skills, Research and Productivity Project in accordance with the AfDB ISS and GoG Environmental, Climate and Social safeguards guidelines and laws. The audit/assessment will collect relevant data on how the project will address relevant social issues, i.e. issues of inclusion/exclusion, targeted beneficiaries and discrimination among others and will address climatic impacts on the project and to ensure that the project promotes measures to reduce carbon emission. The Terms of Reference (TOR) for the ESIA Study are the following:

- To identify issues that may need to be evaluated as part-of the Impact Assessment stage.
- To identify likely impacts of the proposed Project on Physical, Biological/ Ecological and Socio-Economic/Socio–Cultural Environment of the project zone, to predict and evaluate these impacts and determine significance of these impacts to the technical and regulatory concerns.
- To propose appropriate mitigation measures that should be incorporated in the design of the project to minimize if not eliminate the adverse impacts.
- To assess the compliance status of the proposed activities with respect the Environmental and Social Regulation or Legislation of Ghana, District Assembly By–Laws, and AfDB Operational Safeguards.
- To develop a Provisional Environmental and Social Management Plan (PESMP) to provide an implementation mechanism for the environmental as well as social mitigation measures identified in the study.
- To detect adverse effects in time for correction through Monitory Program.
- To identify alternatives to be evaluated at Impact Assessment Stage with the main purpose of focusing the environmental and social assessment on reasonable and feasible alternatives examination.
- To conduct comprehensive stakeholder consultations as part of public participation process.

### **1.6 Scope of ESIA Study**

The scope for the ESIA study is to among other things:

- Provide adequate description of the proposed project and identify all activities of environmental, climate and social concern.

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- Establish the existing environmental, climate and socio-economic baseline conditions of the project area of influence.
- Predict and examine all the significant environmental impacts on the surrounding communities, climate change, gender, health and safety including HIV, Covid issues and the general environment during implementation of the proposed project and advise on appropriate mitigation and abatement measures against potential adverse impacts;
- Provide a monitoring program for predicted impacts;
- Assess the environmental, climate and health and safety issues at the various sub-components in relation to the parameters outlined in the ESMP as well as provide a provisional Environmental, Climate and Social Management Plan (ESMP) that incorporates measures and standard to be put in place by the project
- Conduct stakeholders Engagement to solicit the input of relevant stakeholders into the project that incorporates feedback mechanisms for receiving/hearing and effectively responding to grievances or any other feedback from stakeholders, especially the beneficiary communities of the project.
- Document the socio-economic and cultural advantages and disadvantages associated with the proposed project for stakeholders and interested groups to make an informed decision on the level of environmental and climate compromise and permitting.

### 1.7 Study Areas Boundary

The project study areas cover seven (7) regions (Greater Accra, Eastern, Western, Ashanti, Bono, Upper West and Northern). However, the selected provision of new construction and rehabilitation of infrastructure are either located in a metropolis, municipal or district assembly (See Table 1.0).

**Table 1.0 Profile of New Construction or Rehabilitation of Infrastructure Facilities and Rebuilding of Livelihoods**

<b>Date of Project Site Visit or Meetings</b>	<b>Region</b>	<b>Project Site/Location</b>	<b>Metropolitan, Municipal, District Assembly</b>	<b>New Construction/Rehabilitation of Structures or Rebuilding of Livelihoods through Entrepreneurship and Employment Creation</b>	<b>Individual Consultant Comments from Field Studies and Accompanying Options Considerations</b>
30 <sup>th</sup> March 2022	Greater Accra	<b>MASLOC, Accra</b>	Osu Klottey Municipal District	Rebuilding Youth’s and Women’s Livelihoods through	Consultations, Engagement and Extensive Discussions on the Strategies for Provision of

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				Entrepreneurship and Employment Creation.	Livelihood Restoration Program to MASLOC Beneficiaries through EBAN CAPITAL (Head Office at Ridge, in Accra).
29 <sup>th</sup> March 2022	Greater Accra	<b>Department of Medical Microbiology, Korle Bu, Accra.</b> {University of Ghana Medical School (UGMS), Korle Bu, Accra}	Ablekuma South Metropolitan District	New Construction of Structure	Partial Demolition of Existing Building housing MSSl (Medical and Surgical Skills Institute) and Department of Medical Microbiology Animal House Unit. Demolition process will only affect the section occupied by the Department of Medical Microbiology Animal House Unit.
30 <sup>th</sup> March 2022	Greater Accra	<b>Nursing and Midwifery School, Legon, Accra.</b> {University of Ghana, Legon, Accra}	Accra Metropolis District	New Construction of Structure	Relocation of Temporary Metal Container Structure, Electrical Distribution Transformer and Water Storage Tanks. Demolition of Concrete Platform. Removal of Vegetation Cover leading to the cutting of few small size trees.
30 <sup>th</sup> March 2022	Greater Accra	<b>Biotechnology Centre, Legon, Accra.</b> {University of Ghana, Legon, Accra}	Accra Metropolis District	New Construction of Structure	Removal of Vegetation Cover leading to the cutting of one or two mature mahogany trees. Preservation and conservation of shady mahogany trees adorning the eastern boundary of the project site.

29 <sup>th</sup> March 2022	Greater Accra	<b>Ghana News Agency Office, Accra.</b>	Osu Klottey Municipal District	Rehabilitation of Structure	Rehabilitation Process Phasing to allow for relocation of GNA Staff into one of two buildings (A or B) and avoid resettlement or displacement issues.
31 <sup>st</sup> March 2022	Greater Accra	<b>Ghana News Agency Office, Tema.</b>	Kpong Katamanso Municipal District	Rehabilitation of Structure	Relocation of GNA Staff to allow for rehabilitation of existing structure.
29 <sup>th</sup> April 2022	Eastern	<b>Abetifi Vocational Training Institute, Abetifi.</b>	Kwahu East District	New Construction of Structure	Removal of vegetation cover on fallow farmland as option 1 or removal of vegetation cover on manicured open landscape between new girl's hostel and catering/fashion and design workshop as option 2. <b>Option 2 selected option (see chapter 5)</b>
26 <sup>th</sup> April 2022	Western	<b>Ghana News Agency Office, Takoradi.</b>	Sekondi-Takoradi Metropolitan District	New Construction of Structure	Removal of bushy and thicketed vegetation cover on fallow landscape belonging to Sekondi-Takoradi Regional Coordinating Council (RCC) leading to the cutting of four big size and four medium size neem trees.
27 <sup>th</sup> April 2022	Ashanti	<b>Otaakrom Vocational/Technical Institute, Otaakrom.</b>	Atwima Mponua District	New Construction of Structure	Removal of vegetated fallow grassland leading to the relocation of concretized structure overhead water tank (poly-tank placed on it) and demolition of disused and

					dilapidated school toilet facility (as option 1). Rehabilitation of frontage uncompleted old structure previously marked for showrooms for students' handiworks from the school's workshops (as option 2). <b>Option 1 selected option.</b>
27 <sup>th</sup> April 2022	Ashanti	<b>Ghana News Agency Office, Kumasi.</b>	Kumasi Metropolitan	Rehabilitation of Structure	Removal of bushy grassland vegetation leading to the rehabilitation of uncompleted storey building abandoned by the Kumasi Regional Coordinating Council.
27 <sup>th</sup> April 2022	Bono	<b>Nsoatre Technical School, Nsoatre.</b>	Sunyani West District	New Construction of Structure	Removal of vegetation cover leading to the cutting of few trees as <b>option 1 (Student Bathroom Area)</b> . Removal of vegetation cover leading to the cutting of 10 to 15 single-spaced medium sized trees (not clustered but serving as windbreaks buffer zone) as <b>option 2 (Mosque Area – behind Ghana National Fire Service Station)</b> . Removal of bushy vegetation cover leading to the cutting of several small, medium and large size trees across the high tension electricity line towards

					<p>Ghana Water Company Limited Booster Station feeder road as <b>option 3 (Opposite Fashion Department)</b>.  Removal of bushy vegetation cover leading to the cutting of few trees and destruction of the existing volleyball pitch as <b>option 4 (Volleyball Pitch Area)</b>.  Removal of bushy vegetation cover leading to the cutting of few trees as <b>option 5 (Behind the Kitchen Area)</b>. <b>Option 4 selected option.</b></p>
28 <sup>th</sup> April 2022	Upper West	<b>St. Johns' Vocational/Technical School, Nandom</b>	Nandom Municipal District	New Construction of Structure	<p>Removal of vegetation cover in a wooden fenced-in enclosure with disused, old, and dilapidated sandcrete pigsty with zinc roofing as option 1. Removal of vegetation cover leading to the cutting of big and small neem trees and demolition of disused, old, and dilapidated school urinal as option 2. <b>Option 1 selected option.</b></p>
29 <sup>th</sup> April 2022	Northern	<b>Ghana News Agency Office, Tamale.</b>	Tamale Metropolitan District	Rehabilitation of Structure	<p>Rehabilitation of the existing structure will lead to the relocation of rental institutions staff such as Simnet and Lots Services (service providers to</p>

Source: Independent Consultant Data Records

## 1.8 Study Approach and Methodology

### Study Approach for Scoping Phase

The following activities or task assignments were adopted at the Scoping Phase:

- Field Inspection and Observational Studies
- Environmental Sampling and Analysis
- Terrestrial and Aquatic Studies
- Land Use Studies
- Socio- Economic and Socio – Cultural Studies
- Consultation Program

### Methodology for Data Gathering Scoping Phase

The Scoping Phase resulted in the identification of potential environmental and social impacts that will result from the implementation of the Proposal. This phase also looked at identifying feasible alternatives related to the proposed project activities. Finally, the Scoping Phase provided reasonable opportunity for relevant stakeholders to be involved in the process.

**Field Inspections and Observational Studies:** Linear surveys and observation of the project sites were carried out to confirm and establish all relevant baseline environmental and social issues and conditions to be affected or are likely to develop from the proposed projects implementation. And through field inspection and observational studies, data have been collected and compiled, to develop the baseline or pro-project conditions with regards to the project zone physical, biological/ ecological and human development.

**Environmental Sampling and Analysis:** An Initial Environmental and Social Examination (IESE) has been conducted through project sites observational studies to ascertain whether there were any significant triggers and drivers of environmental and social effects, which leads to the development of a full-blown ESIA.

**Terrestrial and Aquatic Studies:** A walk – throughs of project sites have been undertaken. Primary data on vegetation and natural resources have been collected, to depict potential non-perennial wetlands, habitat types and other biodiversity assets of nature. Secondary sources of data have been consulted on terrestrial vegetation types, invasive species in coastal vegetation type, species of special concern and flagship species and Important Bird Areas (IBAs) and Biodiversity “HOT” spots.

**Land Uses Studies:** Detailed field investigations on landscape and land use pattern have been undertaken to locate the following features: existing commercial operational zone overview, existing open space and fallow lands, existing land uses, cultural, historical, heritage and archaeological sites. A topographical map (1:50,000) of the project area have been used.

**Socio-Economic and Socio-Cultural Studies:** Observational studies and interviews of farmers, traders, lecturers, students, SIF officials, project enclave communities’ population have been carried out through the administration of questionnaires. Data compilations on socio-economic and socio-cultural issues very likely to emerge as potential impacts of the proposal have been undertaken. Supplementary information has been sought on respondent’s background information including residents, age, sex profile and demography, ethnicity and cultural practices.

**Consultation Program:** Consultation with lecturers, students, farmers, traders, SIF officials, drivers, business owners and neighbouring community residents and key and relevant stakeholders have been undertaken. Specific concerns relating to environmental and social impacts will address issues on flora and fauna, construction access roads, dust, noise and vibration pollution, flooding disturbance and construction traffic nuisance.

### **ESIA Study Approach and Methodology**

**Study Approach:** The study approach involved the adoption of task specific assignments and activities such as the following:

- ❖ Plugging Data Gaps after Scoping Phase
- ❖ Conducting Specialist/ Professional Studies at ESIA Phase

**Plugging Data Gaps after Scoping Phase:** This phase covered the following steps:

- Additional Field Visits/ Reconnaissance Studies
- Detailed Environmental and Social Component Examination
- Detailed Terrestrial and Aquatic Studies
- Detailed Socio-Economic and Socio–Cultural Studies
- Additional Stakeholder’s Consultation and Engagement.

**Conducting Specialist / Professional Studies at ESIA Phase:** This stage captured the following:

**Biodiversity (Flora and Fauna) Resources Studies:** Detailed impact assessment studies have been conducted to profile the vegetation cover and its accompanying fauna species content congenial to the flora habitat. Any feasible fauna migratory routes present within the project corridor have been discussed, where applicable.

**Visual and landscape Character Studies:** The character or quality of important aesthetic resources have been captured. A visual impact assessment has been adopted to define the following: visual characteristics of the Project, the Project sites and surrounding areas.

**Archaeological, Cultural and Heritage Resource Studies:** All archaeological and cultural facilities of interest, within the project zone, have been evaluated and discussed under this headline. An archaeological, historical and cultural desk-based assessment (including consultations with stakeholders) have been undertaken to determine the risk posed to buried-treasure from the proposed development. Reference has been made to historic records held by the Museums and Monument Board. Similar studies have been conducted based on information gleaned from previous studies, literature, publications, websites and desk top studies. Such studies have included the following:

- Traffic Sensitivity Analysis and Impact Studies.
- Demolition Sensitivity Analysis and Impact Studies.
- Traffic Congestion Threat Assessment.
- Geo-hydrological, Floods and Runoff Resource Studies
- Roads and Traffic Network Studies.
- Hazardous Chemicals/ Materials Studies.
- Flooding Risks and Impact on Health and the Environment Assessment.



- Risks Associated with Inappropriate Processing and Dumping of Hazardous Waste Assessment.
- Air Quality (Dust, Gas and Odour) Studies.
- Ground or Surface Water Contamination by Leachate Studies.
- Construction Site Debris Studies.
- Nuisance Effects from Vermin and Vector Studies.
- Workers Health and Safety Studies.
- Fire Suppression and Spontaneous Combustion Studies.
- Habitat Loss/Dissection Studies.

### **Methodology of Data Gathering ESIA Phase**

**Scoping Phase Data Gaps:** Data gaps emanating from the Scoping Phase have been plugged by undertaking the following measures: revisiting of project sites by additional site visits; conducting detail environmental components examination of air, water and noise; conducting detail terrestrial and aquatic studies on freshwater wetland, zone of coastal grassland, shrubs, thicket, insects and butter flies, bird's habitat types, nature conservation and protected areas; conducting detail land use studies on settlement patterns, existing open spaces, existing land use; conducting detail socio-economic and socio-cultural studies on lifestyles, influx of outsiders, social fabric changes, increase employment potential, youth unemployment, poverty level, etc.

**ESIA Phase Specialist/ Professional Studies:** Comprehensive specialist/professional studies have been undertaken to gather data for the following relevant areas: biodiversity impact assessment; visual and landscape assessment, archaeological, cultural and heritage resources assessment; biodiversity threat assessment; geo-hydrological floods and runoff assessment; roads and traffic network assessment; hazardous chemicals materials assessment; air quality assessment; demolition impacts and construction site debris assessment; worker health and safety assessment; fire suppression and spontaneous combustion studies; construction workers and project communities relationship assessment.

### **1.9 Limitations, Constraints and Challenges**

- The Independent Consultant notes that where statements are attributed to others, such statements in no way reflect the views of the Independent Consultant.
- Scheduling of field site visits were affected by the impending Easter Holidays celebrations which led to the cancellation and rescheduling of new appointments to meet heads or principals of selected vocational and technical institutions outside of Accra.

- Due to the strike action by the Civil and Local Government Staff Association Ghana (CLOGSAG) – a Registered Trade Union and the mouthpiece of workers in Civil and Local Government Services as well as other establishments – MCEs, DCEs and other Municipal, Metropolitan, District Assemblies officials and staff could not be consulted and engaged under the planned Stakeholders Engagement and Consultation Program.
- Independent Consultant has based his conclusions and recommendations on the information available at the time of the preparation of this report.
- Independent Consultant has collated all the field data obtained and considered such information as part of this report, with technical support from SIF and allied institutions officials.
- The findings of this report are based on the field data collected through structured questionnaires.
- Due to time constraint and the crash instituted for this project, some key baseline information could not be included in this Draft ESIA report. However, at Final ESIA reporting stage, these additional significant components will be addressed in full. They are the following: (i) healthcare delivery (ii) historical, cultural and heritage resources (iii) housing stock, construction materials and utilities (iv) land use, land tenure and right (v) transportation.

#### **1.10 Sources of Maps**

All maps utilized in this ESIA report were adopted from online google maps on Ghana showing all the characteristic features shown in various sections.

## 2.0 Policy, Legal and Administrative Framework.

### 2.1 Requirements

To set the stage for the necessary requirements of the TOR, the following presentation will be made:

- **Section 2.2: Institutional Framework**, an overview of the major entities comprising the framework in which the Project will be implemented;
- **Section 2.3: Overarching Implementation Framework**, a description of the specific Framework, established by the SIF; and
- **Section 2.4: Relevant Policies, Legislation and Regulations**, a description of the laws regulations and standard arrangements that are anticipated at the Project-Level.

With this contextual information as general background, the sections which follow address the stated requirements TOR for the preparation of the ESIA, i.e.; the stipulation that the section of the document addressing framework issues shall identify, discuss and / or assess:

- Government of Ghana policies, legislation (including international treaties and obligations) and regulations relevant to the Projects and Activities. These requirements are addressed in **Section 2.5: Project Regulatory Compliance.**
- Project Activities are consistent within the framework of AfDB Operational Safeguards applicable to the Project. These requirements are addressed in **Section 2.6: Environmental and Social Strategic Action.**
- Resources and capacity of SIF and of the regulatory and implementing agencies responsible for environmental and social issues relevant to the Project. These issues are addressed in **Section 2.7: SIF Policy Documents.**

### 2.2 Institutional Framework

Ghana has the necessary institutional framework with considerable professional expertise that would be required to implement an undertaking such as the Project ESIA Program. The following are the general profiles of key institutions that can be expected to participate and/or provide support in the implementation of the Project ESIA Program.

- **Social Investment Fund (SIF)**

The SIF was set up in 1998 by the Government of Ghana (GoG), African Development Bank (AfDB) and the United Nations Development Program as a rapid, reliable and flexible mechanism for channelling resources and delivering targeted assistance to both urban and rural impoverished communities. The SIF supports economic infrastructure as well as social infrastructure and services. The SIF is currently implementing the Ghana Poverty Reduction Strategy (sponsored by the GoG, AfDB group and the OPEC Fund for International Development (OFID)).

- **Environmental Protection Agency (EPA)**

The EPA formulates the national environmental policy, and coordinates and monitors activities that could have an impact on the environment. The EPA ensures that development plans and programs take into account environmental and social concerns through Environmental Impact Assessment (or ESIA). EPA also ensures regular monitoring of pre-determined environmental indicators. Where necessary, EPA enforces the environmental law. It disseminates public information on the state of the environment and carries out non-formal education programs. The Project ESIA Program will be subject to EPA review.

- **Ghana Health Services**

It is responsible for implementing national policies under the control of the Minister of Health through its governing Council – the Ghana Health Council. It increases access to good quality health and manages prudently resources available for the provision of the health services.

- **Land Use and Spatial Planning Authority (LUSPA - formerly Town and Country Planning (TCP))**

The LUSPA is responsible for planning and management of growth and development of cities, towns and villages in the country. It therefore seeks to promote sustainable human settlements development based on principles of efficiency, orderliness, safety and healthy growth of communities.

- **Ministry of Education (MoE)**

The Ministry of Education is responsible for the government and management of Ghana's education. It is responsible for the national curriculum, primarily instituted by Ghana Education Services, which is part of the Ministry. The Tertiary Education Division of the Ministry of Education oversees the state of higher education in the country.

- **Electricity Company of Ghana (ECG)**

The ECG is responsible for the provision of quality, reliable and safe electricity services to support the socio-economic growth and development of Ghana.

- **Ghana Water Company Limited (GWCL)**

As a public utility company, GWCL functions as the country's bulk water supplier and oversees the urban water sector. It undertakes capacity building in Water Quality Monitoring and Surveillance in Ghana.

- **Metropolitan/Municipal/District Assemblies (MMDAs)**

The projects fall under the jurisdiction of the MMDAs. The MMDAs are the highest political authority in the project zones. The MMDAs has roughly a total of 70 members each, roughly 70 percent of whom are elected and 30 percent are appointed. MMDAs members are responsible for deliberation, evaluation, coordination and implementation of programs accepted as appropriate for the MMDAs economic development.

- **Land Valuation Division (LVD)**

The LVD is a division of the Land Commission responsible for the valuation and numeration of properties, assets, structures and facilities within the project development zone, where there will be issues of involuntary resettlement and compensation payment to project-affected-persons (PAPs). The LVD assesses, values and mark-out all affected properties and identify all the property-affected-persons (PAPs) and prepare a list of all PAPs and associated assets for compensation payments.

- **Non- Governmental Organizations (NGOs)**

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There are many local and international NGOs in the country which have been implementing projects in a participatory manner. They are supported by several donor agencies and organizations such as UNICEF, UNDP, DANIDA and Water Aid. There are a few who operate in towns and communities close to the proposed site; these NGO's include socio-serve, Eco-system development society, Dynamic development Society, Planned Parenthood Association of Ghana, to name a few. Moreover, the project will also rely on expertise located within research and academic institutions like GIMPA, consultancy firms, etc., to support implementation of the ESIA and other ES instruments.

### **2.3 Overarching Implementation Framework**

The SIF as the client and government agency complies and enforces the National Environmental Action Plan which underlines its operations with regards to Environmental and Social Performance of PRSTRP Programs on project zones. The Framework's most significant components for the purposes of the ESIA are:

- Understanding the impact of our operations on the total environment and social scale through control of Energy, Water, Transport and Carbon Footprint.
- Assessing the impact of our programs on the project areas, neighbouring communities and the total environment and social footprint.

The SIF aims to guide the Project with long term sustainability footprint analysis in mind. Moreover, the SIF carries the ultimate responsibility for ensuring that the proposed Project is designed, constructed and operated in conformance with AfDB OS, EHS Guidelines for Building Infrastructure, EHS Guidelines for Water and Sanitation, and Ghana EPA compliance requirements and Industry Best Practice to achieve the required Emission and Effluent Standards.

#### **2.3.1 Sub-Contractor's Policy Framework**

All sub-Contractor(s) to be engaged by any selected contractor(s) on the Project will have to be guided by a Sub-Contractor(s) Policy Objective, developed by SIF which will ensure the following:

- Provision of Copies of Environmental and Social Management Plan (ESMP) to be developed by the Contractor(s) and given to the Sub-Contractor(s) staff to ensure compliance with all AfDB OS, and Ghana EPA Requirements applicable to the Project.
- Appointment of Representative of the Contractor(s) to implement the ESMP and ensure that all employees of Sub-contractor(s) are aware of the ESMP and its requirements.

### **2.3.2 Contractor(s) Certification and Commitment Framework**

The Managing Director and the entire management team of the Contractor(s) will have to attest to adherence and enforcement of National and International Laws and Regulations applicable to Occupational Health, Safety and Environmental Protection and Conservation for the Project. Moreover, the Contractor(s) team will have to attest to a commitment that ensures that the overall environmental and social quality, integrity and industrial health aspect of contractual obligations will be given the highest priority during project execution.

### **2.4 Relevant Policies, Legislation and Regulations**

In principle, the implementation of the projects are expected to comply with Ghana's laws, regulations and standards as well as requirements by which Ghana is bound under international agreements. The process must ensure that the projects are undertaken as part of programs funded by AfDB. The projects must fulfill environmental and social objectives and targets of other policies and plans while not conflicting with them.

### **2.5 Project Regulatory Compliance**

The Projects and related activities shall at the very least be consistent with the Ghana Regulatory Framework, and the AfDB OS. Any gaps in their applications will be disclosed and such gaps closed with the relevant instruments.

#### **2.5.1 International Environmental Conventions**

Ghana is a signatory to these applicable International Conventions:

- The United Nations Convention Biological Diversity (the Biodiversity Convention).
- United Nations Framework Convention on Climate Change.
- Vienna Protocol for the Protection of the Ozone Layer
- Montreal Protocol on substances that Deplete the Ozone Layer.
- Based Convention on the Control of Transboundary Movements of Hazardous wastes and their Disposal (UNEP, 1992).
- Convention Concerning Prevention and Control of Occupational Hazard caused by Carcinogenic Substances and Agents (26<sup>th</sup> June,1974).

- Agenda 21 (plan of action for the 21<sup>st</sup> century adopted by 173 Head of State at the Earth Summit held in Rio in 1992).
- WHO and UNEP initiatives concerning Mercury and Decision VIII/33 of the Parties to the Basel Convention on Mercury Wastes.
- Safe Management of Wastes from Health Care Activities, WHO, 1999.
- Convention on Access to Information, Public participation in decision making and Access to Justice in Environmental Matters, 1998 (Aarhus Convention).
- Convention Concerning the Protection of the World Cultural and National heritage, 1972
- Convention for the Safeguarding of the Intangible Cultural heritage, 2003.
- Bamako Convention (1991).
- Stockholm Convention on Persistent Organic Pollutants (UNEP, 2004).
- Polluter Pays Principle.
- Precautionary Principle.
- Proximity Principle.
- ILO Conventions including the Core Conventions Protecting Worker’s Rights and the UN Conventions protecting the Rights of the Child and of Migrant Workers.
- ILO Convention 87 on Freedom of Association and Protection of the Right to Organize.
- ILO Convention 98 on the Right to Organize and Collective Bargaining.
- ILO Convention 29 on Forced Labour.
- ILO Convention 105 on the Abolition of Forced Labour.
- ILO Convention 138 on Minimum Age (of Employees).
- ILO Convention 182 on the Worst Forms of Child Labour.
- ILO Convention 100 on Equal Remuneration.
- ILO Convention 111 on Discrimination (Employment and Occupation).
- ILO Convention 169 on Indigenous and Tribal peoples.
- UN Convention on the Rights of the Child, and Specially Article 32.1.
- UN Convention on the protection of the Rights of all Migrant Workers and members of their Families.
- International Bill of Human Rights, 1948.

## **2.5.2            Legislation Relevant to Biodiversity**



- Land Planning and Soil Conservation Act, 1957
- Town and Country Planning Ordinance 1945 (Cap 74)
- Economic Plants Protection Decree, 1974 (AFRCD 47)

### **2.5.3 Conventions Related to Biodiversity Conservation to which Ghana is signatory**

- Convention Concerning the Protection of the World Cultural and National Heritage (16<sup>th</sup> November 1972).
- Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (26<sup>th</sup> June 1974).
- Convention Concerning the Protection of Workers against Occupational Hazards in the working environment due to Air Pollution, Noise and Vibration (20<sup>th</sup> June 1979).
- The Convention on International Trade in Endangered Species of Wild Flora and Fauna (the CITIES Convention).
- The Convention of Wetland of International Important especially as wildfowl Habitat (the Ramsar Convention).
- The United Nations Convention Biological Diversity (the Biodiversity Convention).

### **2.5.4 National Regulatory Compliance Requirements**

- Environmental Protection Agency (EPA), Act 1994
- Environmental Assessment Regulations 1999 (LI 1652).
- Environmental Assessment (Amendment) Regulations 2002 (LI 1703)
- Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)
- Hazardous and Electronic Waste Control and Management Regulations 2016 (LI 2250)
- National Building Regulations, 1996 (LI 1630)
- Planning Permission – Local Construction Act, 1993 (Act 462)
- Energy Commission Act (1997) Act 54
- Factories, Offices and Shops Act (1970) Act 328
- Forestry Commission Act (1999) Act 571
- Wild Animals Preservation Act (1961) Act43
- National Museums Decree (1969) NLCD 387
- Water Resources Commission Act (1996) Act 552

- Fire Protection Act (1994) and Fire Protection Regulations 2004 (LI724)
- Ghana Water Company Limited Act (1993)
- State Lands Act, 1962 (Act 125)
- State Lands Regulations, 1962 (LI 230)
- National Development Planning Act, 1994 Act 479
- Local Government Act 1993, Act 462

## 2.6 Ghana Standards

- Ghana Standards for Environment and Health Protection-Requirements for Effluent Discharge (GS 1212, 2019)
- Ghana Standards for Environment and Health Protection-Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236, 2019)
- Ghana Standards for Health Protection-Requirements for Ambient Noise Control (GS 1222, 2018)
- Ghana Standards Acoustics-Guide for Measurement of Outdoor A-Weighted Sound Levels (GS 1253, 2018)
- Ghana Standards for Environment and Health Protection-Requirements for Motor Vehicle Emissions (GS 1219, 2018)

**Table 2.0 Legal, Regulatory and Policy Review**

#	Legal, Regulatory Policy, and Guidelines	Coordinating Agency	Objectives and Highlights	Applicability / Comments
1.	Basel Convention on the Control of Trans boundary Movement of Hazardous Wastes and their Disposal (UNEP, 1992)	EPA/UN/WHO/MoH	Minimize the generation of hazardous wastes, treat them as close as possible to the source and reduce trans boundary movement of hazardous waste.	Applicable for public health, environmental protection and safe management of hazardous waste.
2.	Bamako Convention (1991)	EPA/MoH	Treaty banning the importation of any hazardous wastes into Africa,	Applicable for public health, environmental protection and safety.

			signed by 12 nations (Ghana signatory).	
3.	Stockholm Convention on Persistent Organic Pollutants (UNEP, 2004)	EPA/UN/WHO/MoH	Reduce the production and use of persisted organic pollutants; eliminate uncontrolled emissions of dioxins and furans.	Applicable for public health, environmental protection and safety.
4.	Agenda 21 (plan of action for the 21 <sup>st</sup> Century Adopted by 173 Heads of State at the Earth Summit held in Rio in 1992)	EPA/UN	Minimize the generation of waste, to reuse and recycle, treat and dispose of waste products by safe and environmentally sound methods.	Applicable for public health, environmental protection and safety.
5.	WHO and UNEP Initiatives concerning Mercury and Decision VIII/33 of the Conference of the Parties to the Basel Convention on Mercury waste.	EPA /WHO/UN/MoH	Identify populations at risk of exposure to mercury and to reduce Anthropogenic waste.	Applicable for public health, environmental protection and safety.
6.	“Polluter Pays Principle”	EPA/WHO/MoH	Any producer of waste is legally and financially liable for disposing of that waste in a safe manner.	Application for safe protection of people and the environment.
7.	“Proximity Principle”	EPA/WHO/MoH	Hazardous wastes must be treated and disposed of as close as possible to where they are produced.	Application for safe protection of people and the environment.

Source: Independent Consultant Data Records

**Table 2.0** depict a typical profile of some of the legal, regulatory and policy review governing the proposed projects. The compliance

regimes of most of the administrative frameworks are enshrined in these regulatory principles and rules. This section also presents a review of the existing applicable environmental regulations and institutions relevant to the projects at the local, national, and international levels. The key Environmental Laws and Regulations relevant to the projects are shown in **Table 3.0**. **Table 4.0** depicts the key institutional supports to project implementation.

**Table 3.0 Profile of Key Applicable Environmental Regulations and Legislations**

Serial Number	Act/Rules	Purpose	Applicable (Yes/No)	Reasons for Applicability	Authority
1	Environmental Protection Agency (EPA), Act 1994	To protect and improve overall environment of the nation.	Yes	Oversees all environmental notifications, rules and schedules are issued under this act of EPA establishment.	EPA
2	Environmental Assessment Regulations, 1999 (LI 1652)	To provide environmental clearance to new development activities following environmental impact assessment.	Yes	All new environmental permitting, notifications, rules and schedules are issued under this act.	EPA (Environmental Assessment and Audit Division)
3	Factories, Offices and Shops Act, 1970 Act 328	To protect and improve workers health and safety at the workplace.	Yes	Ensure safe and healthy working environment to protect workers health and safety during construction and operation phases of the project.	EPA (Inspectorate Division)
4	Hazardous and Electronic Waste Control and Management Regulations, 2016 (LI 2250)	To ensure financing and the enforcement of legal framework for e-waste management.	Yes	Ensure importers of electronic devices and gadgets register with Ghana's EPA and pay a pre-emptive eco-tax for imported electronics, which finances the enforcement of the legal framework for e-waste management and the formalization of informal actors.	EPA (Chemicals Control and Management Division)

5	Environmental Assessment (Amendment) Regulations, 2002 (LI 1703)	To revise environmental permitting fees chargeable to approved new development projects following environmental impact assessment.	Yes	Ensure appropriate environmental permitting fees are applied to an approved new development project.	EPA (Environmental Assessment and Audit Division)
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Source: Independent Consultant Data Records

**Table 4.0 Profile of Applicable Key Institutions Relevant for Project Implementation**

Serial Number	Institution	Purpose	Reasons for Applicability
1	Environmental Protection Agency (EPA)	Ensures that new development programs consider environmental and social concerns through Environmental and Social Impact Assessment (ESIA).	Ensures regular monitoring of pre-determined environmental and social indicators. Enforces social and environmental laws and legislations. Oversees Environmental Permitting of new project developments.
2	Metropolitan, Municipal, District Assemblies (MMDA)	Highest political authority in the MMDA. Responsible for deliberation, evaluation, coordination, and implementation of new programs acceptable to the socio-economic development of the MMDA.	Responsible for planning the MMDA. Responsible for providing building permits according to zonal plans.
3	Electricity Company of Ghana	Provision of quality, reliable and safe electricity services to support socio-economic growth and development of Ghana.	Responsible for the supply of electricity. Provides guidance on current and future load capacity requirements.
4	Ghana Water Company Limited (GWCL)	Functions as the country's bulk water supplier. Oversees water sector.	Responsible for the supply of water. Provides guidance on current and future capacity requirements.
5	Land Use and Spatial Planning Authority	Regulates issuing of building permits. Provides building development related permits.	Responsible for the issuance of building permits.

	(formerly Town and Country Planning)		
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Source: Independent Consultant Data Records

## 2.7 Environmental Screening, Determination and Conditions

**Ghana Environmental Protection Agency Environmental Guidelines:** The Ghana EPA will require that Environmental and Social Assessment (ESA) be carried out for moderately significant impact undertaking (any enterprise, activity, scheme of development, construction, project, structure, investment plan, program, demolition, rehabilitation or decommission) to provide adequate information on the undertaking as the basis for decision-making and decision-taking. The findings of the ESA are compiled in ESIA Report. The projects must meet the basic goals and objectives of AfDB environmental and social policies and guidelines. Further AfDB policies relevant to the project include:

**AfDB Environmental Policy:** AfDB policy framework on environment policy has been anchored in the concept of sustainable development. The policy stresses the anticipatory nature of sustainable development rather than the reactive responses so predominant in development related decisions.

**AfDB Involuntary Resettlement Policy:** The primary goal of the involuntary resettlement policy is to ensure that when people must be displaced, they are treated equitably, and that they share in the benefits of the project that involves their resettlement.

**AfDB Guidelines on Cooperation with Civil Society Organization:** The AfDB considers the African civil society as a primary stakeholder and help to enhance transparency and accountability due to the need to change information disclosure policies and enhance participation of stakeholders in the bank operations. The civil society includes groups such as the; non- governmental Organization (NGO's), Community Based Organizations (CBO's), people's organization, trade unions and religion groups among others. The civil society organizations are central to the banks efforts to implement the participatory approaches especially in reaching to the poor people and women which are the priority target groups who have little influence and control over decisions and actions that affect their lives.

Africa Development Bank (AfDB) has adopted an integrated approach to environmental assessment in the so-called Integrated Environmental and Social Impact Assessment (IESIA) guidelines. The Guidelines' major objective is to provide reference material on how to adequately consider cross-cutting themes while assessing the environmental and social impacts of a project. The IESIA Guidelines assist in the project design, as many potential adverse impacts can be avoided or mitigated by modifying or adding certain project components to the initial design. They also provide guidance on how to adequately consider cross-cutting themes in both the preparation and assessment phases. The cross-cutting themes

prioritized by the Bank are the following: poverty, environment, population, gender and participation. In addition, the Bank has recently adopted health priorities that are transversal issues by nature: HIV/AIDS and Malaria control. Consequently, health outcomes are also considered as a cross-cutting theme in the IESIA Guidelines. There are several operational principles discussed in the guidelines, including the following:

- ❖ Gaining and providing information: The bank is expected to make available information to the public and draw knowledge, information from them. The regional member country authorities are expected to be responsive to the civil societies' request, issues and concerns on bank supported programs and projects,
- ❖ Involvement of the civil society organizations (CSO) in policy making: The bank collaborates with the civil society organizations and the regional member country to factor in the interest of the stakeholders in both policy and project activities. The bank takes deliberate measures to remove barriers such as gender biases and other inequalities to allow effective participation,
- ❖ Civil Society Participation in operation: It's the responsibility of the region member country to give responsibility to the CSO in programs financed by the bank loans,
- ❖ To foster effective CSO involvement the AfDB request the regional member country to provide institutional support to CSO for capacity building purposes,
- ❖ The AfDB remains optimistic and committed to effective engagement with the CSO in the future.

**AfDB Policy on Poverty Reduction:** Poverty is not limited to the lack of the physical resources for development, but also rooted in the inability of poor people to influence forces and decisions that shape their lives. AfDB considers the empowering of the poor people to actively participate in the development interventions for sustainable poverty reduction. The main objective of this policy is to provide a framework for action by putting the poverty reduction at the centre of bank lending and non-lending activities for the regional member country. There are several guideline principles highlighted in the policy. These include:

- ❖ The bank focuses in the analysis of incidences and in-depth causes of poverty in Africa and these consequently results in formulation of policies and intervention mechanisms,
- ❖ Support of national capacity building, promotion of participatory approach, development on the new forms of partnership and establishment of poverty monitoring systems,
- ❖ Internal policy coherence to strengthen the existing sector policy and fill gaps in specific areas from poverty reduction,
- ❖ Requires a strong partnership that facilitates the consistence between the bank poverty policy and poverty reduction strategies,
- ❖ Handles the new conceptual framework that expands the concept of poverty beyond income measures and its causes; addresses the economic and non-economic causes of poverty.

The objectives of the policy are to ensure that the disruption of the livelihood of people in the project's area is minimized, ensure that the displaced persons receive resettlement assistance to improve their living standards, provide explicit guidance to Bank staff and to borrowers, and set up a mechanism for monitoring the performance of the resettlement programs. Most importantly, the resettlement plan (RP) should be prepared and based on a development approach that addresses issues of the livelihood and living standards of the displaced person as well as compensation for loss of assets, using a participatory approach at all stages of project design and implementation.

**AfDB Environmental and Social Assessment Procedures (ESAP):** The main purpose of the Environmental and Social Assessment Procedures (ESAP) is to improve decision making and project results to ensure that Bank-financed projects, plans and programs are environmentally and socially sustainable as well as in line with Bank's policies and guidelines.

The primary objective of the ESAP is to provide a formal process for the internal and inter-departmental environmental and social review of Bank-financed projects, programs and plans. The procedures highlight the various steps that shall be followed to assess environmental and social risks and benefits along the project cycle.

In addition, the ESAP aim to ensure the integration of environmental and social dimensions into the public sector project cycle from country programming to post-evaluation. An integrated approach allows interrelations between environmental and social issues and to favor a multidisciplinary review of key concerns in a timely manner.

The ESIA project report for the proposed initiative complies with the AfDB ESAP main purpose and primary objectives. Impact areas and mitigation measures raised in the Environmental and Social Management and Monitoring Plan for the project are environmentally and socially sustainable-the main purpose for ESAP.

**AfDB Environment and Social Safeguards: Integrated Safeguard System (ISS)** - African Development Bank has established an Integrated Safeguard System (ISS) for comprehensive projects review and ensuring across the board perspectives of environmental and social linkages. The ISS comprises of four components, all that existed separately but with identifiable operational weakness. The components include: (i) Integrated Safeguard Policy Statement (ISPS) (ii) Operational Safeguards (OS) (iii) Environmental and Social Assessment Procedures (ESAPs) (iv) Environmental and Social Impact Assessments (ESIAs). The Integrated Safeguard System (ISS) encompasses into five number (5No.) operational safeguards addressing the following fields: Environment; Involuntary Resettlement; Gender; Climate Risk Management and Adaptation; Civil Society Engagement Framework; Health; Integrated Water Resources Management; Agriculture and Rural Development and Poverty Reduction. The specific safeguards are briefly described below:



**Operational Safeguard 1 (OS 1):** This is the main safeguard that guides environment and social assessment as well as climate issues. The safeguard governs the process of determining a projects environment and social assessment requirement. OS 1 is designed to identify access and manage potential environment and social risks and impacts including climate change issues. More specifically, OS1 achieves the following:

- ❖ Identify and assess risks and impacts,
- ❖ Avoid and/or minimize, risks and impact,
- ❖ Provide for stakeholder’s participation.
- ❖ Ensure effective management of risks and impacts
- ❖ Contribute to capacity building elements.

The categorization requirements under OS1 – 5 are also considered as support safeguards. Under the safeguards Environmental and Social Impacts Assessment (ESIA) studies are undertaken on clearly defined projects while environmental and social management framework (ESMF) is prepared for programs or plans with a multiplicity of uncertain projects.

**Operational Safeguard 2 (OS 2):** The safeguard focuses on involuntary resettlements, land acquisition, population displacements and requirements and compensation. It consolidates the policy commitment and requirements on involuntary resettlements and incorporates improvements operational effectiveness.

**Operational Safeguards 3 (OS 3):** This safeguard is designed to govern biodiversity and ecosystem services for the conservation and promotion of sustainable use of natural resources. Among the focus is on the integrated water resources management where commitments translated into operational requirements.

**Operational Safeguard 4 (OS 4);** OS4 governs pollution prevention and control, hazardous materials and resource efficiently. It covers a wide range of impacts arising from pollution, wastes and hazardous materials and particularly those under international conventions and regional standards. This also includes greenhouse accounting. The OS4 principles also support OS1 described above.

**Operational Safeguard 5 (OS 5):** Labour conditions, health and safety are a major concern in projects. The Bank therefore, has established OS5 to address requirements concerning works conditions, rights and protection from abuse and/or exploitation.

**Project Categorization:** The project screening through OS1 and in support of OS 2 - 5 leads to categorization of the project. The project categories are guided by considered linkage levels as follows:

**Category 1: Bank Operations Likely to Cause Significant Environmental and Social Impacts:** Category 1 projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some program-based operations or other regional and Sector program loans have significant adverse environmental or social risks and are deemed to be Category 1. In some cases, projects are included in Category 1 because of their potential cumulative impacts or the potential impacts of associated facilities.

Any project requiring a Full Resettlement Action Plan (FRAP) under the provisions of the Bank's policy on involuntary resettlement is also deemed to be Category 1. Category 1 program-based operations or regional and sector loans require a SESA, and Category 1 investment projects require an ESIA, both leading to the preparation of an ESMP. For a project requiring a FRAP, the ESIA includes, and if there are no other issues requiring assessment may be limited to, the social assessment needed to prepare the FRAP.

**Category 2: Bank Operations Likely to Cause Less Adverse Environmental and Social Impacts than Category 1:** Category 2 projects are likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects. Likely impacts are few, site-specific, largely reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards. An operation that involves resettlement activity for which an Abbreviated Resettlement Action Plan (ARAP) is required under the ESAPs is classified as Category 2. Most program-based operations and regional or sector program loans designed to finance a set of subprojects approved and implemented by the borrower or client are included in this category unless the nature, scale or sensitivity of the intended pipeline of subprojects involves either a high level of environmental and social risk or no such risk. Category 2 projects require an appropriate level of environmental and social assessment (SESA for program operations, investment plans, and some corporate loans, or ESIA for investment projects) tailored to the expected environmental and social risk so that the borrower can prepare and implement an adequate ESMP (for an investment project) or ESMF (for a program operation), to manage the environmental and social risks of subprojects in compliance with the Bank's safeguards.

**Category 3: Bank Operations with Negligible Adverse Environmental and Social Risks:** Category 3 projects do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment. Beyond categorization, no action is required. Nonetheless, to design a Category 3 project properly, it may be necessary to carry out gender

analyses, institutional analyses, or other studies on specific, critical social considerations to anticipate and manage unintended impacts on the affected communities.

**Category 4: Bank Operations Involving Lending to Financial Intermediaries:** Category 4 projects involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts. Financial intermediaries include banks, insurance, reinsurance and leasing companies, microfinance providers, private equity funds and investment funds that use the Bank's funds to lend or provide equity finance to their clients. Financial intermediaries also include private or public sector companies that receive corporate loans or loans for investment plans from the Bank that are used to finance a set of subprojects. Financial intermediary subprojects equivalent to Category 1 and Category 2 are subject to the relevant OS requirements, as if they were directly financed Category 1 or Category 2 projects. However, if a client will use a Bank corporate loan to finance high-risk investment projects known at the time of loan approval, the loan can be considered Category 1.

**AfDB Operational Safeguards:** The ESIA will be undertaken to AfDB lenders' requirements. Some financial institutions are either Equator Principles Financial Institutions (EPFIs) or have their own established and highly detailed environmental and social requirements. This ESIA will be completed in line with International EHS Guidelines, Performance Standards and other Sector Specific Guidelines, which take all funding institutes' requirements into account.

**Classification of Project:** According to the ESMP report developed for the Project, the Project can be classified as "**Category 2**" by AfDB project screening under project categorization because the project will have site-specific environmental and social impacts. Most of the impacts are expected to be less significant and reversible. The project requires environmental and social impact assessment to examine the project's potential negative and positive environmental and social impacts and recommend any mitigation and monitoring measures to prevent, minimize or compensate performance. In AfDB operation the purpose of Environmental and Social Impact Assessment is to improve decision-making and decision-taking, to ensure that project options under consideration are sound and sustainable, and that potentially affected persons have been properly consulted.

**Other Applicable Guidelines and Policies of AfDB:** The other applicable guidelines and policies of the AfDB are:

- ❖ The Bank's Policy on Gender (2001);
- ❖ The Engagement Framework Consolidated by Civil Society Organizations (2012);
- ❖ The Policy on Dissemination and Access to information (2012);

- ❖ AfDB’s Strategy for Climate Risk Management and Adaptation to Change;
- ❖ The Environmental and Social Assessment Procedures for Public Sector Operations of the Bank (2014).
- ❖ Handbook on Stakeholder Consultation and Participation in AfDB Projects and Operations (2001)

**Table 5.0** and **Table 6.0** Summaries the Operational Safeguards Objectives and Triggers Implication to the Project Components and Category Definition for AfDB Projects.

**Table 5.0 Summary of OS Objectives and Triggers Implication to Project Components**

Operational Safeguards	Description	Objectives	Trigger (Yes/No) and How	Implication
OS 1	Environmental and Social Assessment	<p>1.To identify and assess the environmental and social impacts (including gender) and climate change vulnerability issues of Bank lending and grant financed operations in their area of influence.</p> <p>2.To avoid or if not possible minimize, mitigate and compensate for adverse impacts on the environment and on affected communities.</p> <p>3.To ensure that affected communities have timely access to information in suitable forms about Bank operations and are consulted meaningfully about issues that may affect them.</p>	<p><b>Yes</b></p> <p>1.This OS 1 is triggered through the mandatory Environmental and Social Screening Process through which the project is assigned a Category 2 based upon its potential environmental and social risks and impacts in its area of influence. These potential risks and impacts include physical, biological, socio-economic, health, safety, localized impacts and global impacts including Greenhouse gas (GHG) emissions and vulnerability to climate change effects.</p> <p>2.For the preparation of feasibility and design studies for all the project components, the planned works are likely to have less significant environmental</p>	Based on the outcome of the pre-feasibility studies, the preparation of feasibility and design studies reports under the project components have determined that an ESIA is required including management plans (ESMP and Monitoring).

			and social direct, indirect or cumulative impacts locally and not at the regional level. This OS 1 will thus be triggered.	
OS 2	Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.	<p>1.To avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is unavoidable, exploring all viable project design.</p> <p>2.To ensure that displaced people receive significant resettlement assistance, preferably under the project, so that their standards of living, income earning capacity, production levels and overall means of livelihood are improved beyond pre-project levels.</p> <p>3.To set up a mechanism for monitoring the performance of involuntary resettlement programs in Bank operations and remedying problems as they arise to safeguard against ill-prepared and poorly implemented resettlement plans.</p>	<p><b>Yes</b></p> <p>1.This OS 2 is triggered since the project components requires the rebuilding of livelihood and sources of income among youths and women for them to recover from the socio-economic and climate related shocks or impact of the Covid-19 pandemic on individual, households and enterprises, especially SMEs. To improve access to technical and climate-resilient skills training and sustainable green climate finance for youths, women and SMEs.</p> <p>2.The project components implementation will require restoration of livelihoods and income and employment opportunities through entrepreneurship and jobs among youth and women. A Livelihood Restoration Plan (LRP) will be prepared as part of the ESIA to cover economic displacement, livelihoods and income and employment</p>	<p>For the pre-feasibility, feasibility, design and ESIA studies these critical requirements will have to be met:</p> <p>1.A Livelihood Restoration Plan (LRP) will have to be prepared or referenced with Grievance Redress Mechanism for the project components.</p> <p>2.Project components will require the preparation of LRP to address all the issues related to economic displacement by restoration of livelihoods and income and employment opportunities through entrepreneurship and jobs among youths and women.</p> <p>3.A Grievance Redress Mechanism will be required to be defined as part of the ESIA for the project components, taking into consideration the local context.</p> <p>4.The ESIA report of the project components will be disclosed locally, at the national level as</p>

			<p>restoration through entrepreneurship and jobs creation among youths and women.</p> <p>3. Potentially, the proposed construction could lead to, aside economic displacement, physical displacement of people inhabiting or squatting on project sites. For this category of PAPs, there may be need for compensation (land-for-land or cash) or support to those who might have to be displaced temporary or permanently. This OS 2 will thus be triggered.</p>	<p>well as in the SIF website and the AfDB info-shop.</p>
OS 3	Biodiversity and Ecosystem Services	<p>1.To preserve biological diversity by avoiding, or if not possible, reducing and minimizing impacts on biodiversity.</p> <p>2.In cases where some impacts are unavoidable, to endeavor to reinstate or restore biodiversity including, where required, the implementation of biodiversity offsets to achieve “not net loss but net gain” of biodiversity.</p> <p>3.To protect natural, modified and critical habitats.</p> <p>4.To sustain the availability and productivity of priority ecosystem services to maintain</p>	<p><b>No</b></p> <p>1.This OS 3 is not triggered since the project components are not expected to be sited in green fields agricultural farmlands with potential habitat resources for fauna species where there may be potential biodiversity impacts or in areas providing ecosystem services upon which potentially affected stakeholders are dependent for survival, sustenance, livelihood or primary income, or which are used for sustaining the project.</p> <p>2.For the preparation of feasibility and design studies for</p>	<p>The pre-feasibility studies outcome has established and confirm the need for preparation of feasibility and design studies reports for the project components. Determination has already been made to conduct an ESIA which will include recommendations on suitable mitigation measures to prevent, minimize, mitigate or compensate for any adverse environmental and social performance.</p>

		benefits to the affected communities and to sustain project performance.	all the project components, the planned works are likely to have site-specific impacts on nearby non-critical habitats, shrubland and associated grassland fragments, including borrow areas which are not in wildlife corridors and any marshlands. This OS 3 will thus not be triggered.	
OS 4	Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency	<p>1.To manage and reduce pollutants likely to be caused by a project so that they shall not pose harmful risks to human health and the environment, including hazardous, non-hazardous waste and GHG emissions.</p> <p>2.To set a framework for efficiently utilizing all a project's raw materials and natural resources especially focusing on energy and water.</p>	<p><b>Yes</b></p> <p>1.This OS 4 is triggered since the project components are likely to cause less significant adverse environmental or social impacts owing to the emission of pollutants, waste or hazardous materials covered by national legislation, international conventions, or internationally recognized standards or by sustainable resource use. It is also triggered by potentially less significant levels of GHG emissions.</p> <p>2. Especially Component 1 activities may generate pollution to water, land, and air, and consume resources such as energy, water, and raw materials. Certainly, more efficient, and effective use of resources, prevention of</p>	In compliance with OS 4, the technical studies of the proposal will include an analysis of any potential impacts from the project components as well as the identification of potential mitigation measures.

			<p>pollution and avoidance of GHG emissions, and application of appropriate climate-proof technologies and industry practices/standards/guidelines during construction, operation (including disposal) and decommissioning phases should be adopted.</p> <p>3. The field visits did not reveal the presence of asbestos roofing's (since some of the roofing's were buried and out of sight). However, where demolitions will reveal that removal of asbestos roofing's are imminent and/or other harmful chemicals from the project sites are likely this OS 4 may be triggered.</p>	
OS 5	Labor Conditions, Health and Safety	<p>1.To protect the workers' rights and to establish, maintain, and improve the employee-employer relationship.</p> <p>2.To promote compliance with national legal requirements and provide due diligence in case national laws are silent or inconsistent with the OS.</p> <p>3.To provide broad consistency with the relevant international labor Organization (ILO)</p>	<p><b>Yes</b></p> <p>The project components will involve the engagement or establishment of a temporary or permanent workforce. It may be important for the ESIA to also assess any potential risks and threats likely to emanate between project workers and communities where subprojects may be located. It may be prudent that a code of conduct</p>	<p>An ESIA study will be conducted to ensure congenial labor working conditions, health and safety of workforce to be engaged or established by the Project.</p> <p>The project strategy to mitigate and respond to cases related to Sexual Exploitation and Abuse (SEA) will be based on local context and lessons of international experience.</p>



		<p>Conventions, ILO Core Labor Standards and UNICEF Convention on the Rights of the Child in cases where national laws do not provide equivalent protection.</p> <p>4.To protect the workforce from inequality, social exclusion, child labor and forced labor.</p> <p>5.To establish requirements to provide safe and healthy working conditions.</p>	<p>is made part of contracts signed with employees to foster employee-community relationships.</p> <p>This OS 5 is triggered.</p>	<p>The project will support improved management of project implementation and supervision, social and environmental safeguards, identification and mitigation of gender disparities, and citizen engagement.</p> <p>Community dialogue and awareness raising will be undertaken to make sure people in the project areas are aware that they can report project-related cases of SEA through different entry points to the referral pathway (including the GRM).</p> <p>The project will adopt a mandatory workers Code of Conduct with stringent compliance requirements</p>
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Source: AfDB ESAP Document (2015)

**Table 6.0** **Category Definition for AfDB Project**

Serial Number	Category	Description/Definition
1	Category 1	Bank operations likely to cause significant environmental and social impacts.
2	Category 2	Bank operations likely to cause less adverse environmental and social impacts than Category 1.
3	Category 3	Bank operations with negligible adverse environmental and social risks.
4	Category 4	Bank operations involving lending to financial intermediaries.

Source: AfDB ESAP Document (2015) Notes: Incorporation of AfDB Independent Consultants Comments from the Inception Report

### **3.0 Stakeholder Participation Strategy and Consultations**

#### **3.1 Stakeholders Participation Strategy**

Both public/community and institutional consultations were carried out as critical form of environmental and social education through awareness creation. The aim was to alert all sections of the population in the immediate vicinity of the project including relevant institutional officers of the requirements of the proposed project and the imminent challenges of the project execution methods. By such participatory strategy all stakeholders, were roped in as part of the consultation process.

#### **3.2 Purpose of Stakeholders Engagement Plan (SEP)**

A Stakeholder Engagement Plan was adopted to capture all relevant stakeholders such as government officials, community leadership and potentially interested Non-Governmental Organizations (NGOs). The purposes of the SEP are as follows:

- To describe the Project Proponent's Strategy and Program for engaging with stakeholders in a culturally appropriate manner.
- To ensure the timely provision of relevant and understandable information and to create a process that provides opportunities for all stakeholders to express their views and concerns and allows the Project Proponents to respond to them.
- To identify individual stakeholders, stakeholder groups, communities, organizations and business that have a direct or indirect interest and influence on the project site.
- To establish project lifetime relationship with stakeholders that encompasses a range of activities sharing and consultations, to participation, negotiation and formation of partnership.
- To enable stakeholders to participate and inform the ESIA process and baseline data.
- To keep a record of all meetings (both formal and informal), consultations and any commitments made to facilitate successful management of stakeholder's engagement.

#### **3.3 Strategic Objectives for Environmental and Social Education**

The following strategic objectives was adopted as basic principle for environmental and social education:

- Awareness creation and sensitization to the total project environment and its accompanying project impacts.
- Enhance stakeholder's acquisition of basic understanding of the total project environment, associated project impacts and the critical role they can play in it.
- Transform attitudes and habits of stakeholders towards the total project environment, thereby motivating them to participate in the project and help in its improvement.
- Develop stakeholder's sense of responsibility and adoption of effective solutions to environmental problems.

### **3.4 Methods of Dissemination for Environmental and Social Education**

The major methods adopted for environmental and social education dissemination included the following:

- Exchange of ideas, dialogues, discussions and one-on-one consultations as part of interpersonal communications.
- Focus group discussions as part of interpersonal communications.
- Structural formal interviews as part of interpersonal communications.
- Consultations with local and international NGOs in the country which have been implementing projects in a participatory manner.
- Reliance on expertise located within research and academic institutions like GIMPA, consultancy firms, etc., to support implementation of the ESIA and other ES instruments.

### **3.5 Public Rights**

The public has various rights with regards to consultations and engagements as stakeholders on the development and implementation of the proposed project. Such rights was also considered as part of the stakeholder's participation strategy. These public rights are:

- Right of access to information.
- Right to contribute to information.
- Right to challenge decisions.

### 3.6 Summary of Public and Community Consultations

Both public and community consultations and engagement which are still on-going were carried out as part of individual consultations for the proposed development. The results depicted here exclude project residents, students, and other members of staff of the selected institutions. Other stakeholder groups will be consulted and shown in the Final ESIA Report.

**Table 7.0: Profile of Individual Consultations**

Date of Consultations	Location	Consultees	Position/Occupation	Comments
22 <sup>nd</sup> March 2022	SIF Conference Room	Mr. Kofi Frimpong Dr. Albert Kofi Asamoah-Baah Mr. Augustine Donkor-Afram  Dr. Kwaku Agbesi Mr. Kwaku Anim Boateng Mrs. Stella Arthur	Executive Director (SIF) – 0244288137 Technical Advisor (SIF) – 0546372969 Finance and Accounting Specialist – 0244853555 Procurement Specialist – 0244622874 Independent Consultant – 0244657627 Executive Director’s Secretary -	<b>Focus Group Discussion:</b> Negotiation meeting with Environmental and Social Impact Assessment Consultant held at the Conference Room of SIF. The meeting discussed the revised scope of works to form the basis for the implementation of the assignment. The meeting agreed that the duration of the assignment shall be six (6) weeks from the date of signing of the contract as specified in the ToR.
29 <sup>th</sup> March 2022	GNA Office, Accra	Mr. Kofi Owusu	Managing Director- 0544355300	<b>Project Appreciation:</b> development of human resources; expansion of infrastructure base; space enhancement; space utilization for developmental program; employment creation and

Kwaku Anim Boateng (Individual Consultant)

				<p>job generation; locality economic enhancement.</p> <p><b>Project Concerns:</b> fire prevention and control; construction waste generation and disposal; traffic nuisance and control; erosion and siltation episodes; air pollution; noise and vibration effects; public health and safety; pedestrian traffic disruptions; loss of ornamental trees;</p>
29 <sup>th</sup> March 2022	GNA Office, Accra	Mr. Norbert Asenso	Director Business Development Department - 054292292	<p><b>Project Appreciation:</b> human resource development; infrastructure expansion; enhancement of spacing; utilization of spacing; job creation and employment generation; locality economic enhancement.</p> <p><b>Project Concerns:</b> water and energy consumption increase; incidence of erosion and siltation; air pollution (dust, exhaust fumes and odor); noise and vibration construction waste disposal; construction material</p>

				hazards; preservation and addition of trees; pedestrian traffic obstruction; contractor must adhere to all requirements that are needed environmentally; contractor needs to evaluate and possibly consider working in the evenings to reduce the effects of the activities on noise and traffic as the location is in the central business district.
29 <sup>th</sup> March 2022	Department of Medical Microbiology, Korle Bu, Accra. (University of Ghana Medical School, Korle Bu, Accra)	Professor Kwamena Sagoe	Virologist, Lecturer, Principal Investor, Project Director - 0277408528	<b>Project Appreciation:</b> human resource development; building facilities expansion; space enhancement; space utilization; development plan phasing (in order of priority); jobs and employment creation and generation. <b>Project Concerns:</b> water and energy consumption increment; soil erosion and siltation of water bodies; air pollution; noise and vibration nuisance; construction waste disposal; construction

				material hazards; visual impairment and intrusion; traffic flow obstruction and nuisance; public health and safety; occupational health and safety; pedestrian traffic flow disruptions.
30 <sup>th</sup> March 2022	School of Nursing and Midwifery (SONM), University of Ghana, Legon, Accra.	Mrs. Lydia Aziato	Professor, Dean - 0244719686	<p><b>Project Appreciation:</b> human resource development; Structures and buildings expansion; space enhancement; utilization of available space; jobs creation and employment generation; locality economic enhancement.</p> <p><b>Project Concerns:</b> Limited trees to be cut; occupational health and safety; public health and safety; traffic flow disruptions and delays; hazards posed by construction materials; noise and vibration pollution; air pollution; soil erosion and siltation of water resources; water and energy consumption increment.</p>

30 <sup>th</sup> March 2022	Physical Development and Municipal Services Directorate, University of Ghana, Legon, Accra.	Mr. Edmund Sekyere Senyah	Architect - 0243280624	<p><b>Project Appreciation:</b> Legon campus economy enhancement; space utilization and enhancement; infrastructure and facilities enhancement; employment creation and jobs generation; development of human resources.</p> <p><b>Project Concerns:</b> construction materials hazards; construction waste generation and disposal; noise and vibration nuisance effects; water and energy consumption increase; construction traffic congestion and delays.</p>
30 <sup>th</sup> March 2022	Biotechnology Centre, University of Ghana, Legon, Accra.	Dr. John Eleblu	Senior Lecturer - 0551149317	<p><b>Project Appreciation:</b> employment and jobs creation and generation; key research outputs, products, technologies; economic enhancement for locality; human resources capacity building and development; space utilization and enhancement.</p>



				<p><b>Project Concerns:</b>  pedestrian traffic  obstruction and severance effects; air pollution; fire prevention and control; waste generation and disposal from construction activities; soil erosion and siltation of water bodies; noise and vibration effects; construction traffic flow nuisance; visual intrusion and impairment; occupational health and safety; public health and safety; air pollution.</p>
30 <sup>th</sup> March 2022	MASLOC, Accra. (EBank Capital, Ridge, Accra)	Mr. Jim Amegah Mr. Daniel Okuampah  Mr. Eugene Agben  Mr. Kwaku Anim Boateng	CEO – Eban Capital (0244296059). Director Finance and Strategy – EBank Capital (0208080587). Information Technology Consultant – (0504411414). Independent Consultant – 0244657627	<p><b>Focus Group Discussion:</b>  Digitization of Loan Application and Recovery – commercial banks are not lending to SMEs creating the space for them to be pulled together into groups, trained to change their attitudes and behaviour. Self-management of the groups is necessary for the group executives to guarantee their credit worthiness. Accessibility to loans becomes easier due</p>

Kwaku Anim Boateng (Individual Consultant)

				<p>to self-governing, self-sustaining and self-motivating assured by the group operations and dynamics.</p> <p>From MASLOC statistics in Ghana 4.5 million people have bank accounts as compared to an unbanked population of 30.8 million. The unbanked in Ghana form the vast majority of the population. However, out of 30.8 million people, 29.1 million people have mobile phone access and mobile money accounts. There is an estimated 1.7 million people yet to be integrated into the mobile money system. The digitization and automation of the MASLOC loan management system will do a lot to bring more people onto the banking system and mobile money platform and reduce the need for physical cash transactions.</p> <p>Implementation of Livelihood Restoration</p>
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				<p>Program - The focus of the livelihood restoration plan is to support youth and women to quickly re-establish life-support activities to reduce their vulnerability from impacts of Covid-19 pandemic. Given the importance of entrepreneurship and employment creation for youth and women and the links between livelihood, sources of income and vulnerability, it is recommended that the main livelihood support program focuses on skills training. attention should be paid to the needs of disadvantaged groups among those targeted for livelihood intervention. Vulnerable individuals or groups among the youth, women and the SMEs are particularly the marginalized or disadvantaged and who might thus be more likely than others to experience adverse impacts from the Covid-19. Vulnerability can</p>
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				<p>be determined by identifying the likelihood that an individual or a group faces harder conditions as the result of the Covid-19 impacts. This vulnerable status may stem from a group's gender, economic status, ethnicity, religion, cultural behaviour, sexual orientation, language or physical and psychological health conditions. Vulnerable groups may include, among others, female-headed households, those below the poverty line, the landless, those without legal title to assets, ethnic, religious and linguistic minorities, indigenous peoples, those who are disabled, etc.</p>
31 <sup>st</sup> March 2022	GNA Office, Tema	Mr. Francis Ameyibor	Manager – 0277438688	<p><b>Project Appreciation:</b>  enhancement of conducive working environment; human resource improvement and capacity building; replacement of old dilapidated building;</p>

				<p>enhancement and utilization of space; employment creation and job generation; local economy enhancement.</p> <p><b>Project Concerns:</b> rainy season construction activities delays; soil erosion and siltation; noise and vibration incidence; air pollution; construction waste removal from site; traffic flow and disruptions; occupational health and safety; traffic disruptions and congestion from construction activities.</p>
26 <sup>th</sup> April 2022	GNA Office, Takoradi	Mrs Justina Paaga	Regional Manager (0244715112)	<p><b>Project Appreciation:</b> human resource development through capacity building; infrastructure expansion and increment; enhancement of spacing; utilization of spacing; job creation and employment generation; local businesses economic enhancement; provision of the agency with air conditions, computers, printers, furniture,</p>

				television sets, cameras, tap recorders, telephones and curtains to enhance the work of the agency. <b>Project Concerns:</b> water and energy consumption increase; incidence of erosion and siltation because of sloping landform to the western direction; air pollution (dust, exhaust fumes and odor); noise and vibration; construction waste disposal; construction material hazards; limitation in the cutting of trees through preservation and conservation; pedestrian traffic obstruction.
26 <sup>th</sup> April 2022	GNA Office, Takoradi	Mrs Mildred Siabi-Mensah	Journalist	<b>Project Appreciation:</b> expansion of infrastructure; space enhancement. <b>Project Concerns:</b> noise and vibration effects; construction waste disposal.
27 <sup>th</sup> April 2022	GNA Office, Kumasi	Mr.Kwabia Owusu Mensah	Regional Manager (0242553286)	<b>Project Appreciation:</b> human resource development; expansion of infrastructure; space

				<p>enhancement; space utilization; development plan phasing (in order of priority); employment generation and job creation; local businesses economic enhancement.</p> <p><b>Project Concerns:</b> water and energy consumption increment; erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction materials hazards; visual impairment and intrusion; traffic flow obstruction/nuisance; public/occupational health and safety; pedestrian traffic obstruction or severance effect.</p>
27 <sup>th</sup> April 2022	GNA Office, Kumasi	Mr. Stephen Asante	Chief Reporter and Acting Regional Editor (0558372004)	<p><b>Project Appreciation:</b> human resource development through capacity building; expansion of infrastructure; space enhancement; space utilization.</p>

				<b>Project Concerns:</b> air pollution (dust, exhaust fumes and odour); noise and vibration effects.
27 <sup>th</sup> April 2022	Private Newspaper, Kumasi	Mr. Hope King	Inquirer Correspondent (Ashanti Region)	<b>Project Appreciation:</b> economic enhancement for locality; public occupational health and safety; construction materials hazards; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); water and energy consumption increment. <b>Project Concerns:</b> construction materials hazards; pedestrian traffic obstruction/severance; public occupational health and safety; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes, odor); water and energy consumption increment.
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Ms. Josephine Nyanibah Boham	Principal/Management in Business Administration (0554581672)	<b>Project Appreciation:</b> space utilization; space enhancement; expansion



				of infrastructure; human resource development. <b>Project Concerns:</b> noise and vibration effects - will disturb classes and disorganize students attention to teaching.
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Mr. Daniel Amoh	Teacher (0244603340)	<b>Project Appreciation:</b> space utilization; space enhancement; expansion of infrastructure; human resource development; employment generation and job creation; development plan phasing (in order of priority). <b>Project Concerns:</b> construction material hazards; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment; pedestrian traffic obstruction and severance effect; public/occupational health and safety; traffic flow obstruction and nuisance; visual impairment and intrusion.

27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Mr. Emmanuel Nyadu	Instructor (0244889154)	<p><b>Project Appreciation:</b> expansion of infrastructure; employment generation and job creation.</p> <p><b>Project Concerns:</b> construction materials hazards; public and occupational health and safety.</p>
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical institute, Otaakrom	Ms. Berko Faustina	Teacher (0248603139)	<p><b>Project Appreciation:</b> human resource development; space utilization; employment generation and job creation; economic enhancement for locality. Due to the high level of illiteracy in the project community, the creation of the workshop will help in building the locality, the district and the region as a whole. It will also help the project community to be developed.</p> <p><b>Project Concerns:</b> water and energy consumption increment; visual impairment and intrusion; biodiversity loss.</p>

27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Mr. Dabo Francis	Teacher/Facilitator (0240280178)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality; the project community is in need of economic activity and this workshop will give more jobs to the youth.</p> <p><b>Project Concerns:</b> noise and vibration effects; construction waste disposal; visual impairment and intrusion; traffic flow obstruction and nuisance; biodiversity loss; pedestrian traffic obstruction and severance effect.</p>
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Mr. Mensah Solomon	Instructor (0249392821)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; economic enhancement for locality.</p> <p><b>Project Concerns:</b> water and energy consumption</p>

				increment; erosion and siltation incidence; construction waste disposal; construction materials hazards.
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Mrs. Boateng Amankwah Mavis	Teacher (0243326207)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization; development plan phasing (in order of priority); employment generation and job creation.</p> <p><b>Project Concerns:</b> construction materials hazards; public and occupational health and safety.</p>
27 <sup>th</sup> April 2022	Otaakrom Vocational/Technical Institute, Otaakrom	Ms Idun Rebecca	Teacher (0243189193)	<p><b>Project Appreciation:</b> human resources development; space enhancement; space utilization; employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> construction materials hazards; traffic flow obstruction and nuisance; biodiversity loss; pedestrian traffic</p>

				obstruction and severance effect.
27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Mr. Mark A. Naazelle	Instructor (0205456492)	<b>Project Appreciation:</b> human resource development; economic enhancement for locality; employment generation and job creation; space utilization; space enhancement; expansion of infrastructure. <b>Project Concerns:</b> delays in construction time; timely addressal of construction delays to enable effective schoolwork take place.
27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Mr. Koubintuo Alhanssan Issaka	Instructor (0551390900/0241815339)	<b>Project Appreciation:</b> Employment generation and job creation; economic enhancement for locality; expansion of infrastructure; human resource development. <b>Project Concerns:</b> air pollution (dust, exhaust fumes) ; noise and vibration effects; water and energy consumption increment; construction materials hazards; public and occupational health and safety; clearing of the

				land on the construction site can cause erosion; construction work should be completed on time.
27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Ms. Ayereko Elizabeth	Teacher (02005555576)	<b>Project Appreciation:</b> expansion of infrastructure; human resource development; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality. <b>Project Concerns:</b> water and energy consumption increment; erosion and siltation incidence.
27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Mr. Samuel Yeboah Darko	Accounts Officer (0242021903)	<b>Project Appreciation:</b> economic enhancement for locality; employment generation and job creation; space utilization; space enhancement; expansion of infrastructure; human resource development; use of good quality building materials to ensure project last to ensure its full utilization. <b>Project Concerns:</b> erosion and siltation incidence;

				water and energy consumption increment; construction materials hazards; length of time the project will be undertaken; use of quality building materials.
27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Mr. Emmanuel Darko	Teacher (02493670310	<p><b>Project Appreciation:</b> development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> noise and vibration effects; construction waste disposal; construction materials hazards; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment; public and occupational health and safety; quality of work expectation; provision of quality materials; effective supervision; provision of adequate lighting at night for night works.</p>

27 <sup>th</sup> April 2022	Nsoatre Vocational/Technical Institute, Nsoatre	Mr. Felix Ziemagor	Teacher (0249727880)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space enhancement; space utilization; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> provision of adequate ventilation; provision of disability access; water and energy consumption increment; visual impairment and intrusion; construction material hazards; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; provision of proper drainage system</p>
28 <sup>th</sup> April 2022	St. John Vocational/Technical Institute, Nandom	Mr. Yeldelong Gregory	Teacher; Assistant Senior House Master (0551254769)	<p><b>Project Appreciation:</b> human resource development; effective construction supervision; use of durable construction materials.</p>



				<p><b>Project Concerns:</b>  construction undertaken by expert builders;  construction should be supervised well; noise and vibration effects;  construction material hazards.</p>
28 <sup>th</sup> April 2022	St. John Vocational/Technical Institute, Nandom	Ms. Aplo Justine	Teacher (0209250088)	<p><b>Project Appreciation:</b>  human resource development; expansion of infrastructure; space utilization.</p> <p><b>Project Concerns:</b> noise and vibration effects; good relation between contractor and school authorities, teachers and students since the project will be constructed while school is in session; we will expect that the project should be completed within the time frame expected; we expect use of quality materials and good workmanship should be used in constructing the project; funding should be made available; construction materials should be inspected for</p>

				quality standard compliance be usage.
28 <sup>th</sup> April 2022	St. John Vocational/Technical Institute, Nandom	Mr. Gyeribiiri Albert Dorterh	Teacher (0543095051)	<p><b>Project Appreciation:</b> the project when completed will enhance the effective teaching and learning of ICT since the school is highly constrained with enough ICT resources for effective teaching hence making our students to be digital literate; human resource development; expansion of infrastructure; employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> quality materials and quality work should be considered when the project starts; erosion and siltation incidence; water and energy consumption increment.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Liberty Arthur Mensah	Teacher	<p><b>Project Appreciation:</b> expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> use of quality materials must be</p>

				our priority; expert advice should be considered; places of convenience should be provided for optimal use; erosion and siltation incidence; noise and vibration effects;
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr.Kuukankyelle Rodger	Teacher; Senior House Master (0208375706)	<p><b>Project Appreciation:</b> economic enhancement for locality; employment generation and job creation; space utilization; human resource development.</p> <p><b>Project Concerns:</b> engagement of experts; the use of quality materials; adherence to timelines for project completion; the project should be completed within the speculated time; water and energy consumption increment; erosion and siltation incidence.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Ms. Isuuniffa Betty	Teacher (0249045696)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization; development plan phasing (in order of priority); employment</p>

				<p>generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> use of experts; quality materials use; proper use of land; public and occupational health and safety; construction materials hazards; construction waste disposal; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Reverend Brother Patrick Naazie	Vice Principal Academic (0248267323)	<p><b>Project Appreciation:</b> quality work is expected; human resource development; expansion of infrastructure; space utilization; employment generation and job creation; development plan phasing (in order of priority);</p> <p><b>Project Concerns:</b> quality work is very important; judicious use of the space available; proper materials to be used is important; water and energy consumption increment;</p>

				noise and vibration effects; traffic flow obstruction and nuisance.
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Martin Mornaa	Teacher (0540628661)	<p><b>Project Appreciation:</b> space utilization; space; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> water and energy consumption increment; noise and vibration effects; quality work is very important; the right material should be used; experts should be given the job to do; quality material should be used.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Mwinkume Festus	Teacher/Head of Department (0543939192)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization; employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> visual impairment; noise and vibration effects; water and energy consumption increment; the qualified technical people should be used to do quality work; there should be quality</p>

				work at the end of the day.
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Kyepuo Aloysis	Teacher (0541542250)	<p><b>Project Appreciation:</b> human resource development; employment generation and job creation; space utilization; space enhancement; expansion of infrastructure.</p> <p><b>Project Concerns:</b> quality work should be done; durable materials should be used; quality work is expected at the end of the project; public and occupational health and safety; air pollution (dust, exhaust fumes and odor); water and energy consumption increment.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Bawa Nlandbitabini Moses	Teacher (0243295876)	<p><b>Project Appreciation:</b> development plan phasing (in order of priority); economic enhancement for locality; space utilization; space enhancement; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> highly qualified personnel should be employed to work on</p>

				the project; quality equipment and materials should be used for the construction of the infrastructure; water and energy consumption increment; air pollution (dust, exhaust fumes and odor); public and occupational health and safety; biodiversity loss; we expect the contractor(s) to construct modern ICT laboratory.
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Dabuo B. Fidelis	Teacher (0206733165)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization.</p> <p><b>Project Concerns:</b> noise and vibration effects; air pollution (dust, exhaust fumes and odor); water and energy consumption increment; right materials in right size and proportions should be use to execute the job; use of professional artisans to perform the job; completion of work within schedule.</p>

28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. John Boahen	Teacher/House Master (0246022844)	<p><b>Project Appreciation:</b> space utilization; development plan phasing (in order of priority); employment generation and job creation; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> judicious use of proper materials; contractor should meet the targeted deadlines; traffic flow obstruction and nuisance; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Manasseh Kissi-Brown	Teacher (0576155666)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space enhancement; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality;</p> <p><b>Project Concerns:</b> quality of materials; adequate use</p>



				of materials; safety precautions; employ qualified personnel; should meet the targeted deadlines; construction material hazards; noise and vibration effects; air pollution (dust, exhaust fumes and odor); water and energy consumption increment.
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Mori Maadi	Teacher/Form Master (0543297965)	<p><b>Project Appreciation:</b> space utilization; development plan phasing (in order of priority); employment generation and job creation; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> judicious use of materials for construction; to make sure that quality work is done; use of experts or professionals for works execution; water and energy consumption increment; noise and vibration effects.</p>
28 <sup>th</sup> April 2022	St John Vocational/Technical Institute, Nandom	Mr. Muossi N. Cheelidong	Teacher (0543462355)	<p><b>Project Appreciation:</b> expansion of infrastructure; economic</p>

				enhancement for locality; employment generation and job creation; development phasing (in order of priority); human resource development. <b>Project Concerns:</b> water and energy consumption increment; air pollution (dust, exhaust fumes and odor).
29 <sup>th</sup> April 2022	GNA Office, Tamale	Mr. Eric Kwadjo Amoh	Regional Manager (0505005777)	<b>Project Appreciation:</b> human resource development; expansion of infrastructure; space enhancement; space utilization; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality. <b>Project Concerns:</b> water and energy consumption increment; erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction material hazards; public

				and occupational health and safety.
29 <sup>th</sup> April 2022	GNA Office, Tamale	Mr. Albert Futukpor	Editor	<p><b>Project Appreciation:</b> economic enhancement for locality; employment and job creation; development plan phasing (in order of priority); space utilization; space enhancement; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> water and energy consumption; erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction material hazards; visual impairment and intrusion; traffic flow obstruction and nuisance; public occupational health and safety; biodiversity loss; pedestrian traffic obstruction and severance effect.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Samuel Koomson	Teacher/Training Officer (0209418984)	<p><b>Project Appreciation:</b> economic enhancement for locality employment generation and job</p>

				<p>creation; space utilization; space enhancement; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b>  construction waste disposal; visual impairment and intrusion; traffic obstruction and nuisance; public and occupational health and safety; pedestrian traffic obstruction and severance effect;  Noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr.Sampson Agdeli Botthey	Institute Manager/Principal (0244757859)	<p><b>Project Appreciation:</b>  human resource development; expansion of infrastructure; space enhancement; space utilization; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p>

				<p><b>Project Concerns:</b>  checking of erosion;  management of construction waste;  respect for authorities, students, teachers;  movement of workers in the night after 8:00 pm;  identification of all people on the project; bi-weekly meeting between contractor and school;  contractor and workers operate within their limits and ensure that their activities do not unduly obstruct school activities so much; water and energy consumption;  erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction material hazards; visual impairment and intrusion;  traffic flow obstruction and nuisance; public and occupational health and safety; biodiversity loss; pedestrian traffic</p>
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				obstruction and severance effect;
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Ms. Felicia Boatemaa	Senior Accountant (0543756579)	<b>Project Appreciation:</b> space enhancement; space utilization; expansion of infrastructure; human resource development. <b>Project Concerns:</b> erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; traffic flow obstruction and nuisance.
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. David Gafah	Senior Training Officer	<b>Project Appreciation:</b> space utilization; space enhancement; expansion of infrastructure; human resources development; employment generation and job creation; economic enhancement for locality. <b>Project Concerns:</b> pedestrian traffic obstruction and severance effect; public and occupational health and safety; traffic flow obstruction and nuisance; construction material hazards; construction waste disposal; noise and

				vibration effects; air pollution (dust, exhaust fumes and odor); water and energy consumption increment.
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Ms. Mabel A. Narkotey	Teacher (0202670696)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space utilization; development plan phasing (in order of priority); employment generation and job creation.</p> <p><b>Project Concerns:</b> water and energy consumption increment; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction materials hazards; traffic flow obstruction and nuisance; public and occupational health and safety.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Ms. Tengey Lena	Teacher/Training Officer (0557400974)	<p><b>Project Appreciation:</b> space utilization; space enhancement; expansion of infrastructure; human resource development; development plan phasing (in order of priority).</p>

				<b>Project Concerns:</b> erosion and siltation incidence; noise and vibration effects; construction waste disposal; biodiversity loss.
29 <sup>th</sup> April 2022	Abetifi Vocational Training institute, Abetifi	Ms. Debrah Elsie	Teacher/Training Officer (0245137994)	<b>Project Appreciation:</b> human resource development; expansion of infrastructure; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality. <b>Project Concerns:</b> water and energy consumption; erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction material hazards; visual impairment and intrusion; traffic flow obstruction and nuisance; public and occupational health and safety.
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Eric Gyamfi Obeng	Teacher/Training Officer (0247891510)	<b>Project Appreciation:</b> : human resource development; expansion of infrastructure;



				<p>development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> water and energy consumption; erosion and siltation incidence; air pollution (dust, exhaust fumes and odor); noise and vibration effects; construction waste disposal; construction material hazards; visual impairment and intrusion; traffic flow obstruction and nuisance; public and occupational health and safety.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Dominic Osei Tutu	Teacher (0543206658)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space enhancement; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> pedestrian traffic</p>

				obstruction and severance effect; traffic flow obstruction and nuisance; construction material hazards; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption.
29 <sup>th</sup> April; 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Swanzy Lurd Joseph	Teacher/Training Officer (0242547408)	<p><b>Project Appreciation:</b> space utilization; space enhancement; expansion of infrastructure; human resource development.</p> <p><b>Project Concerns:</b> pedestrian traffic obstruction and severance effect; traffic flow obstruction and nuisance; visual impairment and intrusion; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption increment.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Kennedy Ansong	Accountant (02427117466)	<p><b>Project Appreciation:</b> human resource development; expansion</p>

				<p>of infrastructure; space enhancement; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b> public and occupation health and safety; traffic flow obstruction and nuisance; visual impairment and intrusion; construction material hazards; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Ms. Theresa Pokua	Teacher/Training Officer (0242715317)	<p><b>Project Appreciation:</b> human resource development; expansion of infrastructure; space enhancement; development plan phasing (in order of priority); employment generation and job creation;</p>

				<p>economic enhancement for locality.</p> <p><b>Project Concerns:</b>  construction material hazards; construction waste disposal; noise and vibration effects; air pollution (dust, exhaust fumes and odor); erosion and siltation incidence; water and energy consumption.</p>
29 <sup>th</sup> April 2022	Abetifi Vocational Training Institute, Abetifi	Mr. Kesse Enoch Antgwi	Principal Training Officer (0246203739)	<p><b>Project Appreciation:</b>  human resource development; expansion of infrastructure; space enhancement; development plan phasing (in order of priority); employment generation and job creation; economic enhancement for locality.</p> <p><b>Project Concerns:</b>  construction workers should not go out with our girls (trainees); construction workers should not smoke to entice our trainees; construction workers should obey the school regulations; pedestrian</p>

				traffic obstruction and severance effect; public and occupation health and safety; traffic flow obstruction and nuisance; visual impairment and intrusion; construction material hazards; construction waste disposal; noise and vibration effects; water and energy consumption.
6 <sup>th</sup> May 2022	ASSI Head Office, Accra	Mr. Bismark Boakye Mr. Ishmael A. Junongs Mr. Ignatius Cobbina Mr. S.K. Ampim Mr. Alfred Y. Kissi Mrs Evelyn Azumah Mrs. Gladys Yamoah Alhaji Saeed Mr. Jim Amegah Mr. Victor K. Okoh  Mr. Kwaku Anim Boateng	Enterprise innovation (0200240094) ASSI – Ghana (0557027232) Enterprise Innovation (0242330626) ASSI – Ghana (0244185362) ASSI – Gen. Secretary (0244532262) ASSI – Sowutoum (0240824946) ASSI – Chairperson (0244149231) ASSI – President (0244889961) CEO - EBAN Capital (0244296059) ASSI – Chairman Eastern Region (0244931756)	<b>Focus Group Discussion:</b> <b>ASSI Background Information – Alhaji Saeed (President) -</b> •ASSI is an umbrella association for several small-scale industry associations throughout the country and was established in 1986. •ASSI is a non-profit making, non-political and an autonomous private sector institution. •It operates in 16 regions of Ghana with 200 local branches. It has a membership of over 4 million enterprise owners with 30% being women-led enterprises. •ASSI is led by the national,

			<p>Independent Consultant (0244657627)</p>	<p>regional, and zonal executive councils. •Its membership is constituted of 59 sector associations across the regions.  <b>Objective:</b> Generally, the objective of the association is to assist and strengthen new and existing small-scale industries to achieve economic development and viability to ensure growth. ASSI Activities: As the lead voice for micro-small enterprises in Ghana, ASSI supports its members through Policy Advocacy, Research, Training, Access to Finance/Funding and Capacity Building through its partner Consultant, the Enterprise Innovation Hub (EIH). <b>Value Proposition:</b> The association strengths include increasing member base, strong governance structures, mature governance processes, sustained business model, innovation, business growth of member</p>
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Kwaku Anim Boateng (Individual Consultant)

				<p>enterprises, employment creation, contribution to economic growth, etc.</p> <p><b>Business Sectors Under ASSI:</b> Textiles and Garment manufacturing Wood works Leather works Hairdressing Agro-processing Metal fabrication and vehicle repairs Commerce and trading, ICT Construction Crafts, etc.</p> <p><b>Challenges of ASSI</b> • The association is challenged by the lack of a uniform digitized database for its membership. <b>Operations</b> are – Lack of a system for tracking member needs; reliance on manual systems for data collection; inability to collect member dues to help with its day-day operations. • Limited access to financial services • Lack of capacity building – Members of the association also lack financial literacy and entrepreneurship skills that is needed for their</p>
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				<p>financial inclusion. – Positioning members to have access to financing is also very difficult – Limited technical/skills know-how.</p> <p><b>Support Programs from ASSI Consultants (EBAN Capital; Enterprise Innovations):</b> Provide digitized membership database and reliable access to data • Development of a website/social media account. • Extend the Digitization to Member Associations and provide mobile apps for various MSMEs • Working through Technology Partner Eban Capital. Provision of access to finance for enterprise growth • Linkages with FSPs for access to financial products • Identification of external sources of funding for the enterprises • Working through partnership with Enterprise Innovation Hub.</p> <p><b>Introduction of Livelihood Restoration Program (LRP) to ASSI - Executives</b></p>
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				<p><b>under the Covid-19 Restoration Program (Independent Consultant – Mr. Kwaku Anim Boateng):</b> Identification of ASSI registered SMEs suffering from severe shocks of Covid-19 pandemic which has rendered them vulnerable and very vulnerable to regain their former welfare level. Such SME owners, in the event of the severe shocks from Covid-19 pandemic adapted coping strategies of relying on their savings to the point of depletion, changed eating patterns, sold personal and business assets to indicate semblance of regaining former welfare levels, but to no avail. Moreover, these ailing SMEs never have enough to support their financial obligations. ASSI and supporting consultants by working with the independent consultant have been tasked to identify the</p>
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Kwaku Anim Boateng (Individual Consultant)

				ailing SMEs within the ASSI membership for LRP assistance from the Covid-19 Restoration Program.
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**Source: Independent Consultant Data Records**

## 4.0 Description of the Proposed Project

### 4.1 Introduction

The PRSTRP is classified as Category II according to the African Development Bank's environmental guidelines, the Bank's Climate Safeguards System and an Environmental and Social Management Plan (ESMP) that has been prepared. Therefore, all project implementation activities will follow AfDB OS guidelines.

### 4.2 Project Components

The activities implemented under the project include new construction and rehabilitation at **three** institutions. These include construction and rehabilitation of infrastructure/facilities for teaching and learning such as ICT laboratories, Science and Technologies production units, pharmaceutical production research and diagnostic laboratories, offices, lecture rooms, libraries and others will be rehabilitated and climate-proofed. In addition, Climate-proofed rehabilitation of 4 GNA structures in Accra, Northern Belt (Tamale), the Middle Belt (Kumasi), and the Coastal Belt (Takoradi). The project components under contract are shown in Table 8.0.

**Table 8.0 Profile of Summarized Project Components**

Serial Number	Components	Description of Components	Comments
1	1 - Strengthening the health system- climate resilient infrastructure rehabilitation and procurement of equipment.	This component will support the recovery of Ghana's health system from the impacts of the COVID-19 pandemic by improving of the capacity of the University of Ghana to train additional health workers to respond to COVID-19 and future environmentally induced pandemics enhance capacity for testing, diagnosis, and treatment in the system. At the University of Ghana, infrastructure including teaching and learning facilities	Total component cost, implementing entity responsibilities have been provided in the AfDB project output statement document.

		such as ICT laboratories, Science and Technologies production units, pharmaceutical production research and diagnostic laboratories, offices, lecture rooms, libraries and others will be rehabilitated.	
2	1.1 - Strengthening the health system- climate resilient infrastructure rehabilitation and procurement of equipment.	Climate-proofed rehabilitation of 4 GNA structures in Accra, Northern Belt (Tamale), the Middle Belt (Kumasi), and the Coastal Belt (Takoradi).	Total component cost, implementing entity responsibilities have been provided in the AfDB project output statement document.
3	2 - Rebuilding youths` and women`s livelihoods through entrepreneurship and employment creation.	This component will support the rebuilding of livelihood and sources of income among youths and women for them to recover from the socioeconomic and climate related shocks or impacts of the COVID-19 pandemic on individuals, households, and enterprises, especially SMEs. It is aimed at improving access to technical and climate-resilient skills training and sustainable green climate finance for youths, women, and SMEs. In addition, the project will support the construction of 2 to 4 technical skills training centers at Nsoatre (Bono Region), St. John`s (Nandom in Upper West Region), Otaakrom (Atwima Mponua District in Rural Ashanti Region),	Total component cost, implementing entity responsibilities have been provided in the AfDB project output statement document.

		and Abetifi (Kwahu-East District in the Eastern Region).	
4	3 - Project Management	This component aims to provide technical and administrative support for the implementation of project activities under the two components above.	Total component cost, implementing entity responsibilities have been provided in the AfDB project output statement document.

Source: SIF Project Document

**Table 9.0. Detailed AfDB Output Statements on Project Components**

<b>OUTPUT STATEMENT 3:</b> Increased access to modern and adequate teaching and research equipment at the School of Biomedical Sciences, the Biotechnology Centre, and the School of Nursing and Midwifery of the University of Ghana						
RESULTS CHAIN AND INDICATOR DESCRIPTION	RMF INDICATOR	UNIT OF MEASUREMENT	BASELINE (as at 2020)	TARGET AT COMPLETION (2026)	MEANS OF VERIFICATION	FREQUENCY OF REPORTING
<u>INDICATOR 3a:</u> Availability of teaching and research equipment at the University of Ghana in biotechnology, microbiology, and nursing and midwifery:	<input checked="" type="checkbox"/>	Number	???	146	University of Ghana and SIF Project Quarterly and Reports	Quarterly and Annually
<u>INDICATOR 3b:</u> Biotechnological and biomedical research linked to the sustainable local production of medical supplies such as vaccines, drugs, and other medical supplies	<input checked="" type="checkbox"/>	Yes/No	No links	Links established and functional	University of Ghana and SIF Annual Reports	Annually
<b>OUTPUT STATEMENT 4:</b> Improved capacities of the Ghana News Agency (GNA), UoG, and other media houses to inform and educate the public on COVID-19 and other climate related pandemics, to disseminate research findings of UoG, and link youths, women, MSMEs, and cooperatives to income and employment opportunities						
<u>INDICATOR 4a:</u> Staff of GNA, other media houses, and GoG trained in effective communication on COVID-19 and other pandemics prevention and therapeutic measures and dissemination of UoG	<input type="checkbox"/>	Number	0 (2021)	200	Project Report/ Annual Report/	Annually

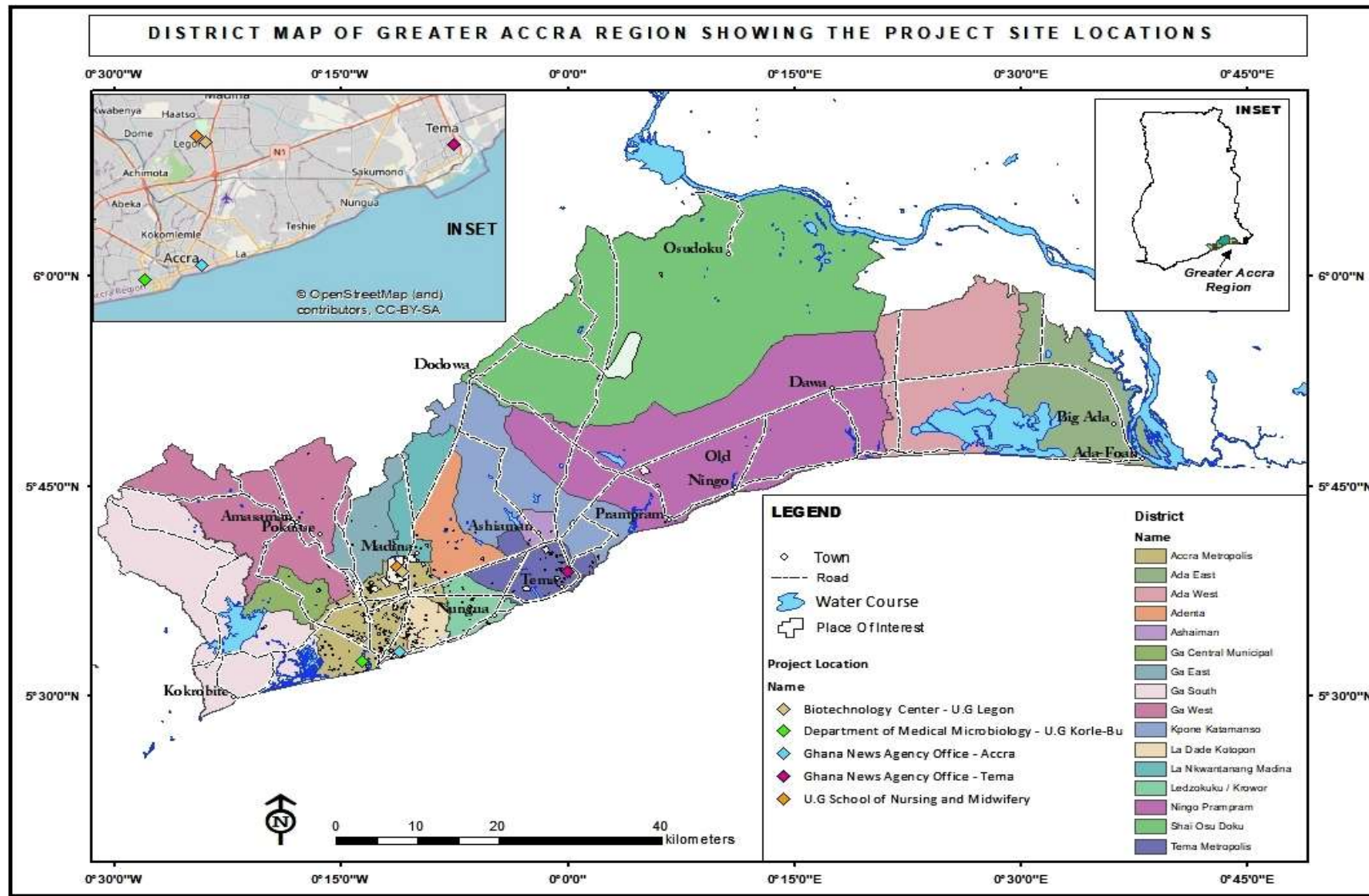
research findings and MSMEs credit access						
INDICATOR 4b: Locations where GNA infrastructure is rehabilitated		Number	0 (2021)	4	SIF Project Quarterly and Annual Progress Reports	Quarterly and Annually
INDICATOR 4c: GNA and other media houses using digitalized communication platforms on the COVID-19 pandemic and MSMEs access to credit	<input checked="" type="checkbox"/>	Yes/No	No	Yes	SIF Project Quarterly and Annual Progress Reports	Quarterly and Annually
<b>OUTPUT STATEMENT 5: Increased access to technical, entrepreneurial and climate-resilient skills training for youths and women</b>						
INDICATOR 5a: Youths and women trained in technical, entrepreneurial and climate resilient skills and sustainable green climate finance for youth, women SMEs, and cooperatives	<input type="checkbox"/>	Number	Number of trainees= Males= Females=	Number of trainees= Males= Females=	Ghana Enterprise Agency (GEA), SIF and MASLOC Project Quarterly and Annual Progress Reports	Quarterly and Annually
<b>OUTPUT STATEMENT 6: Increased access to sustainable green climate finance for youth and women SMEs and cooperatives</b>						
INDICATOR 6a: Access to green climate finance increased for youths, women, MSMEs and cooperatives	<input checked="" type="checkbox"/>	Number	Number of males= Number of females=	Number of males= Number of females=	GEA, Ghana SIF and MASLOC Project Quarterly and Annual Progress Reports	Quarterly and Annually
INDICATOR 6b: MASLOC credit operations and transactions fully digitalized to deepen financial inclusion	<input checked="" type="checkbox"/>	Yes / No	Manual	Digitalized	SIF and MASLOC Project Quarterly and Annual Progress Reports	Quarterly and Annually
INDICATOR 6c: Green and climate resilient jobs created for youths and women	<input checked="" type="checkbox"/>	Number	Direct jobs=5,000 Males= Females= Indirect jobs= Males=	Direct jobs=6,000 Males= Females= Indirect jobs= Males=	GEA, SIF and MASLOC Project Quarterly and Annual Progress Reports	Quarterly and Annually

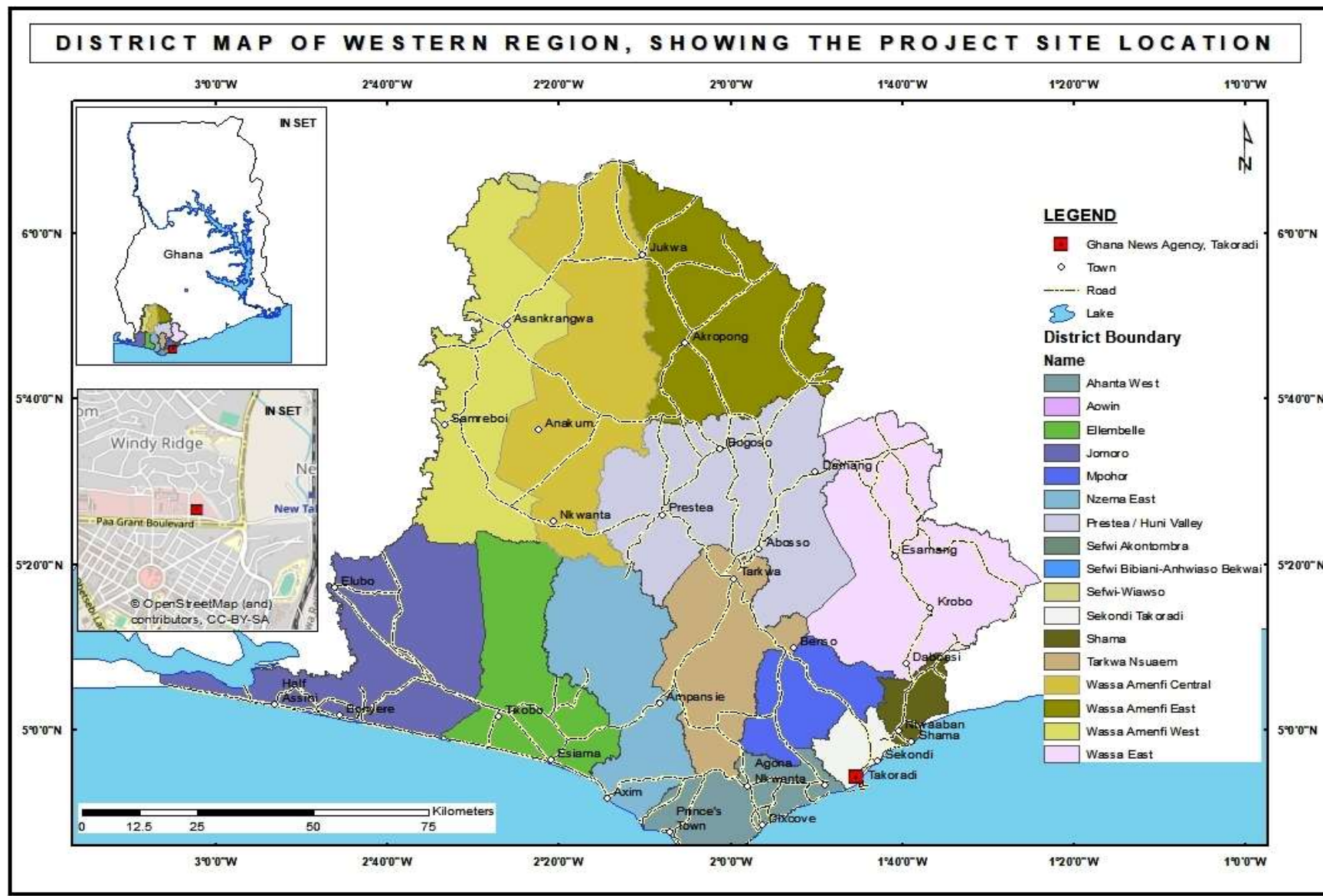
ACTIVITIES		INPUTS		
<p><b>PROJECT COMPONENTS</b></p> <p>A. Component 1: Infrastructure Rehabilitation and Procurement of Equipment</p> <p>B. Component 2: Rebuilding youths' and women's livelihoods through entrepreneurship and employment creation</p> <p>C. Component 3: Project Management</p>		<b>Source</b>		
		ADF Grant (million)		Government (In Kind)
		A- Infrastructure Rehabilitation and Procurement of Equipment	UA 7.13	UA 0.71
		B-Component 2: Rebuilding youths' and women's livelihoods through entrepreneurship and employment creation	UA11.00	UA 1.10
		C. Project Management	UA2.01	UA 0.20
		D		-
				-
		<b>Total (UA )</b>	<b>20.14</b>	<b>2.01</b>

Source : AfDB Data Records



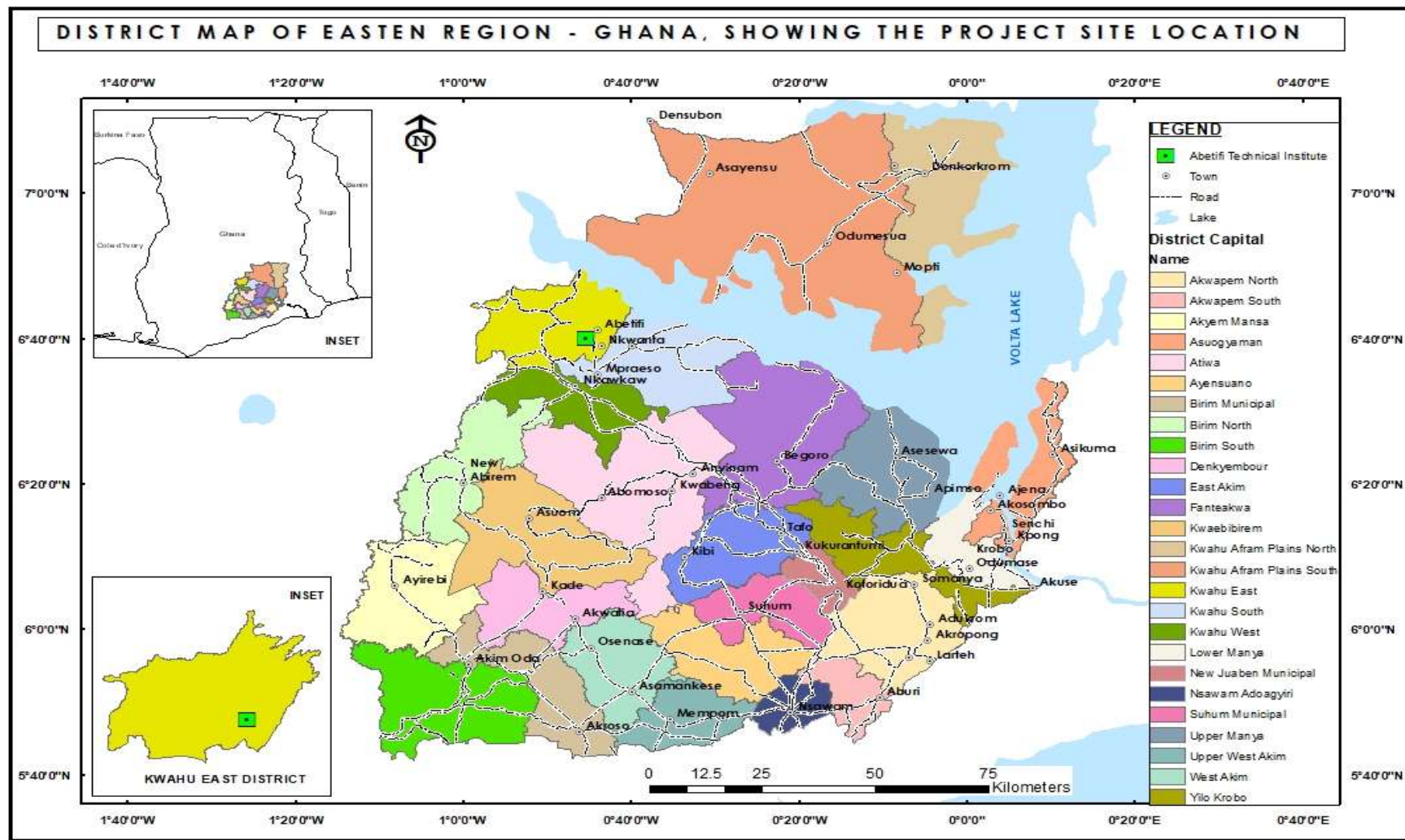


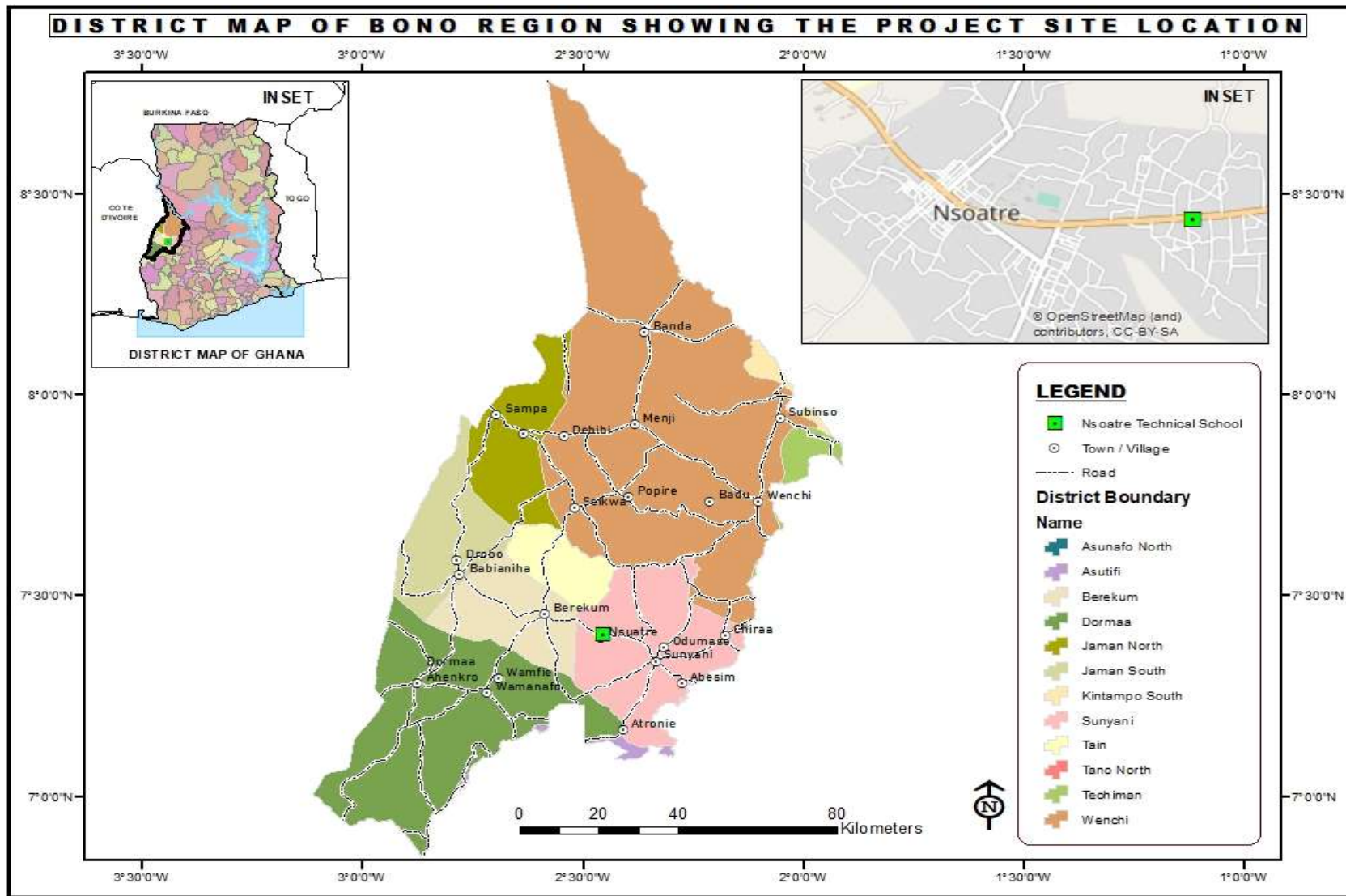


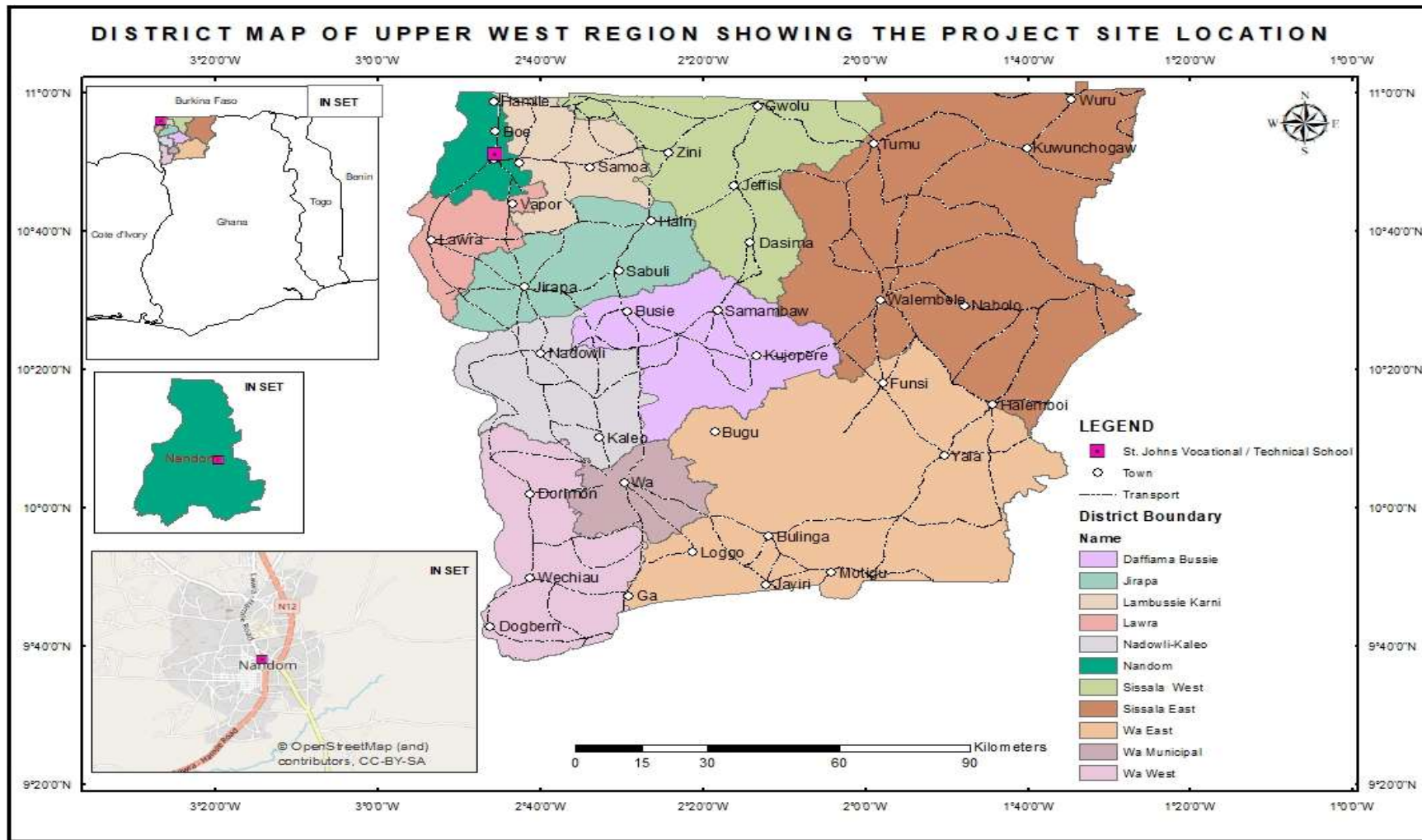




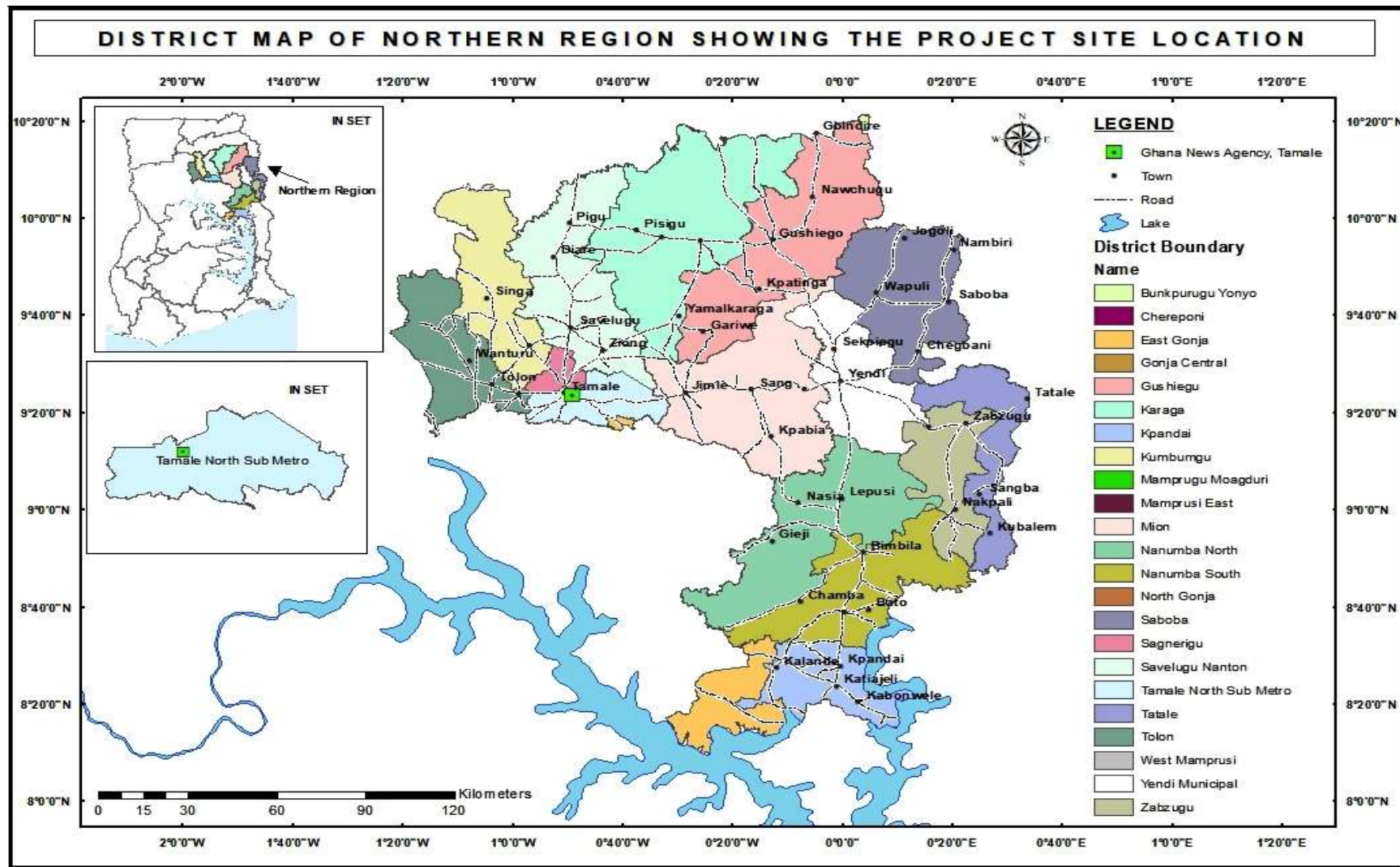












### **4.3 Project Activities Description**

The project activities to be undertaken have the overriding consideration of avoidance or preservation of environmentally and socially sensitive areas and limitation of adjoining facilities degradation. In addition, there will be the minimization of the destruction of trees, crops, and arable farmlands, in borrow areas (where applicable). The major project activities phasing for consideration are the following: pre-construction, construction, and post-construction (decommissioning operation and maintenance) phases.

#### **4.3.1 Pre-Construction Phase Activities**

The following pre-construction phase activities are required for the Projects:

- Design and Feasibility Studies.
- Project Zone or Corridor Identification and Survey.
- Identification of Site Offices and Site Camps.
- Consultations with all Relevant Stakeholders Institutions and Affected Community Individuals.
- Environmental Sampling Analysis of Air, Water and Noise Quality of Project Enclave.
- Preparation and Submission of Reports for Inception, Draft Final and Final Scoping, Draft Final ESIA and Final ESIA.
- Materials, Equipment and Machinery Mobilization.
- HIV/AIDS Awareness Education.
- COVID-19 Exposure and Prevention Education.
- Road Safety Awareness Education.
- Environmental Protection Training.
  
- **Design and Feasibility Studies**

This phase of the project cycle involves project planning and design, through conceptualization, feasibility survey and preparation of feasibility report. Various options consideration and recommendations are highlighted including the preferable option for the project.

- **Project Zone or Corridor Identification and Survey**



The project zone or corridor identification and survey will be established from review of existing mapping. Then field inspections or surveys will be undertaken to confirm and clarify identified project zone and its exact location.

- **Identification of Site Offices**

Principal site offices, construction materials storage areas, spoils and waste storage areas will be selected within the project beneficiary institutions selected project sites with the approval by the Site Engineer. These will also be done in direct consultation with the Project Institutions Administration, Metropolitan/Municipal/District Municipal Assembly officials, and project community residents (to avoid any project boundary disputes emergence). Generally, the sites selection will preferably involve flat terrain with sparse student population densities and devoid of intense traffic and commercial activities within the project boundaries. There will be no site camps creation for construction workers, since both local and foreign labourers will be expected to reside within the beneficiary project communities. There is no anticipated site acquisitions for contractor offices outside the project institutional boundaries. The project will trigger mitigation measures to control potential E&S issues related to site acquisitions for contractor winning of materials from borrow areas. All potential EHS issues associated with borrow pits opening and closure will be addressed by the contractor(s). Emphatically, site offices and workers' camp sites will be established. These are expected to be established within existing facilities. Therefore, involuntary resettlement and land acquisition and land take may not be expected. At maximum, there could be displacement (physical and economic) for which a relocation and assistance plan/support should be drawn for the PAPs.

- **Consultations**

In course of the scoping exercise, representatives of the selected institutions were consulted. This was to enable the ESIA study team gain access to the proposed project sites, to undertake the necessary field studies.

- **Environmental Components Examination**

The Initial Environmental and Social Examination (IESE) concluded that, there will be less adverse triggers and drivers of environmental, climate and social effects, which will lead to the development of Environmental, Climate and Social Impact Assessment (ESIA) report.

- **Preparation and Submission of Reports for Draft Final and Final Scoping, Draft Final ESIA and Final ESIA Reports**

The Scoping Report of the Scoping Exercise will be submitted to the Client and Project Financiers. This Draft Final ESIA and the Final ESIA Studies will be submitted to the Client, EPA and Project Financiers for discussion and approval. Such approvals will lead to the permitting of the proposed project by EPA for onward implementation.

- **Materials, Equipment and Machinery Mobilization**

The haulage of large quantities of construction materials - fine and aggregates – including cement by different project location roads to the project sites will take place. There will also be the transportation of heavy construction equipment and machinery to the project sites, under materials, equipment, and machinery mobilization work program.

- **HIV/AIDS Awareness Education**

HIV/AIDS Awareness Training Program will be organized for project communities and construction labour units. Moreover, sexually transmitted diseases awareness will be organized alongside the HIV/AIDS Awareness Creation. The program will help explain the pandemic to the workers and the project community residents. The program is to make people aware that AIDS is real.

- **COVID-19 Exposure Prevention, Preparedness and Response Education**

COVID-19 Exposure Prevention and HIV/AIDS Awareness Training Programs will be organized for project communities and construction labour units. Moreover, COVID-19 exposure prevention, preparedness and response education, sexually transmitted diseases awareness and sensitization will be organized alongside the HIV/AIDS Awareness Creation. These programs will help explain the pandemic to the workers and the project community residents. These programs are to make people aware that COVID-19 and AIDS are real.

- **Road Safety Awareness Education**

Road Safety Awareness Campaign through education will be instituted for project communities and construction crew to curb the likelihood of road accidents associated with project implementation. In collaboration with the National Road Safety Campaign of the Ministry of Transport and the Traffic Police Unit, this activity will review the approach and methodology for the road safety awareness campaign and monitor the effectiveness of proposed mitigation measures. The target groups will include school children, street vendors and vehicle operators.

- **Environmental Health Safety and Security Training**

Environmental, Health, Safety and Security Training will be organized for Contractor(s) and other stakeholders. This activity will assist contractor(s) to ensure environmental, health, safety and security measures are adopted to instil good environmental, health, safety and security management and monitoring practices during construction. The training program will help protect, restore, and enhance quality of the environmental, health, safety and security arrangements due to project implementation.

The proposed project works would be divided into five (5) main segments of activities:

- Site Preparation Works
- Construction Works
- Post – Construction Works
- Decommissioning Works
- Maintenance Works

#### **4.3.2 Site Preparation Works**

This will include the survey works to determine siting of the facilities for construction works. No make shift camps will be constructed to cater for workers accommodation since all workers will be expected to reside within the project neighbouring communities. Further works will involve the transportation of materials, machinery and equipment and other aggregates needed to initiate the construction process.

#### **4.3.3 Construction Works**

The major steps of construction would involve the following:

- Initial stripping of vegetation cover or site clearance involving the removal of a few millimetres of topsoil.
- Excavation works for the development of foundation and drainage channels for storm water runoff and liquid waste disposal.
- Civil works for the erection of sandcrete structures to depict offices, lecture rooms, meeting rooms, storage and utility rooms, laboratories, library, septic tanks, washrooms, stores among others. Provision of access roads would be carried out where necessary.

- Installation works involving the electrical fittings, roofing, windows, doors, flooring and landscaping of the exterior façade and surroundings.
- Material utilization involving the use of sandcrete blocks, cement/concrete, fine and coarse aggregates, reinforcement laterite and roofing sheets. Provision of water storage reservoirs (such as poly-tanks) to store potable water for domestic chores.
- Equipment/machinery most likely to be used for the construction process would be earth moving; materials handling; stationary systems and impact accessories.

**Buildings and Structures Demolition Plan:** Contractor will develop Buildings and Structures Demolition Plan, where applicable, which will factor in the various parameters shown in **Table 10.0**.

**Table 10.0** **Buildings and Structures Demolition Plan for the Project**

Serial Number	Demolition Parameters Consideration	Detail Description
1	Sequence of Operation	Pre-Demolition Activities. Detailed Description of Demolition Process. Control Measures. Rigging and Lifting.
2	Site Mobilization	Equipment. Personnel.
3	Pre-Demolition Activities	Utility Locations. Building Structural Integrity Evaluation. Hazardous Materials Characterization. Pre-Demolition Survey.
4	Asbestos Abatement	Types identification:

		Transite. Caulk. Galbestos.
5	Hazardous Materials Identification and Removal	Lead Based Paint (LBP).
6	Building Preparations	Trench and Drain Plugging. Premature Collapse. Fire Safety Procedures/Prevention. Work Area Ingress/Egress. Severe Weather Stoppage Consideration.
7	Demolition Activities	Water Management. Dust Control Methods. Structure Demolition.
8	Dust Control	Particulate Matter Emissions. Total Suspended Particulate. Air Pollution Control.
9	Stockpiling and Segregation	Collection of Dismantled Materials. Separation of Salvageable Materials. Recycling of Recyclable Materials.
10	Surface Water/Pollution Prevention	Polluted storm-water runoff into surface and groundwater resources.

11	Post Demolition Activities	Clean-up. Site Restoration. Demobilization. Project Completion Report.
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**Source: Independent Consultant Data Records**

**Method Statement for Demolition Works:** Method Statement for Demolition Works should be prepared by the Certified Contractor(s) addressing the following issues: (i) Façade Works (ii) Roof Works (iii) Floor Coverings (iv) Suspended Ceiling Coverings (v) Internal Partitions (vi) Structural Steel Elements (vii) Reinforced Concrete Slabs and Beams (viii) Reinforced Concrete Foundations.

**Façade Works:** Glazed façade claddings with aluminium frames and aluminium claddings should be demounted. After completion of demounting activities, glass and aluminium materials should be transported out of the construction site for recycling. Brick walls should be demolished by crushers, all environmental and social regulatory compliance requirements should be observed during demolition works. Trash materials should be transported to the excavation waste storage area of Municipal/District Landfill Site. Before transportation all legal permissions should be obtained.

**Roof Works:** Roof claddings should be demounted. Steel and aluminium parts should be separated and transported out of the construction site for recycling.

**Floor Coverings:** Floor covering like ceramic, granite, marble and terrazzo tiles should be demolished by crushers. Trash materials should be transported to the excavation waste storage area of Municipal/District Landfill Site.

**Suspended Ceiling Coverings:** Gypsum board false ceilings should be demounted. Gypsum and aluminium materials should be separated. Gypsum parts should be transported to the excavation waste storage area of Municipal/District Landfill Site. Aluminium parts should be sent to recycling units.

**Internal Partitions:** Glazed partition with aluminium frames and aluminium façade claddings should be demounted. After completion of demounting, glass and aluminium materials should be transported out of the construction site for recycling. Drywalls should be demounted gypsum and aluminium materials should be separated. Gypsum parts should be transported to the garbage dump of Municipal/District Landfill Site. Aluminium parts should be sent to recycling factories. Brick walls should be demolished by crushers, all environmental and social

regulatory standards should be observed during demolition works. Trash materials should be picked and transported to excavation waste storage area of Municipal /District Landfill Site.

**Structural Steel Elements:** All steel beams should be demounted from bolts and nuts and removed by using lifters. Steel columns should be demounted from anchorages and removed by using lifters. All steel materials should be stored properly and the transported to recycling steel mills in Tema.

**Reinforced Concrete Slabs and Beams:** All reinforced concrete slabs and beams demolition should be undertaken without using any explosives. All environmental and social precautionary measures should be taken during the demolition works. Demolition works should be started from upper levels. All slabs and beams should be demolished by crushers to control the loads of columns. After demolishing the slabs and beams, columns should be demolished next by crushers. All floors from top to bottom should be demolished by the same method. All trash materials should be collected and transported to excavation waste storage area of Municipal/District Landfill Site.

**Reinforced Concrete Foundations:** All reinforced concrete foundations should be demolished by use of excavators. The demolished debris should be collected and transported to excavation waste storage area of Municipal/District Landfill Site.

**Asbestos Analysis and Removal and Lead-Based Paint Abatement:** The following guidelines should be followed with regards to asbestos analysis and removal and lead-based paint abatement: **Asbestos Analysis and Removal:** An accredited company with expertise in Asbestos Analysis and Management should be engaged to determine whether the buildings slated for demolition contains Asbestos. Following site studies, an Inventory Report should address these issues:

- Types, quantities and locations of the asbestos containing materials detected at the facility and its buildings.
- Asbestos resource detection results, measures to be taken and recommendations.
- General survey results, measures to be taken and recommendations.
- Risk Assessment.

**Lead-Based Paint Abatement:** A Certified Contractor should be required to develop an abatement of lead-based paint from the dismantled structural steel members designated for proposed torch cutting. Some of the existing paint on structural steel components might contain lead. Lead- Based Paint (LBP) should not require removal prior to demolition. But in specific cases where hot work cutting techniques should be used to segment material with LBP, lead should be abated, or engineering controls should be implemented prior to any cutting. The following precautions and procedures should be for worker and pedestrian safety:

- Painted surfaces on piping, ductwork and other suspect surfaces shall be assumed to be lead containing until a positive determination is made. Appropriate measures to prevent spread of contamination and exposure shall be made.
- Personal air monitoring for lead exposure shall be taken during all torch cutting operations.
- Abatement of lead paint from the structural steel at proposed torch cutting locations via approved paint removal gel is a viable alternative.
- Personnel shall be provided with the appropriate PPE.

**Waste Management:** All project generated wastes will need to be managed and disposed of in a manner that prevents potential impacts on the environment and risks to human health. The majority of waste will result from the following activities within the discrete project activities: **Construction Activities** – waste generated from construction activities such as vehicle maintenance, refuelling of construction vehicles and equipment; and household waste (including organic biodegradable waste from kitchens/canteen or living quarters, paper and cardboard), and sewage and grey water from operation of the construction site offices; and **Decommissioning Activities** – waste generated from the decommissioning of the construction site offices. **Categorization of Wastes:** Wastes generated from project activities would be categorized as nonhazardous or hazardous according to their types and associated risks. The definitions of waste categories are as follows: **Non-hazardous wastes** are those that do not exhibit any hazardous properties and are relatively low risk to human health and the environment. This category would include a range of materials that may be recycled or can safely be disposed of in a landfill. **Hazardous wastes** exhibit one or more characteristics which mean that the wastes are potentially harmful to human health and/or cause damage to the environment (air, land, and/or water) or natural ecosystems. For example, the waste may be corrosive, reactive, toxic, mutagenic, teratogenic, infectious, carcinogenic, ecotoxic, flammable, or explosive. Solid wastes will be segregated to facilitate alternative management routes. Sewerage, grey water and organic biodegradables will be appropriately disposed of in consultation with the MMDAs Environment and Health Divisions. Organic biodegradable wastes from food preparation and leftovers will be disposed of as compost. Small quantities of paper and cardboard packaging will be transported off-site to a suitable recyclable waste regeneration site in the project areas. Waste services will be investigated by SIF for third party involvement as part of the project developments. All hazardous wastes such as spent oil, oil filters, spent batteries; oily rags will be stored separately from non-hazardous wastes and clearly labelled. Spent batteries, drained oil filters, and spent oil will be sent for recycling to an approved recycler. Oily rags and Personal Protective Equipment (PPE) such as masks will be sent for incineration to an approved facility. Waste management activities will be performed in accordance with the following waste hierarchy principles:

- **Reduce** - the quantity of waste generated by project activities.
- **Re-use** - materials where possible in engineering structures or return to suppliers where surplus to requirements.



- **Recycle and recover**– material streams where practicable (e.g. oils, metal, wood, paper, plastics, etc.) to reduce the quantity of wastes disposed.
- **Responsible treatment and disposal** – to landfill or alternative following appropriate treatments to reduce hazards and long-term impacts on the environment.

As part of the development of the Waste Management Plan, the SIF will identify suitable local companies and facilities to receive recyclable wastes and treat hazardous wastes. SIF and HSE will conduct site audits at regular intervals to ensure that all waste is being managed in accordance with the Waste Management Plan and procedures.

**Health and Safety:** All occupational health and safety requirements will be in place and workers trained in necessary procedures (e.g. spill response plan). Health and safety requirements will be applied to all aspects of the Projects (including construction and transport routes). Personnel Protective Equipment (PPE) will be available to workers as required (e.g. high visibility vest, safety boots) and processes in place for obtaining relevant PPE.

#### **4.3.4 Post – Construction Works**

This would involve the commissioning of the project. Functionality of the office spaces, laboratories, classroom units, septic tanks, sewer lines, storm drains, gutters, drainage channels and traffic flow patterns, socio- economic activities within the project areas corridor, job creation and employment generation would be evaluated.

#### **4.3.5 Decommissioning Works**

This would involve the dismantling of the work camp and site office facilities and removal of project machinery and equipment from the project sites. Any used materials would be recycled for reuse or disposed of at approved locations by the district, municipality or metropolitan assemblies. All the contoured sites would be re-contoured to their original or natural state, prior to project commissioning. Moreover, the medical facilities to be established for research into vaccines should be requested to develop biosafety protocols which will be made familiar to staff, students, and visitors.

#### **4.3.6 Maintenance Works**

The maintenance scheme for drainage and storm water management systems would involve the following: ditch clearing by manual labour, re-excavation of drainage ditches to install high-capacity channels for storm run-offs, clearing and minor crack repair on drainage structures and erosion and scour repairs. The maintenance scheme for buildings and facilities would include the following: repairs and replacement of structure component parts, cleaning and painting of structures, good housekeeping measures, recycling of used petroleum products and scrap metals, replacement of fluorescent lamps/tubes. Roadways with moderate grade will experience surface maintenance such as: pothole patching, repair of depressing, ruts, shoving and corrugations, edge failure repairs, resurfacing and/or surface dressing.

## **5.0 Alternatives Consideration**

### **5.1 Overview**

This chapter describes and evaluates the range of reasonable options as alternatives considering the objectives of the project. The description and evaluation of each option were at the level of detail sufficient to permit a comparative assessment of the alternatives discussed. The key thematic issues addressed included the following: no – development option; development option; and selected option.

### **5.2 No – Development Option**

The zero option refers to the “No Action Alternative” which in essence refers to not implementing the proposed project at all. Project actions predicted in the zero alternative indicated that the project lands will lie fallow and abandoned with farming activities or other form of activities ensued. The No-development option will not register any of the impacts (both positive and negative) associated with any specific alternative or the development proposal. It is important to note that this zero Alternative is the baseline against which all other alternatives and the development proposal have been assessed.

Furthermore, the “No –Action” or “No- Project” is included in the analysis of alternatives in environmental and social investigations to assess what is likely to occur if the proposed actions are not taken. The “No-Action” Alternative is defined as a decision not to undertake the proposed Project through the use of the AfDB Funds. In the absence of adequate local funds and/or other international funding sources to undertake the Planned Projects, the “No Action” would result in the continued diseconomies in Ghana’s financial management systems for planned development projects would not materialize. This means the regions will continue to be without improved SIF sponsored facilities which will impede upon the growth of the regions and the country as a whole.

Although in a ‘No Project Scenario’, the lands can be used for farming activities, the long term effects on failure to undertake the Project Initiative would severely cripple the selected areas development efforts. Therefore, the “No – Action” Alternative is imprudent in the best interest of SIF sustainability effort and expansion of project infrastructure.

### **5.3 Alternative Technologies**

The development considerations captured the following: **Alternative Technology 1** – Efficient Energy-Savings Air Conditioning System; **Alternative Technology 2** – Natural and Non-Mechanized Ventilation System; **Alternative Technology 3** – Solar Power Generation System.

#### 5.4 Alternative Architectural Designs

The development consideration captured the following: **Alternative Design 1** – Green-Building Concept Design; **Alternative Design 2** – Conventional-Building Concept Design.

#### 5.5 Alternative Sites

**Project Sites Inaccessibility Under both Wet and Dry Conditions:** The typical access to the project sites which were considered and dismissed were determined on the surface inaccessibility challenges in connection with the mode of accessibility such as footpaths, motorable and unmotorable paved or feeder roads, farm track or deteriorated paved roads. Moreover, the site conditions under both wet and dry seasons were assessed with regards to difficulty in accessibility or inaccessibility facilitation. **Topography of Project Sites Landform:** The topography of the projects terrain which were considered and dismissed were evaluated on the following features of landform: hilly landscape; sloping hilly landscape; evidence of potential landslide incidence under severe precipitation events. **Cutting or Felling Considerable Number of Trees:** The episode of felling or cutting tremendous number of trees (large -; medium -; and small-size) were considered and dismissed on the basis of deprivation of wind-break tree farms to support carbon sequestration.

**Table 11.0 Proposed Alternative Sites Selection Options**

Project Components	Project Location	Alternative Site Option 1	Alternative Site Option 2	Alternative Site Option 3	Alternative Site Option 4	Alternative Site Option 5
Otaakrom Vocational/ Technical Institute	Otaakrom	Removal of vegetated fallow grassland leading to the relocation of concretized structure overhead water tank (poly-tank placed on it) and	Rehabilitation of frontage uncompleted old structure previously marked for showrooms for students handiworks from	-	-	-

		demolition of disused and dilapidated school toilet facility.	the school's workshops.			
Nsoatre Vocational /Technical School	Nsoatre	Removal of vegetation cover leading to the cutting of few trees as <b>(Student Bathroom Area)</b> .	Removal of vegetation cover leading to the cutting of 10 to 15 single-spaced medium sized trees (not clustered but serving as windbreaks buffer zone) <b>(Mosque Area – behind Ghana National Fire Service Station)</b> .	Removal of bushy vegetation cover leading to the cutting of several small, medium, and large size trees across the high-tension electricity line towards Ghana Water Company Limited Booster Station feeder road <b>(Opposite Fashion Department)</b> .	Removal of bushy vegetation cover leading to the cutting of few trees and destruction of the existing volleyball pitch <b>(Volley Ball's Pitch Area)</b> .	Removal of bushy vegetation cover leading to the cutting of few trees <b>(Behind the Kitchen Area)</b> .
Abetifi Vocational Training Institute, Abetifi.	Abetifi	Removal of vegetation cover on fallow farmland.	Removal of vegetation cover on manicured open landscape between new girl's hostel and catering/fashion and design workshop.	-	-	-
St. Johns' Vocational/Technical School, Nandom	Nandom	Removal of vegetation cover in a wooden	Removal of vegetation cover leading to the	-	-	-

		fenced-in enclosure with disused, old and dilapidated sandcrete pigsty with zinc roofing.	cutting of big and small neem trees and demolition of disused, old and dilapidated school urinal.			
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## 5.6 Development Options Considered and Dismissed.

These alternatives and the rationale for either dismissing or carrying on with each has been presented in the following sections.

### 5.6.1 Proposed Alternative Technologies

**Alternative Technologies 1 and 2** which did meet the purpose and need for the Proposed Action and were reasonable alternatives and were carried forward for detailed consideration, have been disclosed. Similarly, **Alternative Technologies 3** entailed substantially lower environmental, social but high economic cost was not carried forward in the case for energy mix consideration, where the economic cost becomes a burden for project beneficiaries.

### 5.6.2 Proposed Alternative Architectural Designs

Over the years, SIF has examined dozens of concepts for providing project facilities. The main general building concepts discussed included the following:

**GREEN-BUILDING DESIGN CONCEPT (Alternative Design 1):** The SIF aims to develop, implement and maintain a green energy policy to diversify energy supply sources, conserve energy and natural resources and promote good health. All buildings and utilities will be designed and built as green buildings, harnessing natural energy sources, promoting energy efficiency, reducing utility bills and creating avenues for healthy well-being of students and lecturers. The key objective of this design option is to develop a smart and sustainable building which will reduce MMDAs conventional energy consumption and increase renewable energy consumption: Technologies such as biogas generation, rain water harvesting, green and solar panelled roofs, storm water management and water-wise irrigation and energy efficient buildings systems or materials will be

employed, where applicable, to ensure that the project energy needs are not solely dependent on national power supply. Because the Green-Building Concept would meet the purpose of project design, it has been seen as the logical way forward for detailed design consideration.

**CONVENTIONAL-BUILDING DESIGN CONCEPTS (Alternative Design 2):** Conventional building design refers to the traditional method of construction. It refers to wet construction (in-situ) using reinforced concrete. The environmental impacts of conventional buildings are enormous. Conventional buildings use large amounts of energy, water, land and raw materials for construction and operation. They are responsible for large greenhouse gas (GHG) emissions as well as emissions of other harmful air pollutants. They also generate large amounts of construction and demolition waste and have social impacts on plants and wildlife.

### 5.6.3 Summary of Proposed Options Considered and Dismissed

This section provides for the consideration of alternatives considered and dismissed. As such, the alternatives for the proposed projects and associated improvements addressed in this chapter are summarized in **Table 12.0**.

**Table 12.0 Summary of Proposed Options Considered and Dismissed**

Description	No-Action Alternative  1	Alternative Sites  2	Alternative Technologies  3	Alternative Architectural Designs  4
No-Development Option	No development action. No potential income increase. Poor socio-environmental practice.	No	No	No
Proposed Alternative Sites Considered and Dismissed	No	No Felling of large quantities of shady trees forming wind	No	No

		breaks protecting lives and properties.		
Proposed Alternative Technologies Considered and Dismissed	No	No	No Absence of efficient air-conditioning system leading to high heat loads resulting in huge monetary cost to the project beneficiaries. High solar power generation system with huge cost to the project beneficiaries.	No
Proposed Alternative Architectural Designs Considered and Dismissed	No	No	No	Yes Low performance glazing to minimize solar gains. Non-airtight roof and façade to minimize air leakage. None certified green-building design concept.
Selected Sites	No	Yes Accessibility criteria attainment under all weather conditions. Flat topography of land form. Location safety, security, and land use compatibility. Felling of limited number of trees.	No	No
Selected Technologies	No	No	Yes High efficiency light sources and lighting designs.	No



			High efficiency lighting control systems. All air conditioning to be air displacement systems to realize cheaper cost to project beneficiaries. Reducing demand by use of efficient systems. Low use of fossil to enhance low carbon emission and noise reduction (use of generation sets).	
Selected Architectural Designs	No	No	No	Yes Enhancement of natural conditions. Use of renewables. Variable speed drives on fans and pumps. Certified green building designs. High performance glazing to minimize solar gains. Airtight roof and façade to minimize air leakage.

Source: Design Documents Records

### 5.7 Selected Development Option.

Basically, the choice of site selection was based on engineering, environmental and community sensitivity considerations in meeting the Proposal objectives. The following principal issues of concern arose as pertinent environmental features which were adopted as benchmarks:

- Sites free of all physical impediments, obstacles and encumbrances that could stall project implementation schedules with resultant delays.
- Sites devoid of land litigations and resultant legal actions at the law courts that could hold back the project work plan.

- Sites situated outside “bushfire prone” zones to forestall any incidence of bush fire effects on the Proposal during the operational phase.
- Sites located away from low-lying wetlands typically receptive to flooding and flood prone conditions and flash-flood incidence.
- Sites acceptable to the Metropolitan/Municipal/District Assemblies and the Land Use and Spatial Planning Authority (formerly Town and Country Planning as specially demarcated and appropriately zoned areas for the project.

Moreover, determination have been made whether all the selected sites meet the environmental features checklist for site selection criteria employed to select these suitable sites. All the selected suitable sites should meet satisfactorily the following conditions:

- Accessibility criteria under all weather conditions.
- Topography of site landform for easy constructability of project works.
- Adequate design standards to handle effectively all hydrological and drainage pattern systems for storm water and runoff water flows.
- Location safety, security and land use compatibility with efficient and effective handling of all compensation issues; in cases where squatters will have to be physical displaced from the project sites. For this category of PAPs, there may be need for compensation (land-for-land or cash) or support to those who might have to be displaced temporary or permanently.
- Closeness or nearness to public transportation systems, non-restrictions from easements and encumbrances on project sites.
- Demolition of structures to make way for project with the associated sensitivity analysis for potential site remediation action plan, where applicable (especially reclamation of disused school toilet facility areas).
- Felling or cutting minimum number of trees to sustain provision of tree canopies serving as wind breaks within Nsoatre and Nandom.
- Environmental and social issues of concern could be addressed with prescriptions for mitigation, management and monitoring plans to minimize, reduce or eliminate the potential constraints associated with the projects.

## 6.0 Description of the Baseline Environmental, Climate and Social Conditions

The existing baseline conditions include known plans, programs, apparent commitments and/or intentions to the extent they are known, to consider them in the assessment of cumulative impacts. The existing key baseline data were gathered to depict the physical, biological/ecological, and socio-economic/socio-cultural environments in the project sphere of influence. The basic baseline information of the selected project sites have been disclosed from the regional perspective to facilitate ease of presentation and readability as follows:

### 6.1 Physical Aspects

#### 6.1.1 Climate and Meteorology

**Greater Accra Region:** The region falls within the dry, coastal, equatorial climatic zone with temperatures ranging between 20° and 30° Celsius, and annual rainfall ranging between 635 millimetres along the coast to 1,140 millimetres in the northern parts. There are two rainfall peaks, notably in June and October. The first rainfall season between April and July is associated with the major cropping season in the region.

**Western Region:** The region is the wettest part of Ghana. The rainfall map of the region shows clearly that rainfall decreases northwards and eastwards from the extreme south-west which is the wettest part of the region and the country. Rainfall distribution in the region is characterized by two seasons; with the major one reaching its maximum in May/June and the minor one in October. There is practically no month without rain. The region falls under two main climatic types: the south-western equatorial and the wet semi-equatorial. The south-western equatorial climatic type roughly coincides with the evergreen forest and the wet semi-equatorial climatic type with the semi-deciduous forest. The south-western equatorial climate is the wettest in the country with rainfall patterns as described above. The highest temperatures which occur in March/April are around 30°C while the lowest temperatures of 26°C occur in August. Relative humidity is between 70-80% all year round. The wet semi-equatorial climate has average yearly rainfall between 1250 and 2000 millimetres with sharp dry seasons.

**Ashanti Region:** The region has an average annual rainfall of 1,270 mm and two rainy seasons; the major season is from April to mid-August and the minor season is from September to November. The period December to March and mid-August to mid-September is relatively dry. The average daily temperature is about 27 degrees Celsius.

**Bono Region:** In Bono, the dry seasons are long, hot, and muggy; the wet seasons are very cold and wet; and it is partly cloudy year-round. Over the course of the year, the temperature typically varies from -0.56°C to 32.2°C and is rarely below -8.3°C or above 36.1°C. The warm-weather activities are from mid May to mid June and from mid August to early October. The hot season lasts for 3.9 months, from May 23 to September 20, with an average daily high temperature above 27.2°C. The hottest month of the year in Bono is July, with an average high

of 32.2°C and low of 22.2°C. The wet season lasts for 3.0 months, from November 28 to February 26, with an average daily high temperature below 12.8°C. The coldest month of the year in Bono is January, with an average low of -0.56°C and high of 7.8°C. The chance of wet days in Bono varies throughout the year.

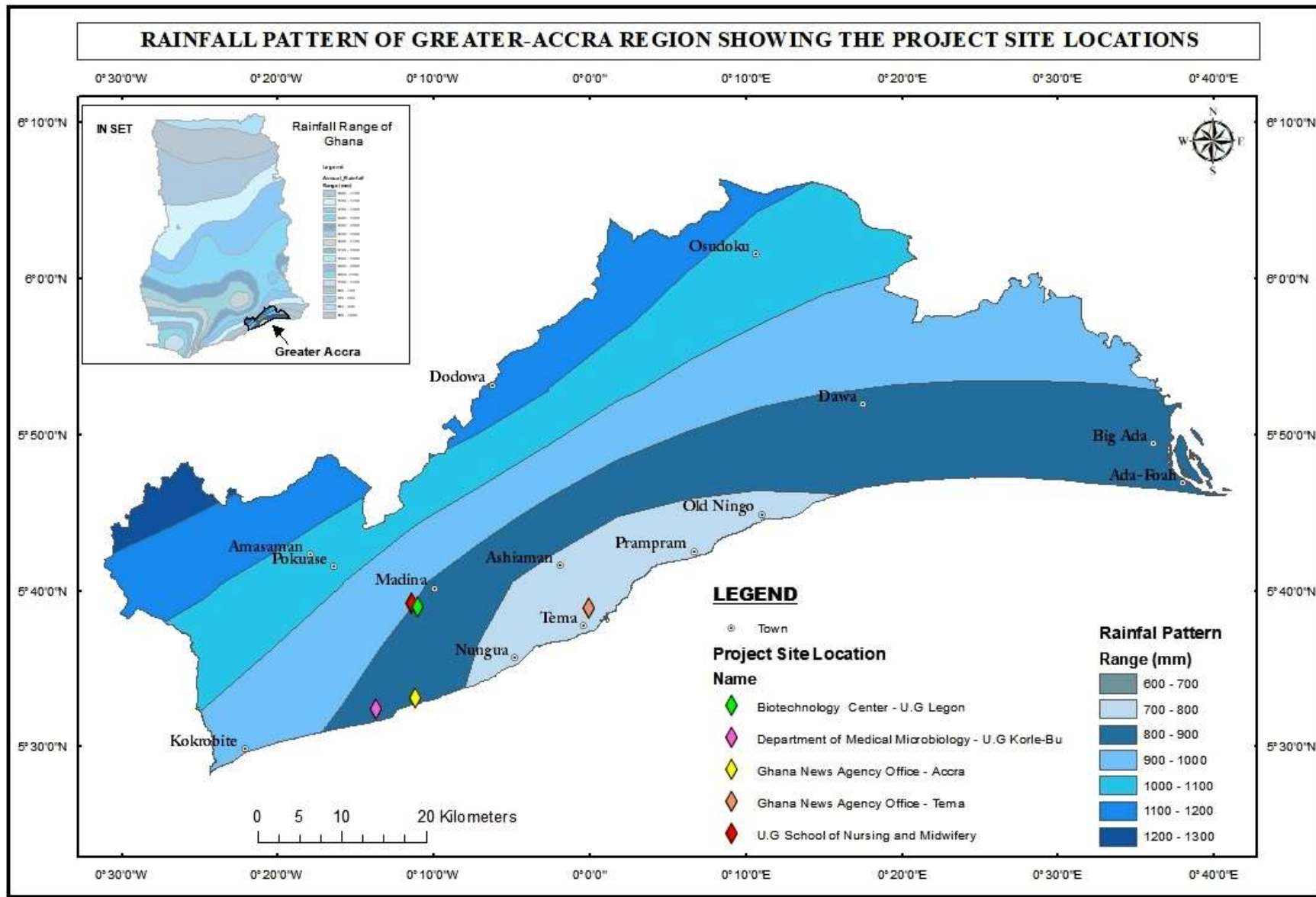
The wetter season lasts 4.8 months, from March 15 to August 10, with a greater than 30% chance of a given day being a wet day. The month with the most wet days in Bono is May, with an average of 11.6 days with at least 0.04 inches of precipitation.

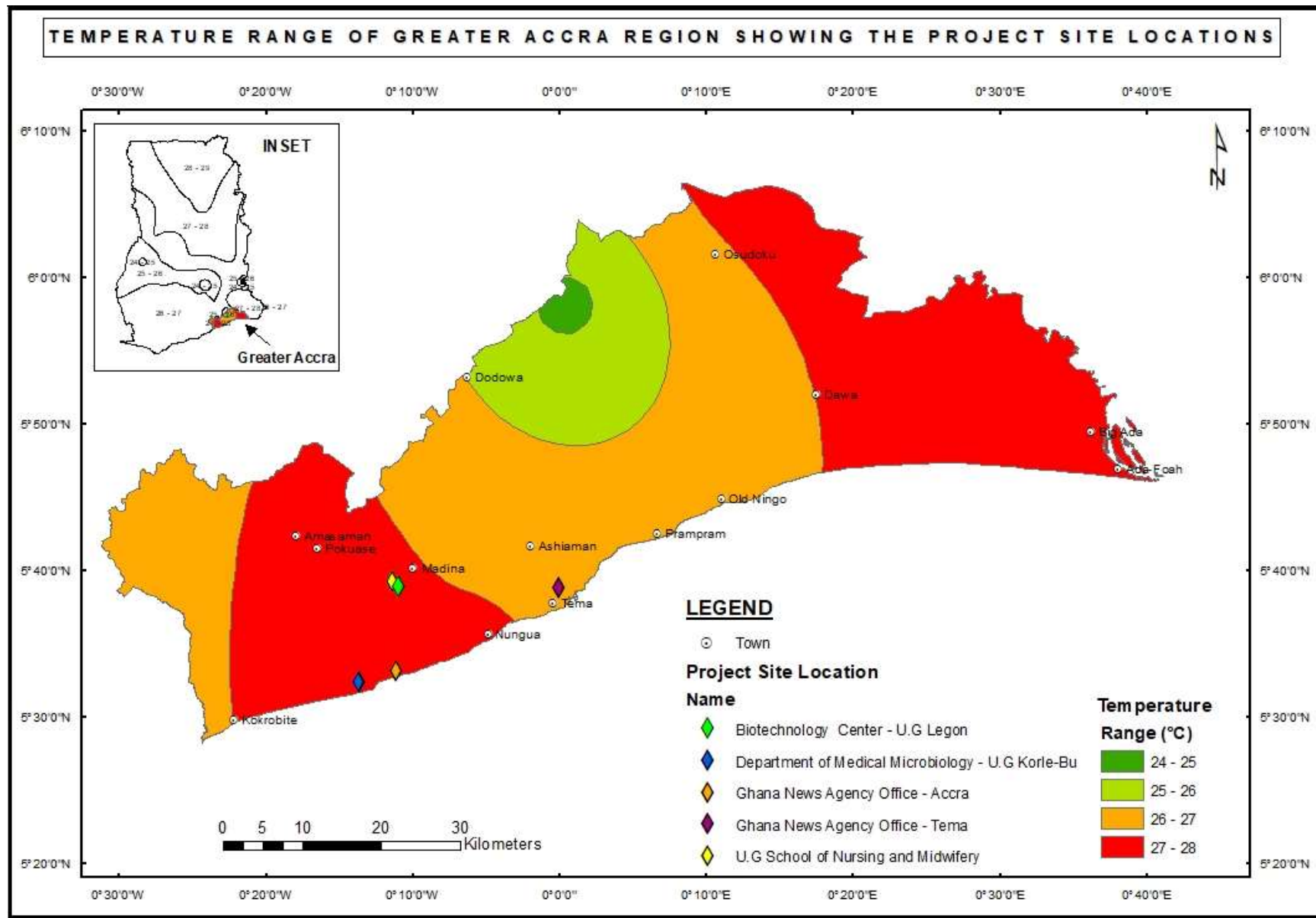
The drier season lasts 7.2 months, from August 10 to March 15. The month with the fewest wet days in Bono is January, with an average of 7.0 days with at least 0.04 inches of precipitation. The month with the most days of rain alone in Bono is May, with an average of 11.6 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 39% on May 15.

**Eastern Region:** The region lies within the wet semi-equatorial zone which is characterized by double maxima rainfall in June and October. The first rainy season is from May to June with the heaviest rainfall occurring in June while the second season is from September to October, with little variations between the distribution. Temperatures in the region are high and range between 26°C in August and 30°C in March. The relative humidity which is high throughout the year varies between 70 percent and 80 percent.

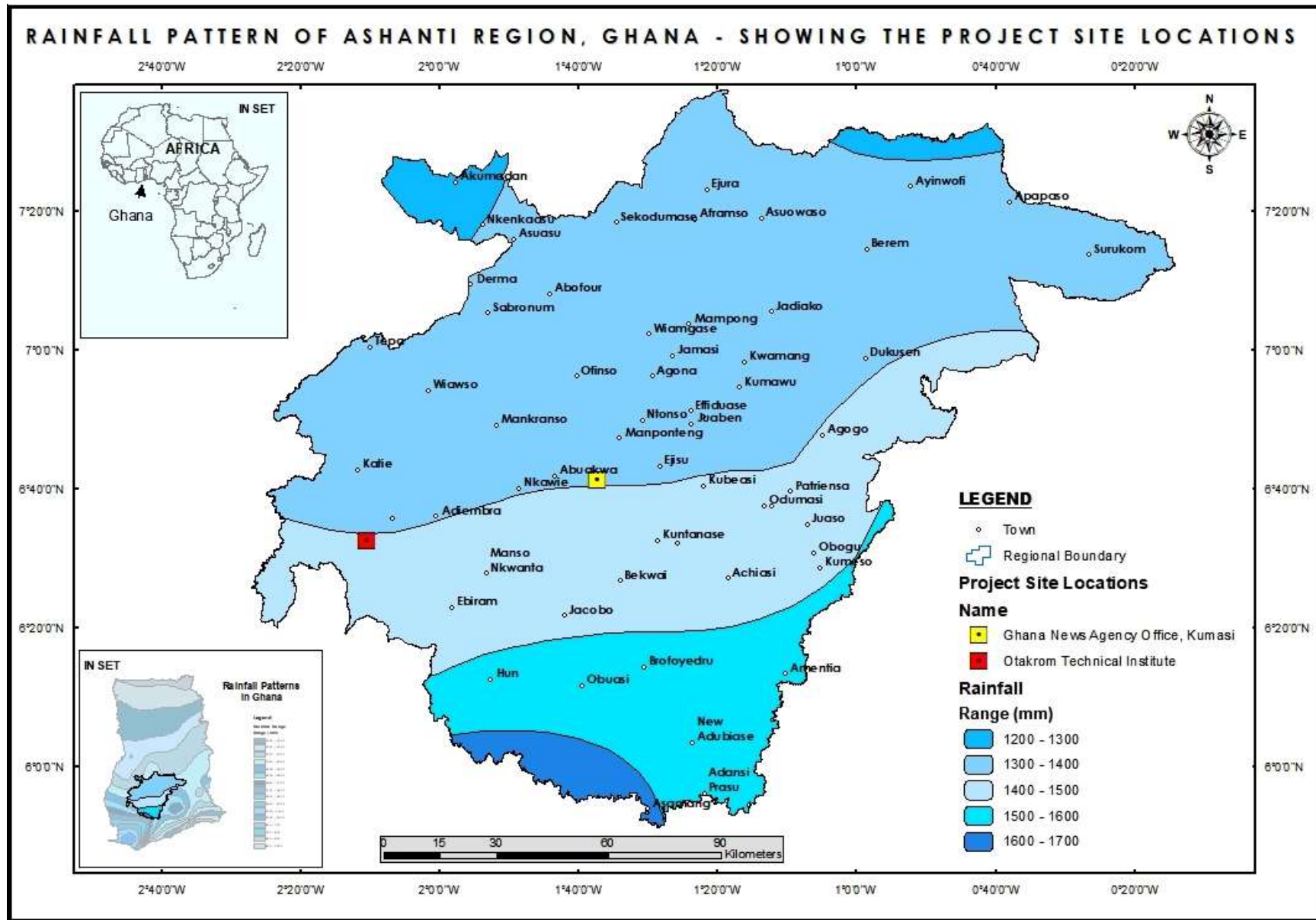
**Upper West Region:** The climate of the Upper West Region follows a general pattern identified [within the five northern regions](#). It has a single rainy season from April to September, with average annual rainfall of about 115 cm. This is followed by harmattan, a prolonged dry season characterized by cold and hazy weather from early November to March, and an intense hot weather that ends only with the onset of early rainfall in April. The mean monthly temperature ranges between 21 degrees centigrade and 32 degrees centigrade . Temperatures rise to their maximum (40 degrees centigrade) in March, just before the onset of the rainy season, and fall to their minimum (20 degrees centigrade) in December during harmattan which is brought about by the north-east trade winds.

**Northern Region:** The climate of the region is relatively dry, with a single rainy season that begins in May and ends in October. The amount of rainfall recorded annually varies between 750 millimetres and 1,050 millimetres. The dry season starts in November and ends in March/April with maximum temperatures occurring towards the end of the dry season (March-April) and minimum temperatures in December and January. The harmattan winds, which occur from December to early February, have a considerable effect on temperatures in the region, making them vary between 14 degree centigrade at night and 40 degree centigrade during the day. Humidity is very low, aggravating the effect of the daytime heat.

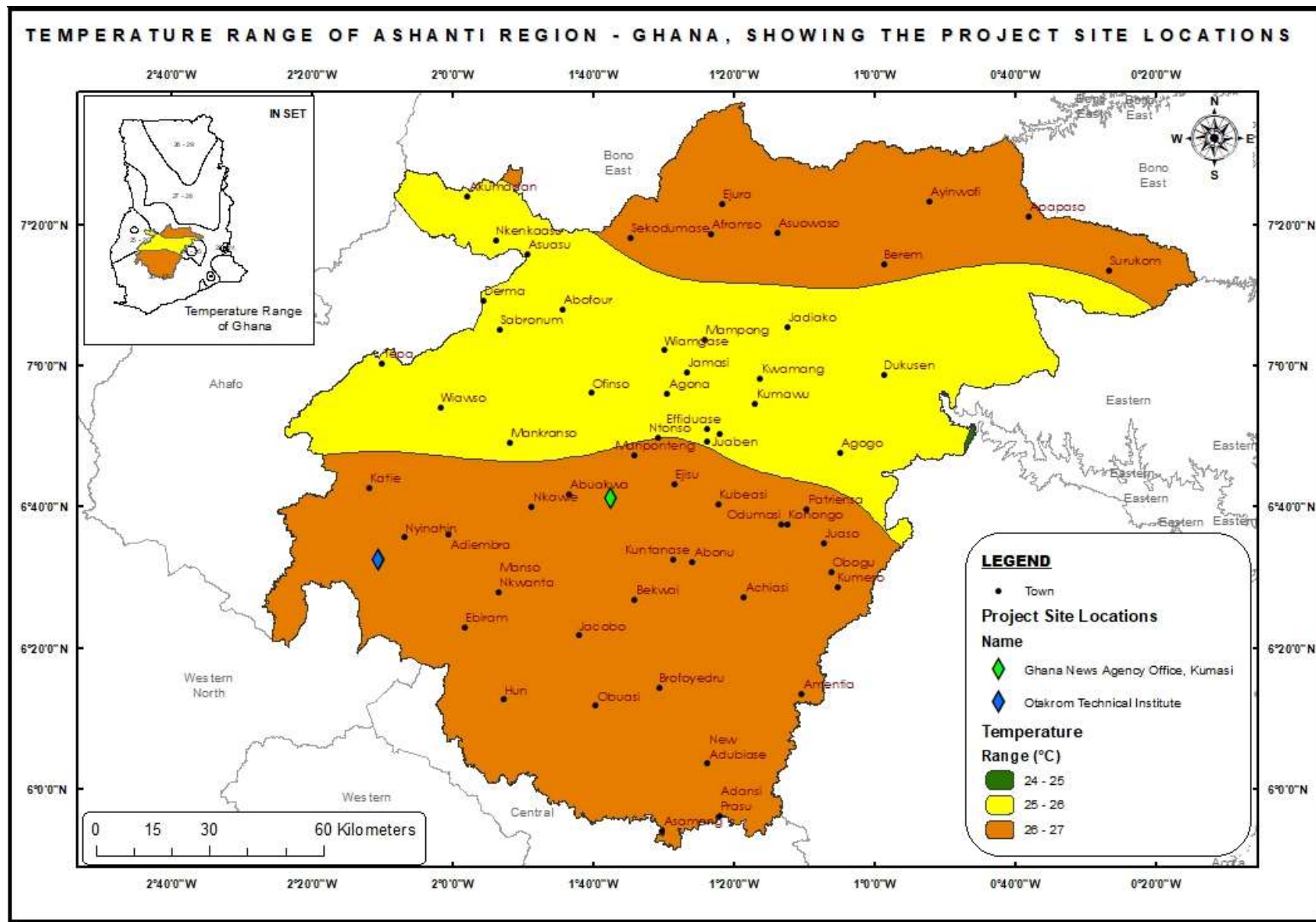




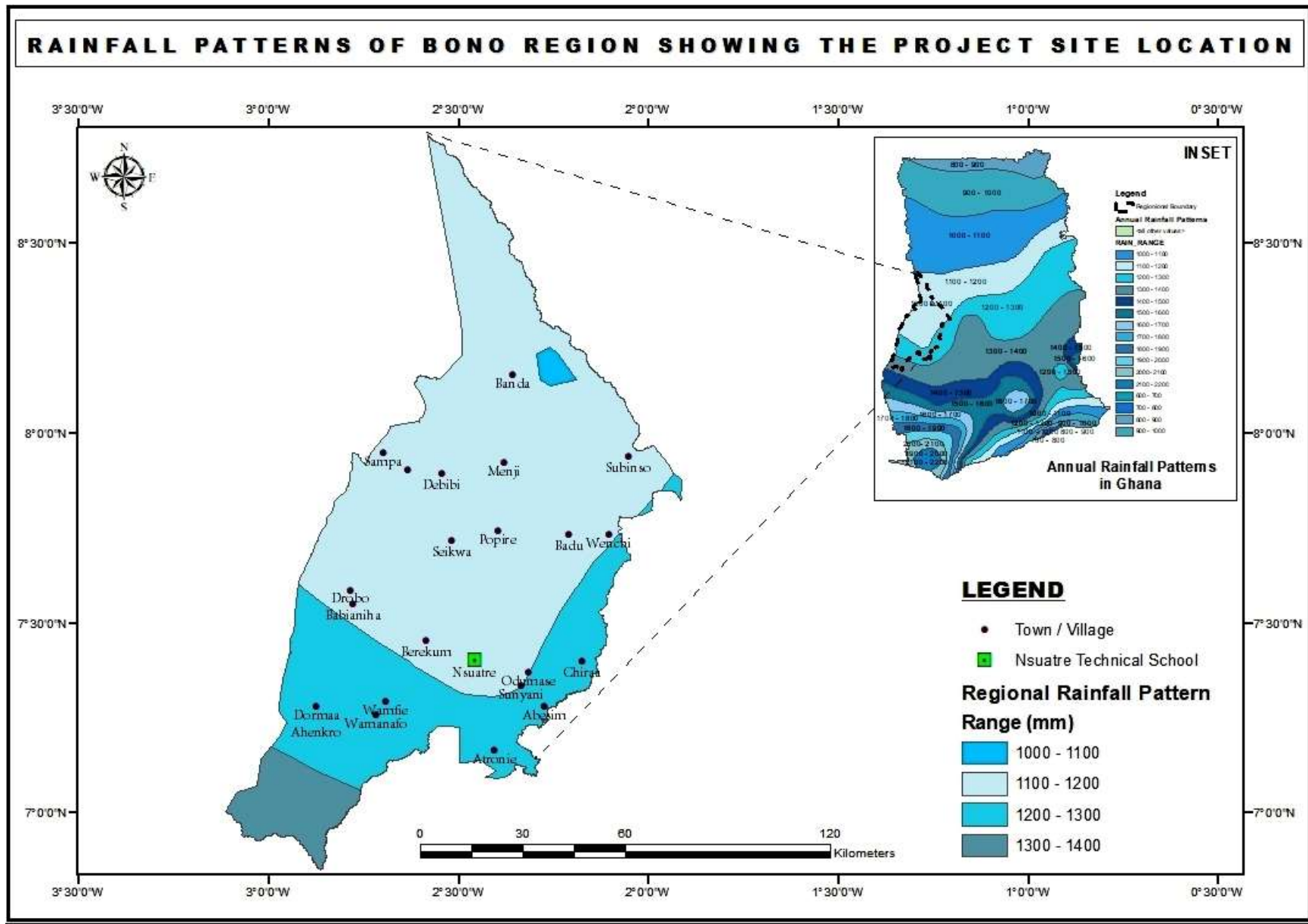
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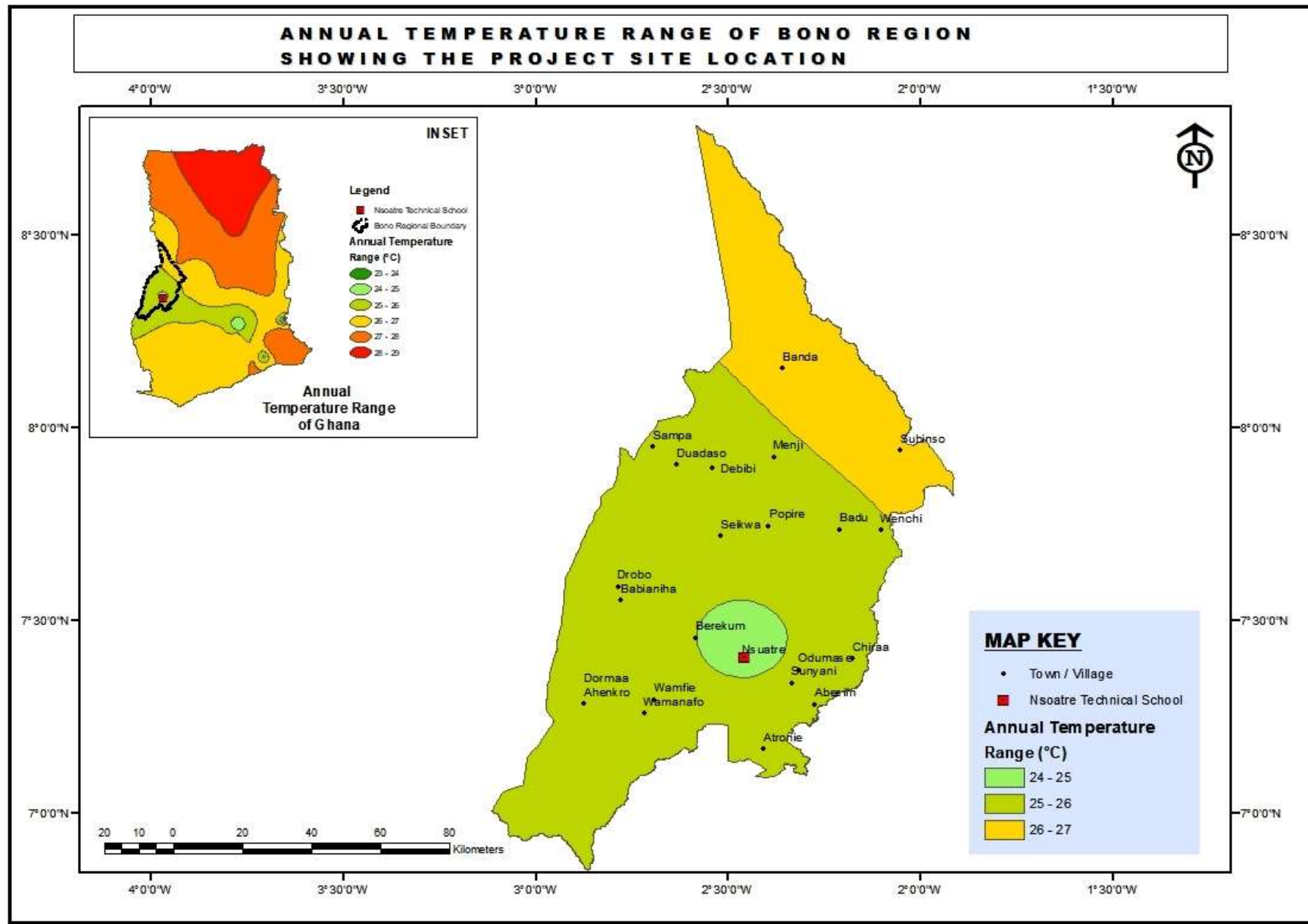


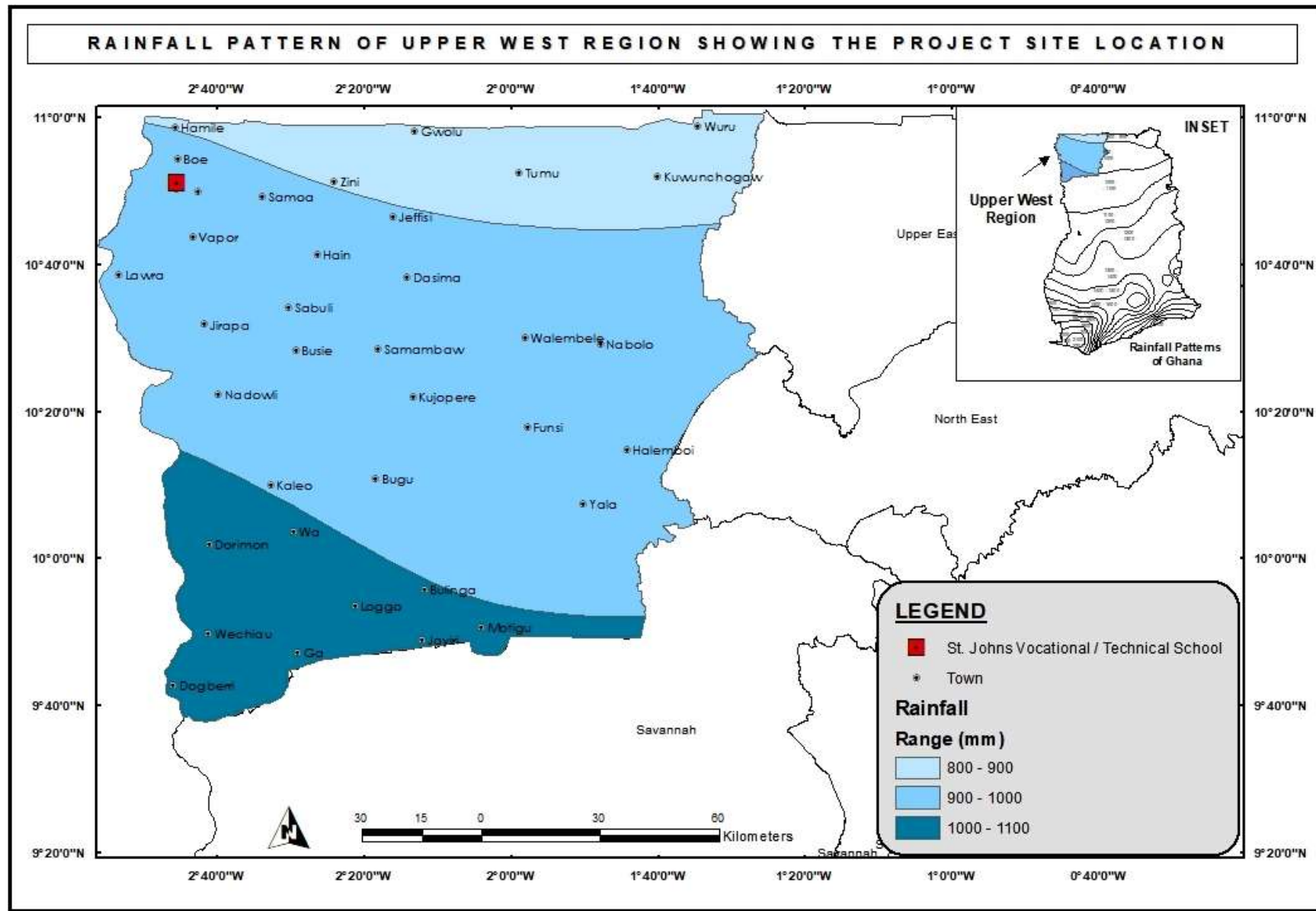


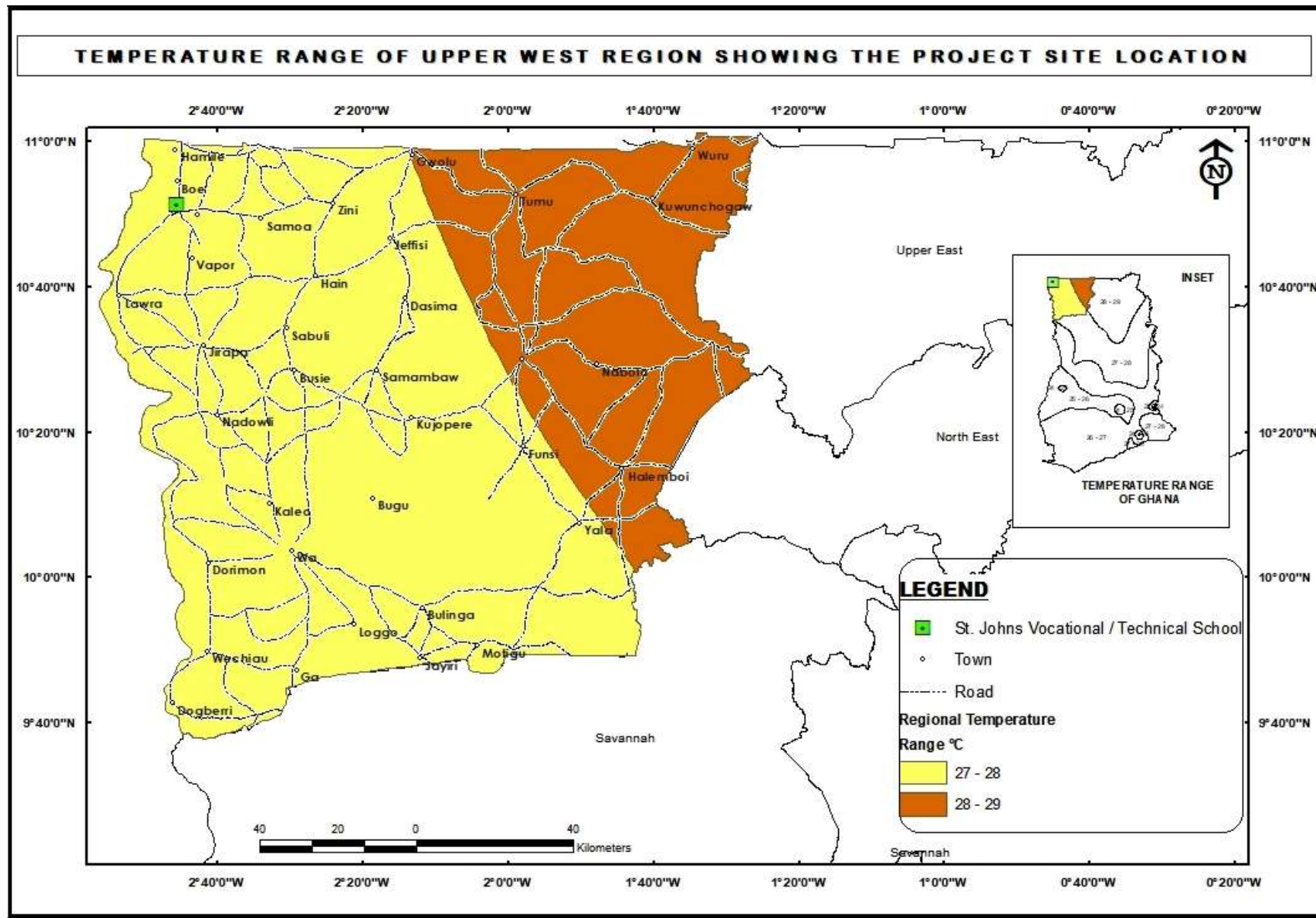




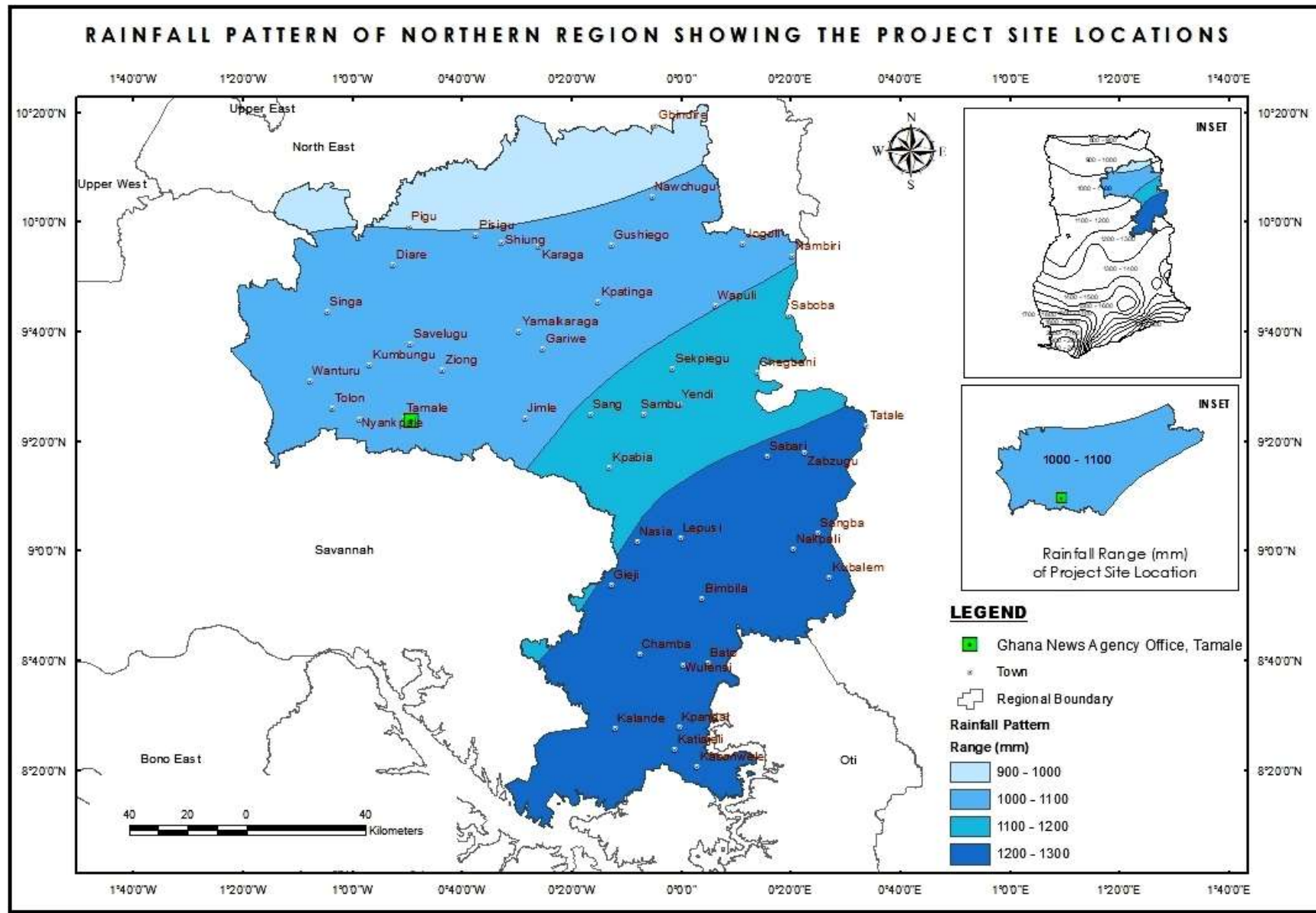
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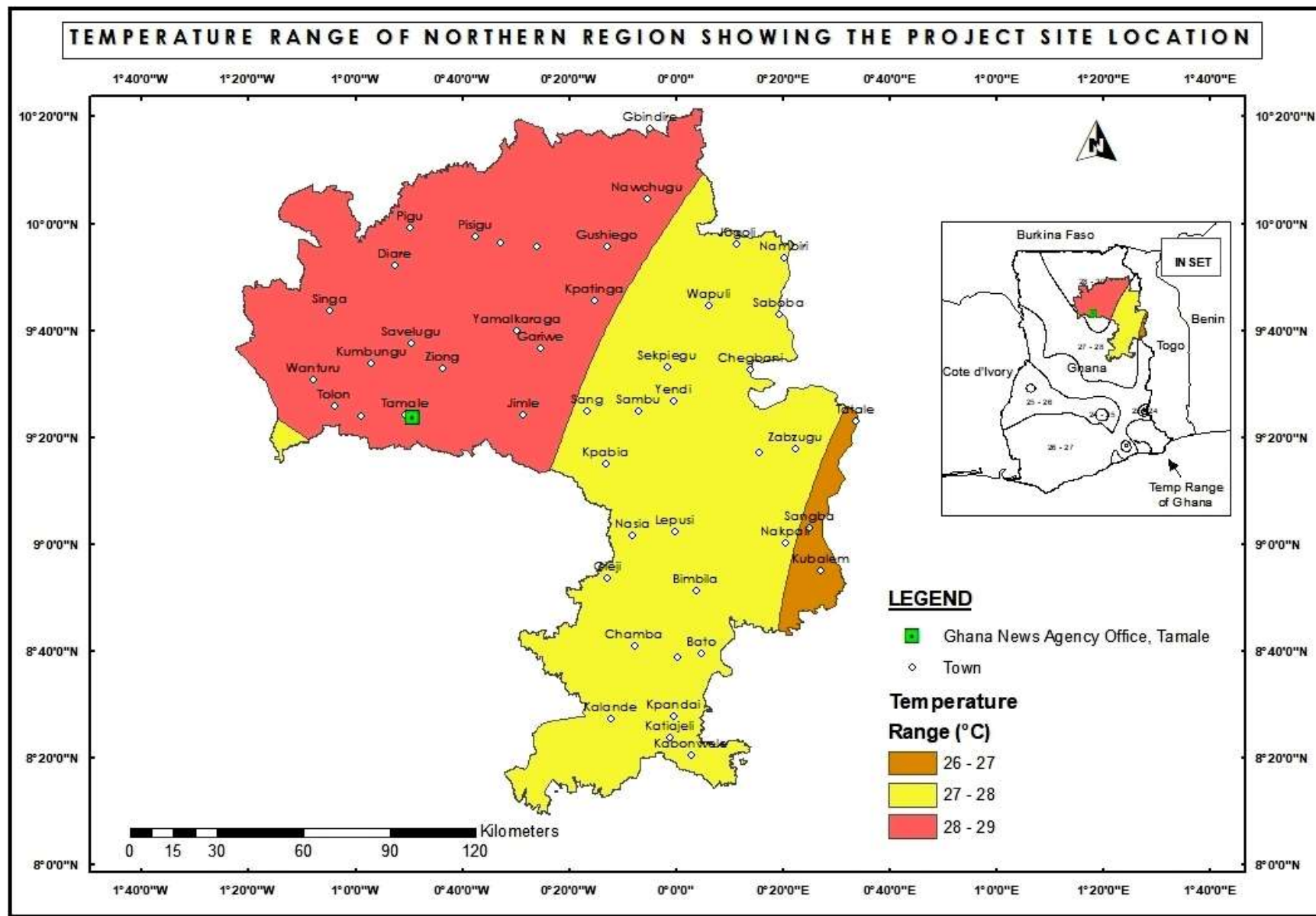












### 6.1.2 Seismicity, Seismic Activities and Geo-hazards

**Greater Accra Region:** The project corridor of influence may be located within an active fault zone and has experienced some earthquakes in the past years. Therefore, with reference to seismic activities and geo-hazards, the project road catchment area is located within a region with non-zero factor of intensity. That is, the project corridors and the surrounding catchment enclave do lie near the very heart of seismic zone activities, according to Geo-hazards Records. The project area is considered as a region with high potential for earthquakes occurrences. Given the level of occurrence of historic seismic activities in the project corridors, the risk is still considered as high. However, a technical note can recommend that a risk/cost analysis is undertaken if it is deemed to be a concern for the proposed project sites. When a seismic activity causes an earthquake large enough to hit the project enclave, a significant warning period should be provided. It is hereby recommended within the Emergency Response Plan specific measures are outlined to manage the unlikely event of an earthquake affecting the project area. Within this, a framework should be to ensure that the following measures are instituted: (i) a warning system is developed on the proposed project corridors and all project personnel, visitors, pedestrians and project community residents are aware of its presence and purpose (ii) in the event of an alarm, evacuation measures should be instituted as far as possible (iii) all project personnel, visitors, pedestrians and closer community residents are evacuated from the project area and all buildings of the camp sites (See Fig 1.0).

**Western, Ashanti, Bono, Eastern, Upper West and Northern Regions:** Moving away from the Greater Region and the coastal belt towards the interior of the country, seismic activities and geo-hazards level of intensity diminishes in potential for earthquakes occurrences. According to Geo-hazards Records, the project areas outside of the Greater Region do not lie on any active fault lines leading to experiences in earthquake occurrences. Therefore, the project areas in the Western, Ashanti, Bono, Upper West, and Northern Regions almost zero factor of intensity for seismicity, seismic activities and geo-hazards in the face of earthquake occurrences (See Fig 1.0).

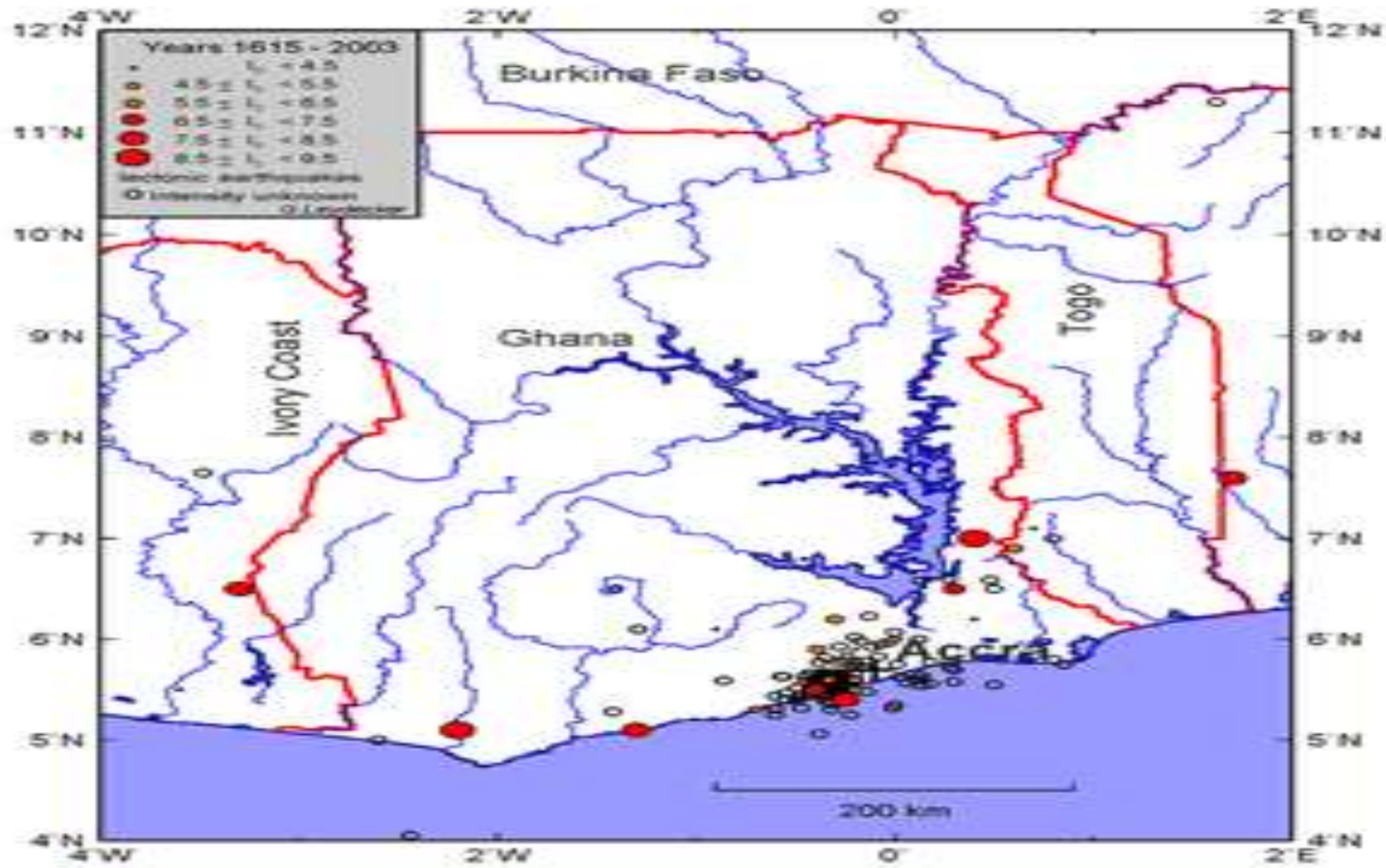


Figure 1.0 Earthquake Catalogue of Ghana (1615 – 2003)

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### 6.1.3 Geomorphology and Geology

**Greater Accra Region:** Accra coastal zone has 3-type of rock in three identified geomorphic regions. They include unconsolidated and poorly consolidated rock along the western region, the Accraian series occupying the central region and the Dahomeyan series in the eastern region.

**Western Region:** Much of the region is covered by Pre-Cambrian rocks which he calls the “Birimian” and “Tarkwaian” series. According to him, the two rock types are important because most of the gold, manganese and diamonds mined in the country are obtained from the Birimian rocks, while the Tarkwaian provides large quantities of gold. Also, rich deposits of bauxite occur in areas covered by the two types of rock.

**Ashanti Region:** The geology is summarized as follows: About 98% of the region is dominated by Birimian and the Voltaian systems. The Birimian system covers about 54% and consists of Precambrian igneous and metamorphic rocks.

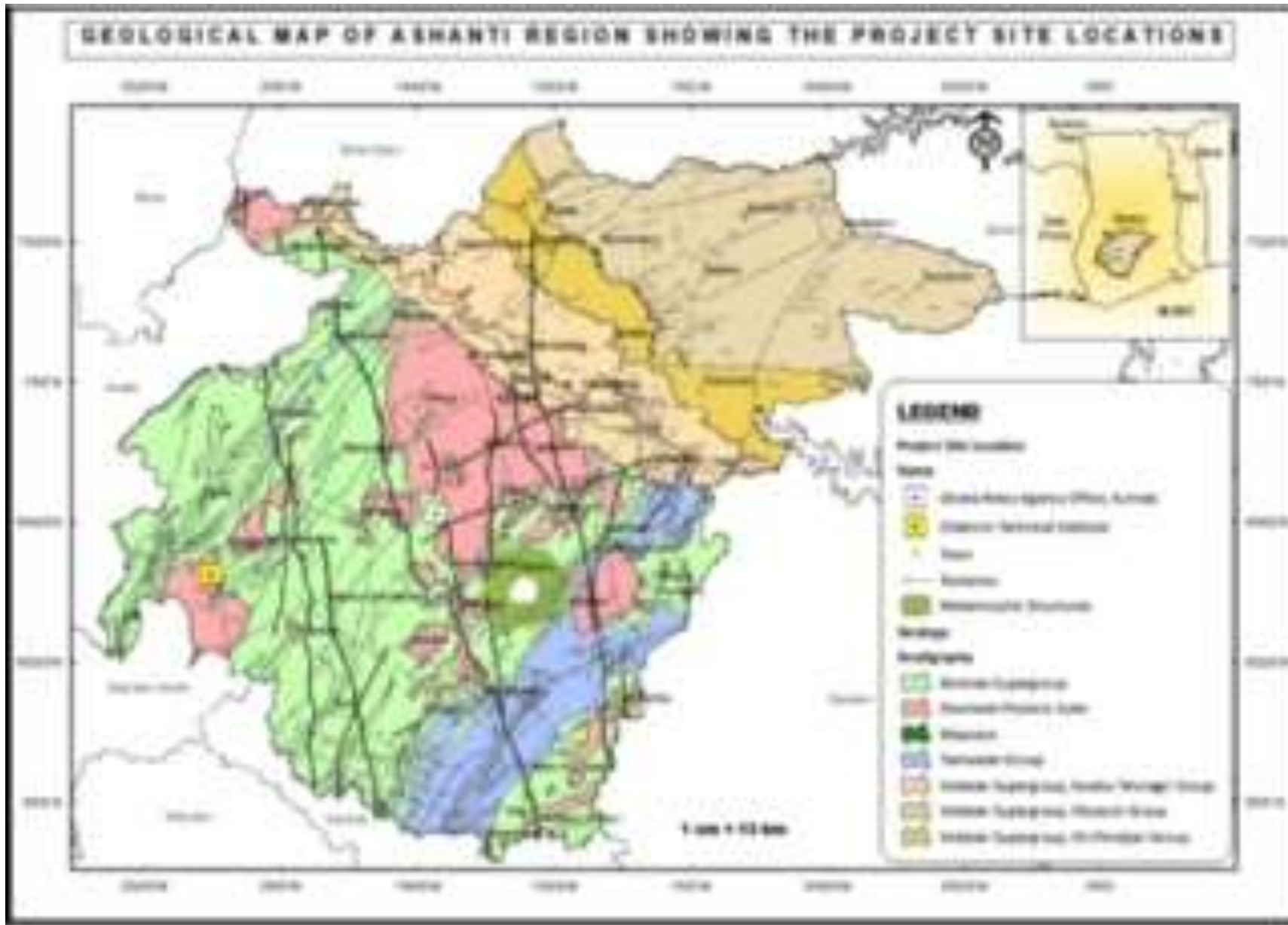
**Bono Region:** The geological structure to the eastern part is covered by Voltaian formation of palaeoxic origin that is quartzite, shale, arkose and mudstones, Western section exhibit lower Birimian (Middle Pre-Cambrian) origin with some intrusive of upper Birimian and lower Pre-Cambrian.

**Eastern Region:** The geology comprises the late Proterozoic – Paleozoic Voltaian Group (which forms a thick sedimentary cover in the eastern part of the West African Craton), the Togo Formation (which is part of the Pre-Cambrian Mobile Belt), the intrusive basin-type Ekumean granitoid (cape Coast granite complex) and the Proterozoic Birimian Supergroup belonging to the West African Craton.

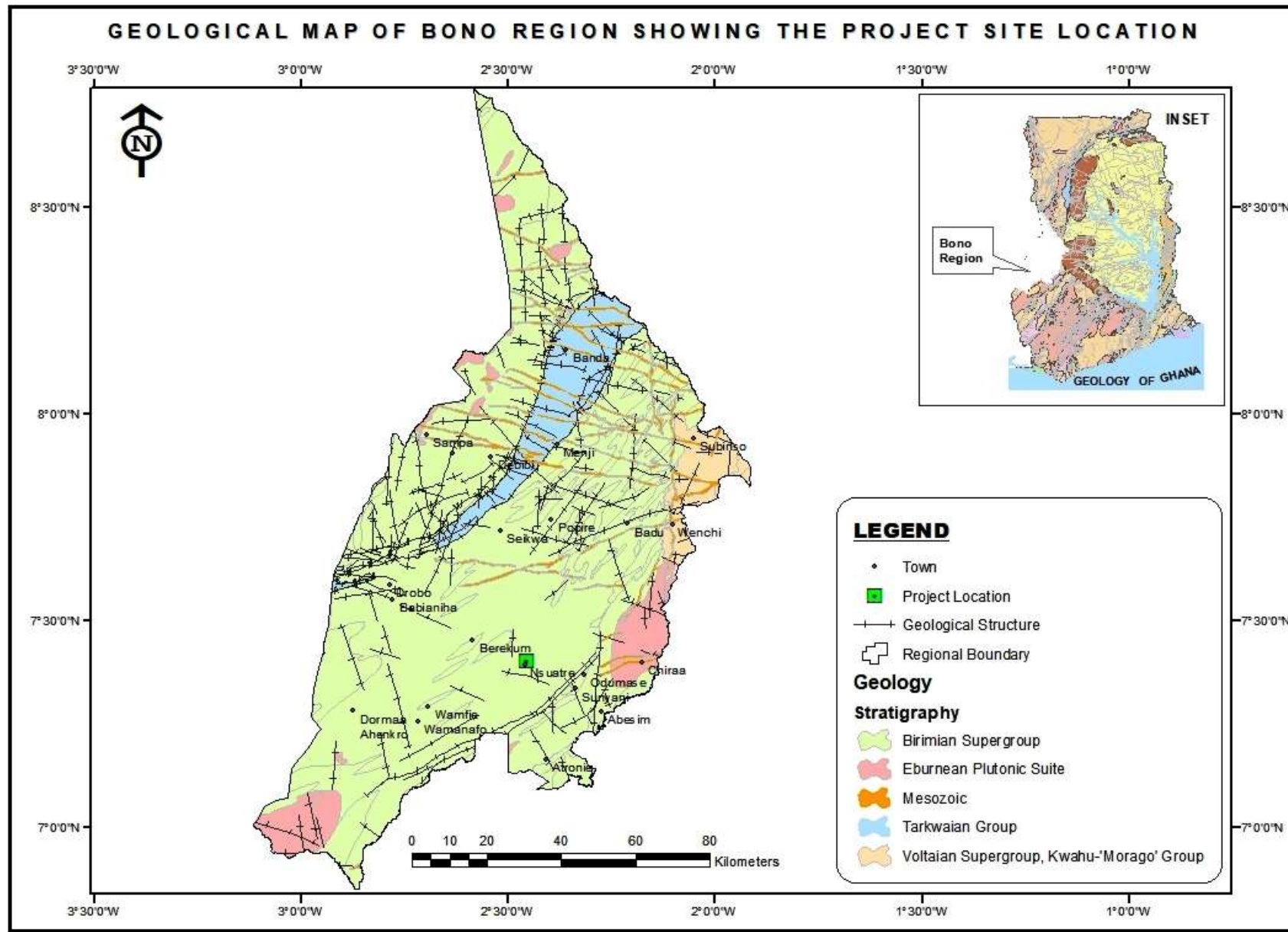
**Upper West Region:** The geology is part of the high plains that cover most of the North-Western part of Ghana. These are characterised by a series of wide plateaus made up of Birimian and post-Birimian granites and their weathered materials. The surfaces have been levelled by denudation.

**Northern Region:** The geology is “Voltaian Sandstone Basin”. It extends over an area of 112,765 sq kms, representing close to 70% of Ghana’s surface area. The rock system comprises Palaeozoic sedimentary series formed around 300-500 million years ago. Rock component includes gentle dipping or flat-bedded sandstones, mudstones, shales, limestones, silt stones, etc.



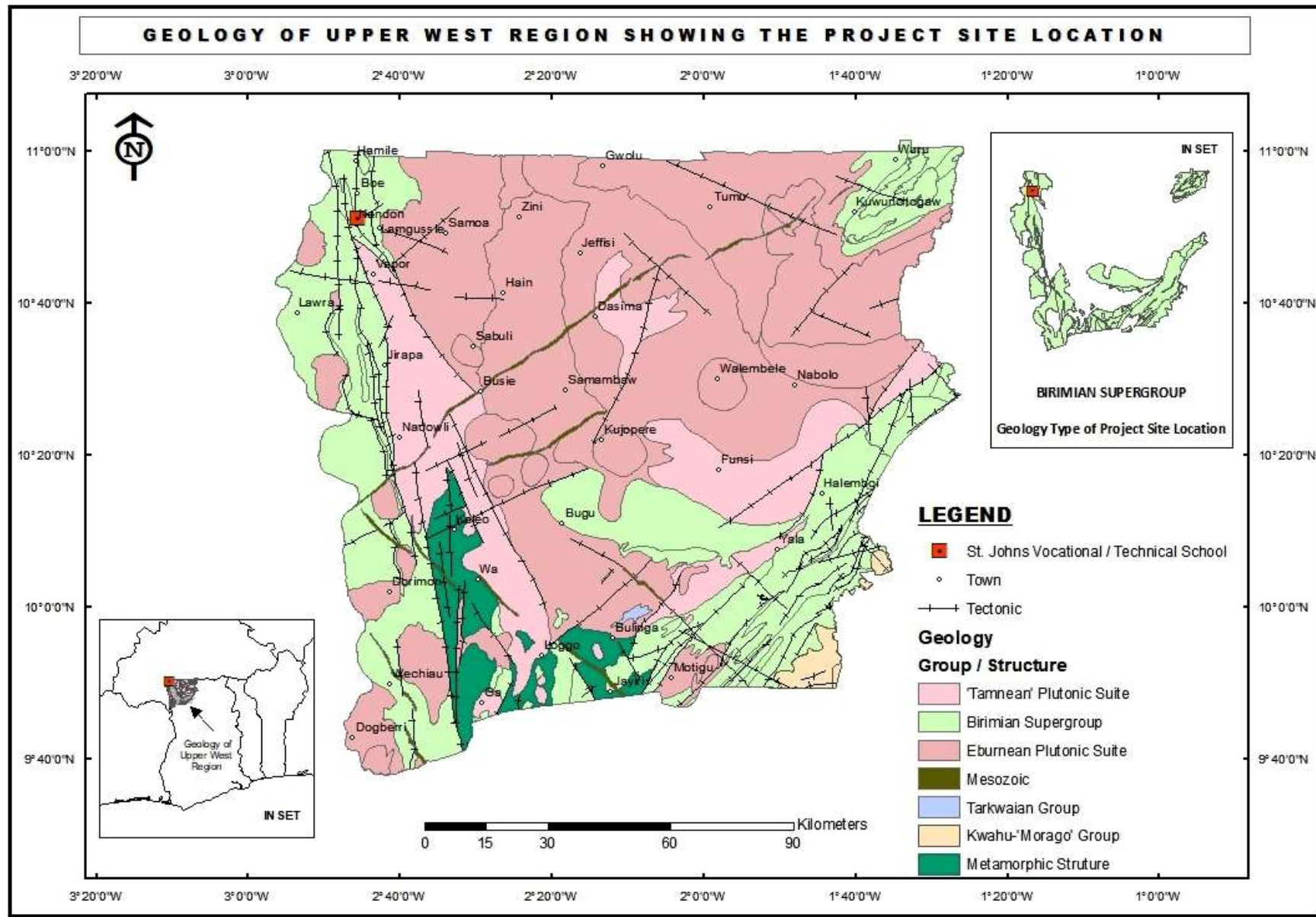


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#### 6.1.4 Hydrogeology, Hydrology and Drainage Systems

**Greater Accra Region:** The main rivers that flows through the region are the Volta and Densu, In addition, there are small seasonal streams flowing mostly from the Akwapim Ridge into the sea through numerous lagoons. Because the region is bordered on the south by the Gulf of Guinea, there are ecologically very important but highly polluted lagoons and wetlands in AMA, Tema and Dangme East. The Volta estuary is located at Ada.

**Western Region:** Four main rivers flow through the region: Pra, Ankobra, Tano and Bia. Apart from the Ankobra, the other rivers have their source in forests in neighbouring regions and flow southwards into the sea. The Tano and Bia enter the sea outside Ghana through the La Cote d'Ivoire. River Pra has potential for hydro-power generation. These rivers do not lend themselves to use by large boats because of interruptions in many places by rapids and waterfalls. The Sutri falls on the lower Tano near Abuoso and the rapid on the Pra just south of Twifo Praso are sited to buttress the point.

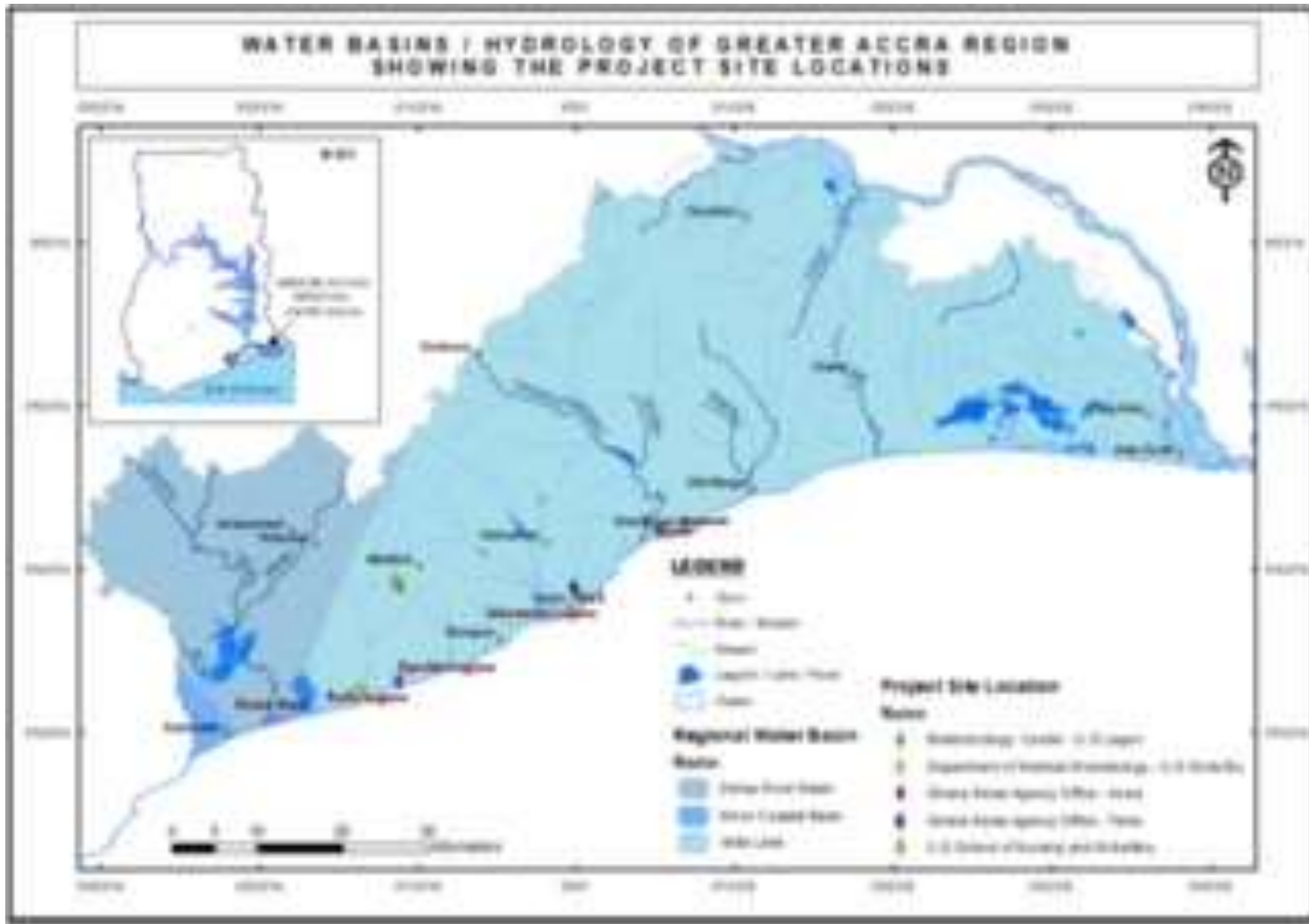
**Ashanti Region:** The region is drained by Lake Bosumtwi (the largest natural lake in the country) and many rivers such as Offin, Pra, Afram and Owabi which serve as sources of drinking water for residents of many localities in the region.

**Bono Region:** Two main drainage systems could be distinguished in the Region. The Black Volta dominates the northern parts of the Region while to the south, the Tain, Bia, Pru and Tano Rivers form the main drainage basins.

**Eastern Region:** The region is well drained with the Volta Lake covering large stretches of the land. By it, transportation is made possible between the southern and northern parts of the country. The suspension bridge on the lake, the Adomi Bridge, is also a major connection between south eastern parts of the country and the Greater Accra region.

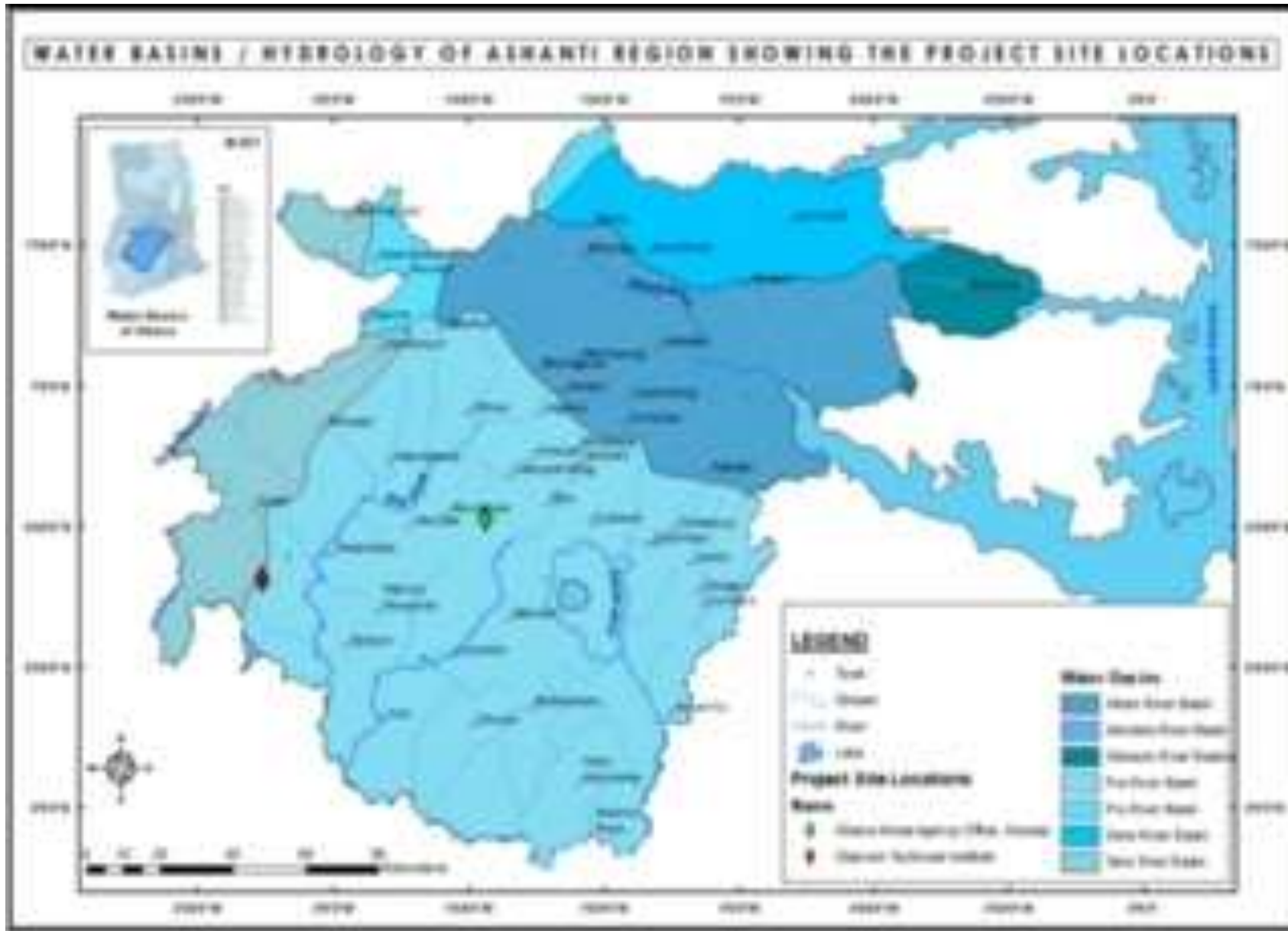
**Upper West Region:** The area is drained by the White Volta and its tributaries like the Sissili and the Kulpawn rivers. Flooding by the White Volta is an annual problem caused mainly by the numerous small rivers, which flow into it. The present combination of heavy run-off, high evaporation and transpiration and low infiltration rates to recharge aquifers in some areas of the municipality, contribute to water deficiencies, especially to the west of the White Volta.

**Northern Region:** The region is drained by the Black and White Volta Rivers and their tributaries such as the Nasia and Daka rivers.

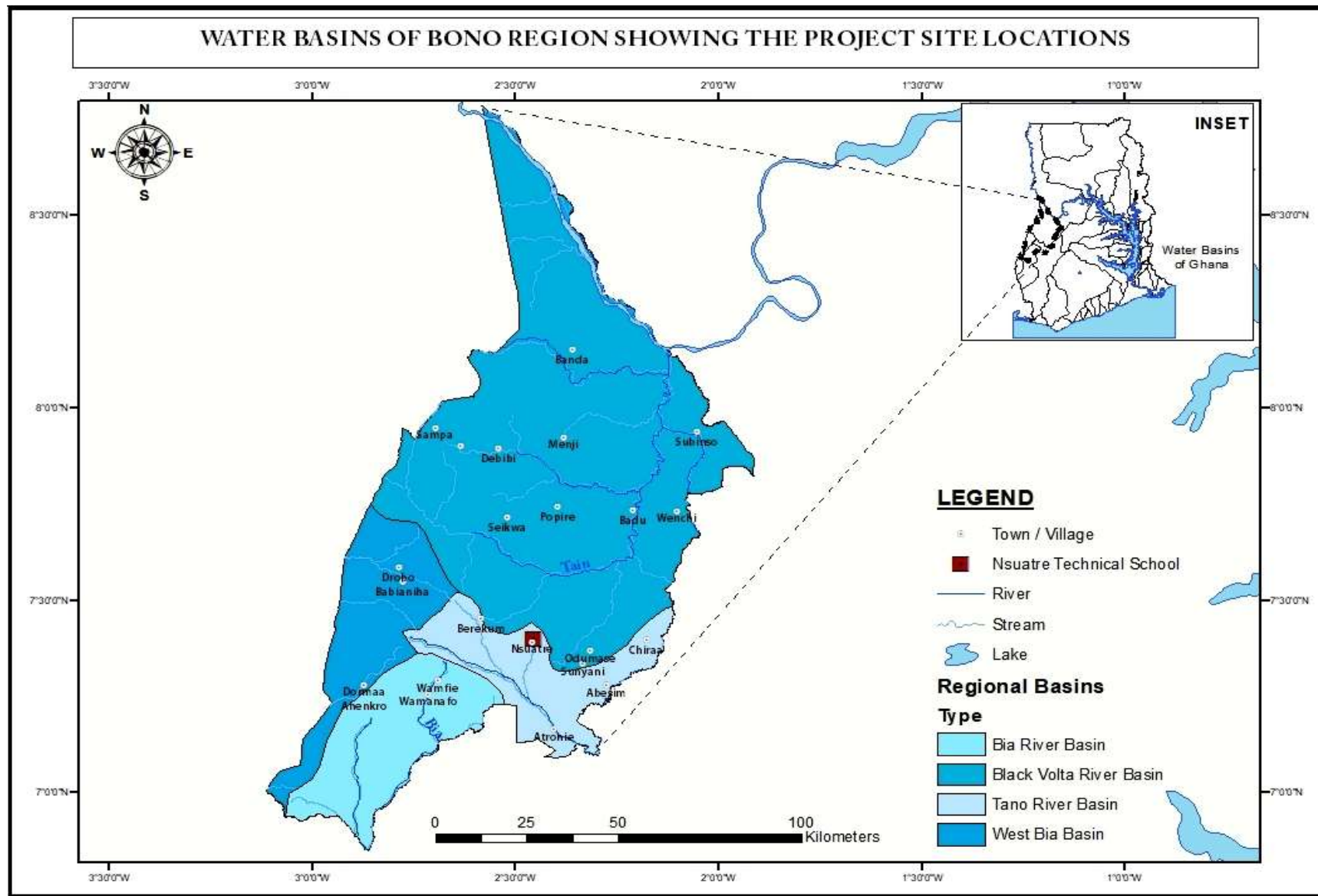


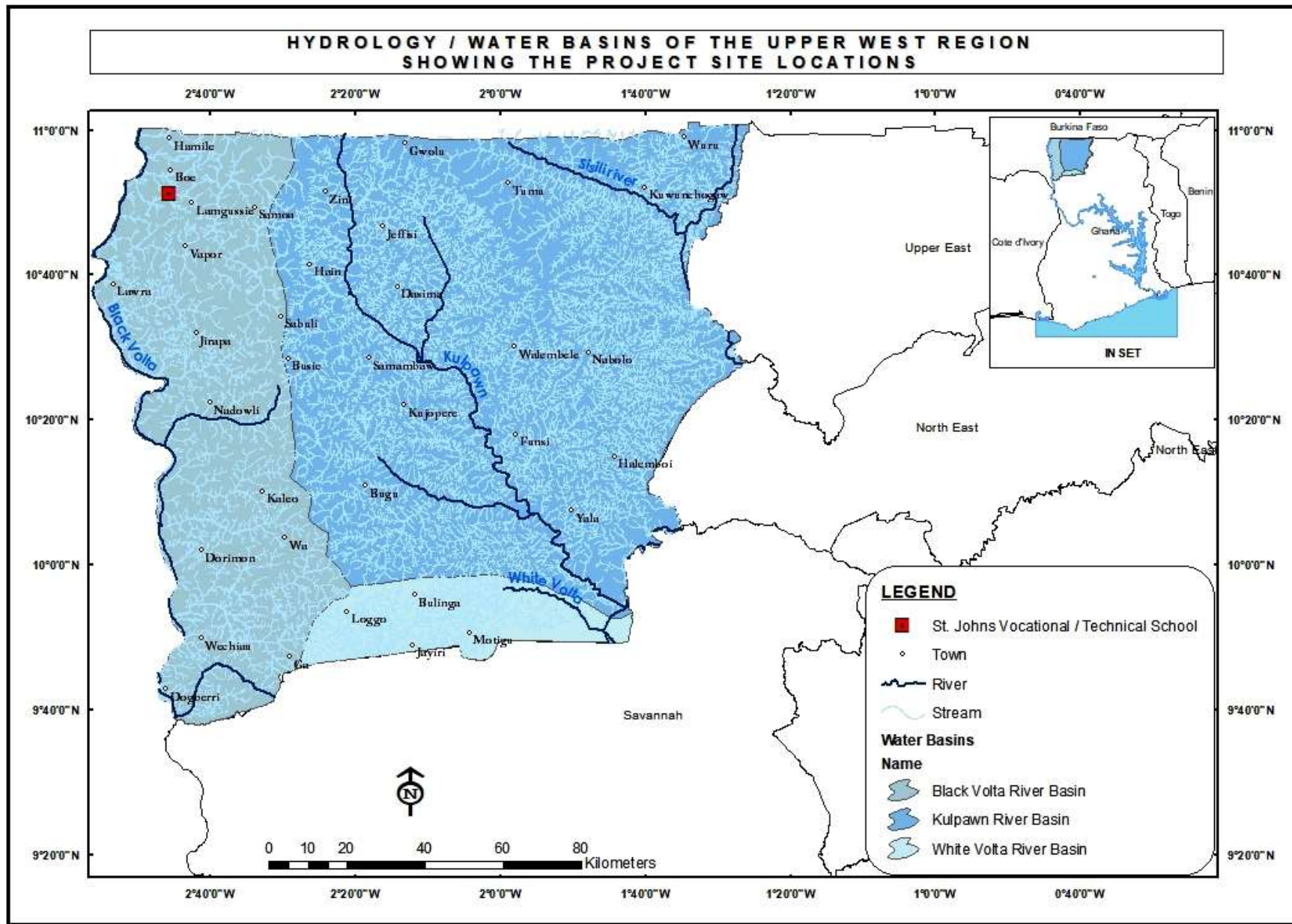
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### 6.1.5 Soils

**Greater Accra Region:** Soils are sandy and clayey loams. Alluvia soils are found at the valley bottoms and the estuary. The soils have low organic contents with shallow top soils which limit the capacity for crop production.

**Western Region:** Generally, the soil types are characterised by their geological formation. The soil types are the following: (i) soils formed over granite rocks which are generally undulating to rolling landscape; these are not suitable for agriculture, because the soils are shallow with rocky outcrops (ii) soils developed over Lower Birimian rocks which are soils of the high rainforest areas; these are deeply weathered, severely leached and strongly acidic (iii) soils identified as forest ochrosols-oxysols and totally oxysols are the two main agricultural soil groups.

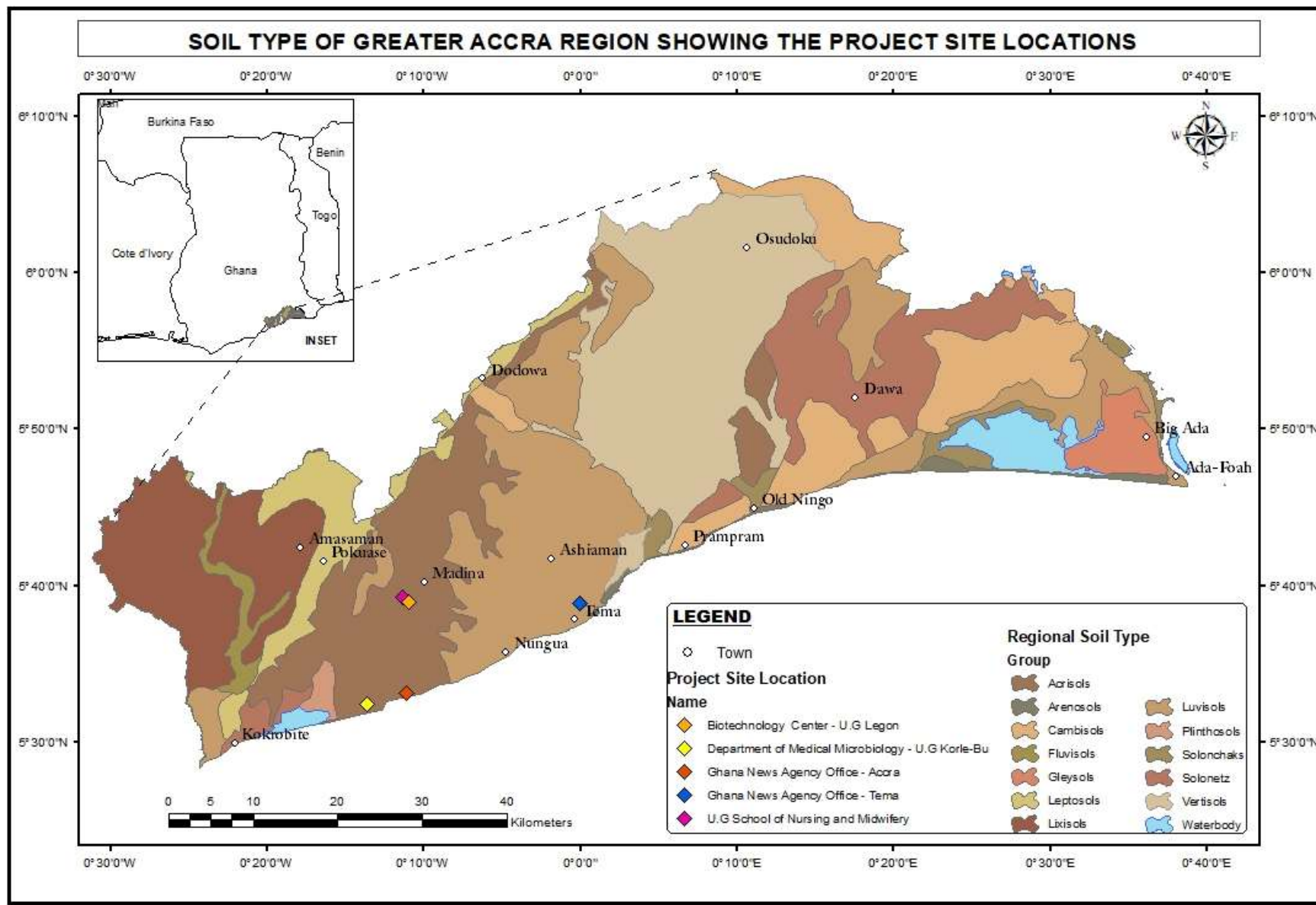
**Ashanti Region:** The soils are mainly of two types. Forest ochrosols are found in the southern districts whilst the savanna ochrosols are confined to the northern districts.

**Bono Region:** Three main soil groups are found within the region. These are (i) Forest Ochrosols, covering the south-western part (ii) Savanna Ochrosols, this stretches as wide belt from the west and gradually narrows toward the east (iii) Ground water Laterite Ochrosols Inter. This intergrades in the northern parts of the Region. Besides these, there are some small patches of Oxysols and Rubrisols. Ochrosols intergrades to the south of Sunyani.

**Eastern Region:** The main soil type in all the areas of the region except Kwahu North (Afram Plains) is forest ochrosol and lithosol. Savanna ochrosol occurs mainly in Kwahu North and parts of Yilo-Krobo, Manya and Asuogyaman areas, with patches of forest rubisol in the New Juaben and east Akim areas.

**Upper West Region:** Many types of soil are found in the region. They include the Savannah ochrosols, tropical brown yeast, terrace soils found along the banks of rivers and streams, and groundwater laterites. These soil types favour the cultivation of a variety of grains, pulses and tubers and cotton. One crop commonly cultivated on the terrace soil type is tobacco.

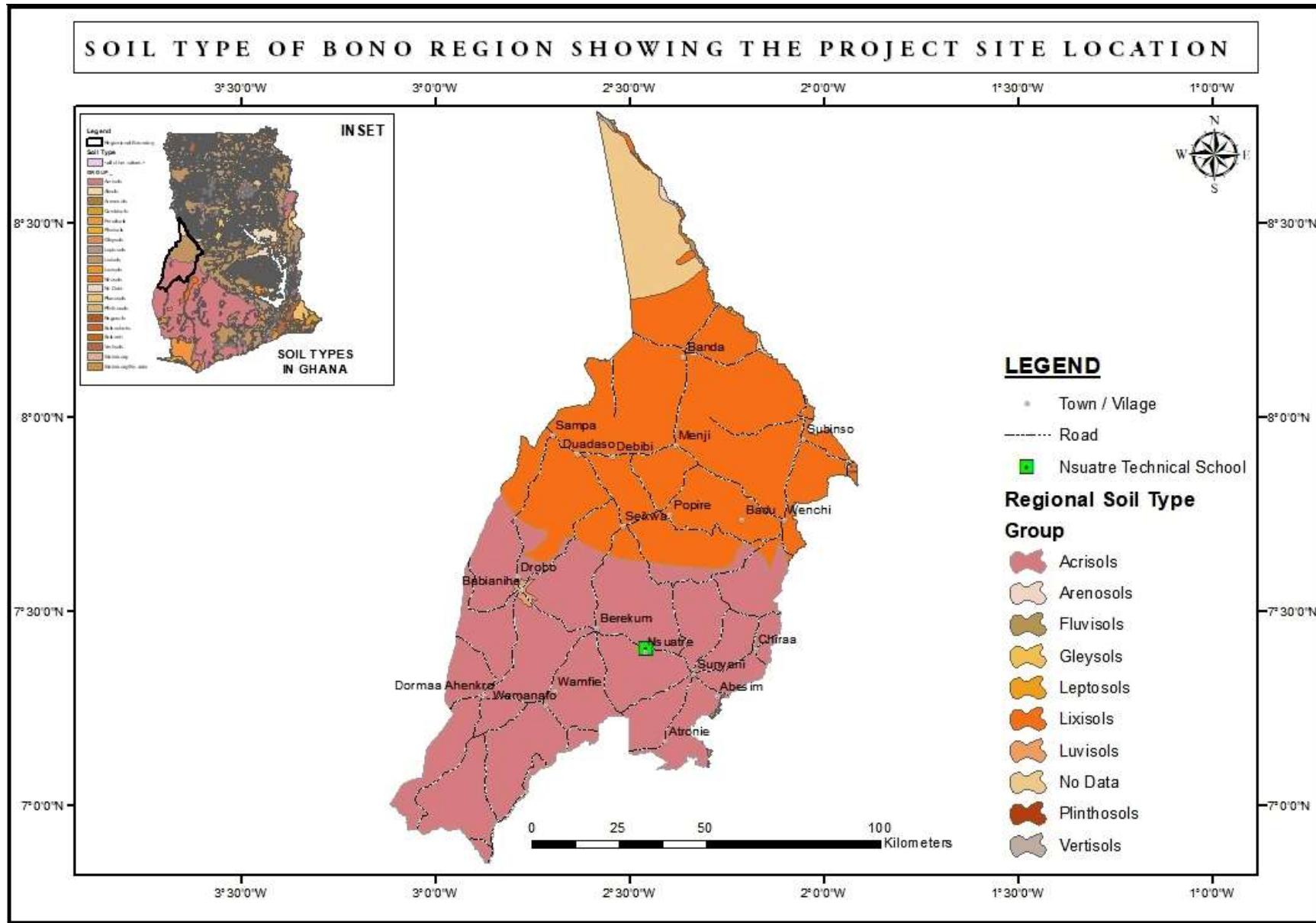
**Northern Region:** The predominant soil types in the Municipality are sandy, loam, sandy-loams, and clayey soils. Naturally this provides the municipality an opportunity for the cultivation of a diversity of crop types be they upland crops such as maize, groundnuts, cowpea and soybeans or valley bottom crops such as rice.



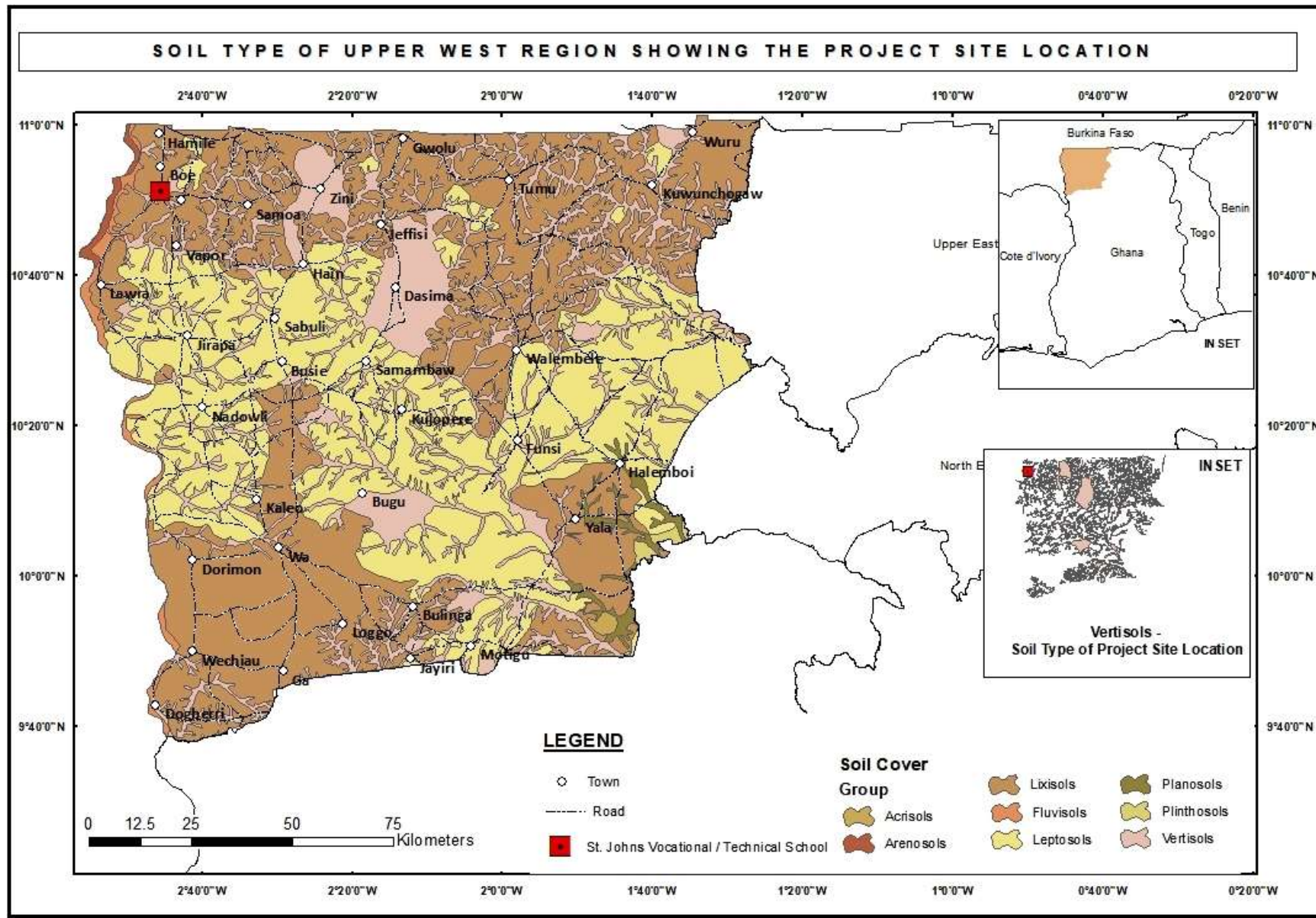


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### 6.1.6 Topography

**Greater Region:** The almost flat and featureless Accra plains descend gradually to the gulf from a height of 150m. The Topography east of the city is marked by ridges and valleys, while to the west, the low plains contain broader valleys, and round, low hills with a few rocky headlands.

**Western Region:** The relief of the Western region falls in the physiographic type classified as the forest dissected plateau. Much of the region is a plain between about 240 and 300 metres above sea level with isolated hills. In the North-West (covering about five districts) the topography is rugged and hilly.

**Ashanti Region:** Much of the region is situated below 150 and 300 m above sea-level.

**Bono Region:** The southern and eastern parts have rather low elevations not exceeding 152.4m above sea level. The land then gradually rises toward the north around Wenchi, where it attains a height of 533.7m in the Buoyem Hills. Other higher elevations occur at Bosumkese 712.6m and Bonsam 643.1m. Sunyani, the regional capital has an average elevation of about 384.8m. Along the Cote d'Ivoire border the land rises at certain places, for instance Asuakwaw 483.7m, Sampa 547.5m and Banda 592.2m.

**Eastern Region:** There are four main topographical features: (i) the Kwahu scarp with an elevation of 759m above sea-level (ii) the Atiwa-Atwaredu Ranges near Kibi, reaching an elevation of 732m above sea-level (iii) the Akwapim highland attaining an elevation of 467m above sea level which is the southern extension of the Togo-Atakora mountain ranges (iv) the isolated hills/mountains dotting the relatively low-lying plains to the south, notably the Krobo and the Yogaga mountain.

**Upper West Region:** The region has an almost entirely flat topography, especially west of the capital Wa and around Lawra, better referred to as the Wa-Lawra plains. The height of the land is generally between 275m and 300m above sea level, except eastwards of Wa where the land rises over 300m above sea level. Further eastwards, the land falls to about 150m above sea level.

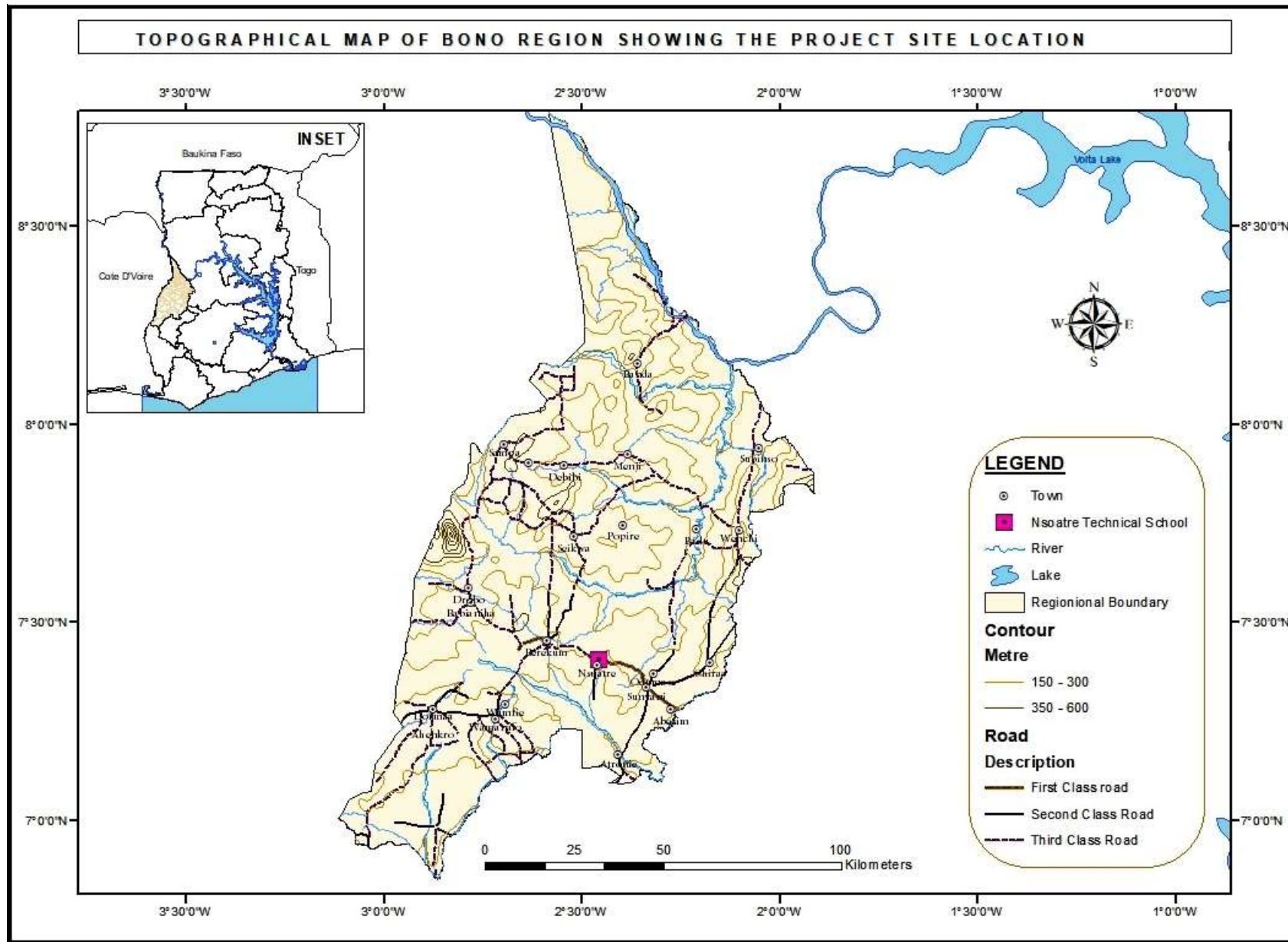
**Northern Region:** The land is mostly low lying except in the north eastern corner with the Gambaga escarpment and along the western corridor. The landscape is one of flat extensive plain with a height range of 60–150 meters above sea level. The lands located to the far west of West Gonja District, close to the Cote d'Ivoire border, fall within the north–south physiographic zone geographically dubbed 'Savannah High Plains'. The towns and villages located in this zone include Bole, Sawla, Tuna, Mankuma and Kuntasi.







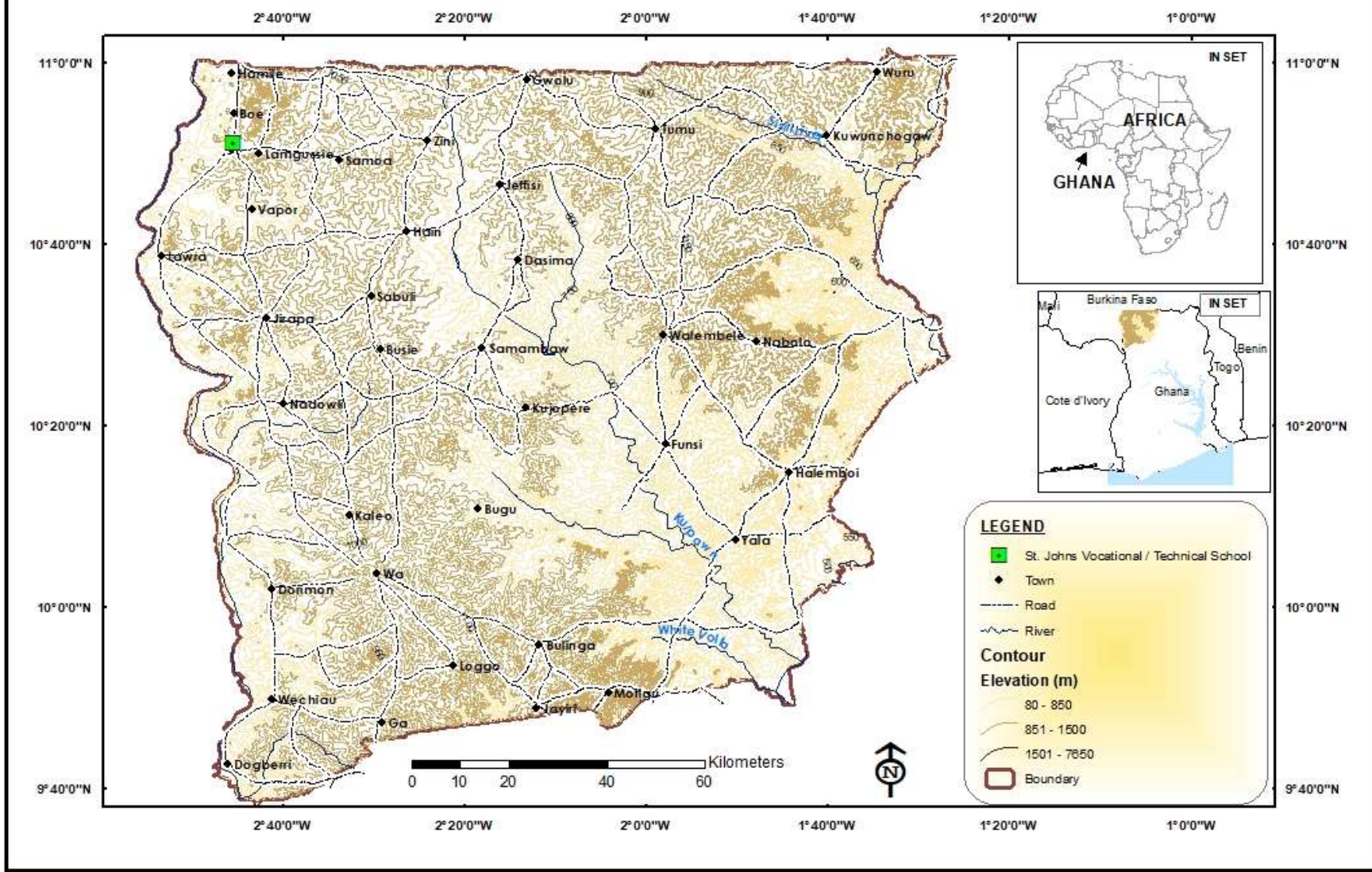
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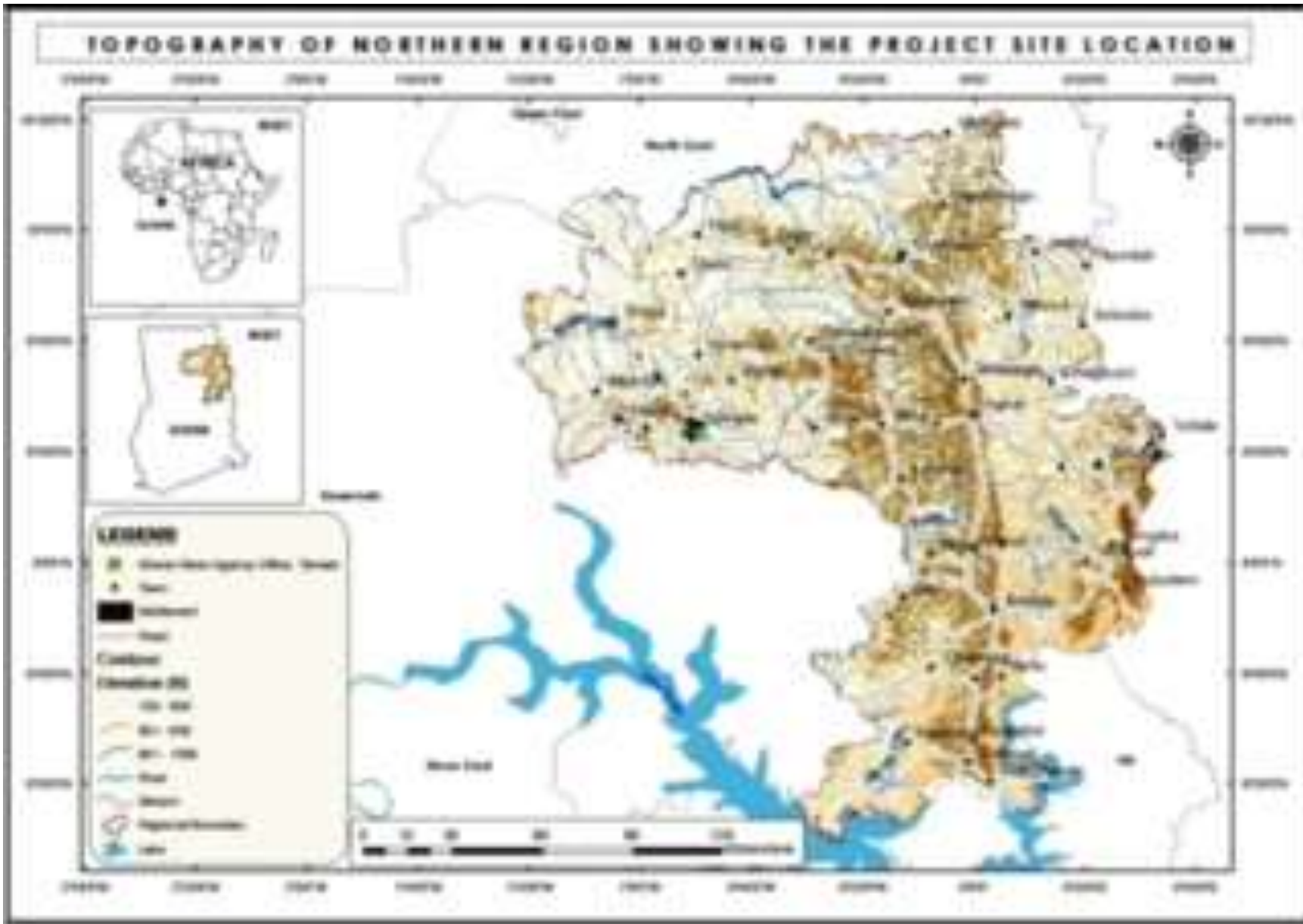


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TOPOGRAPHICAL MAP OF UPPER WEST REGION SHOWING THE PROJECT SITE LOCATION





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### 6.1.7 Air Quality, Dust and Odor

**Greater Accra, Western, Ashanti, Bono, Eastern, Upper West and Northern Regions:** The vehicular traffic generated air pollution poses an intermittent threat to create severe pollution in the project corridor because of the absence of trees cape or trees canopy alignment within the the project landscape. Generally, the air ambient quality at the project sites will be punctuated by vehicular exhaust fumes, total suspended particulate and inhalable particulate matter (PM<sub>10</sub>).

Moreover, the intensity of such emissions will increase with the increasing number of vehicular traffic movement during peak rush hours (6am and 8am in the mornings; 4pm and 6pm in the evenings) on market days. However, periods of reduced vehicular movements will portray lessened vehicular traffic activities hence minimal number of vehicular traffic movement translates into less exhaust fumes delivery. At such times, the air quality is slightly degraded. But these processes of deterioration are all reversible, resulting in the re-adjustment of air quality to acceptable national standards (field sampling of air quality analysis would have to be carried out and the results will be disclosed for EPA Ghana permitting purposes).

### 6.1.8 Ambient Noise Levels

**Greater Accra, Western, Ashanti, Bono, Eastern, Upper West and Northern Regions:** The increase number of vehicular traffic at project zone during peak rush hours (6am to 8am in the morning; 4pm to 6pm in the evening) on market days lead to a higher frequency in automobile engine noise pollution and auditory nuisance. Greater intensity of such noise and auditing distortions will increase during rush hour continuous idling of automobile or vehicular engines on market days within marketing centres. But less reduced occurrences in vehicular movement during non-peak rush hours, will originate slightly induced disturbances from noise pollution during non-market days within marketing centres (field sampling of ambient noise levels would have to be carried out and the results will be disclosed for EPA Ghana permitting purposes).

## 6.2 Biological/Ecological Aspect

### 6.2.1 Flora Species

**Greater Accra Region:** The vegetation is mainly coastal savannah shrubs interspersed with thickets. Some trees are mostly found in the Dangme west and Ga Districts.

**Western Region:** The vegetation types found in the region is evergreen or rain forest, semi-deciduous forest, Guinea savannah and coastal savannah. The rain forest can be found in the south-western equatorial climatic region at the extreme south-western corner of the Region. The

high temperatures and heavy rainfall facilitate all year round speedy growth of plants. The trees of the forest are evergreen as only a few of the top two out of three layers shed their leaves. The semi- deciduous forest which covers a larger part of the region is similar to the rain forest in its structure except a much higher proportion of trees shed their leaves. Like the rain forest, the trees do not all shed their leaves at the same time, and so is never bare of leaves. Human activities such as farming have led to the destruction of most of the virgin forest, hence only secondary forest currently remains. For most part of the Jomoro district, the guinea savannah covers a narrow strip along the south-western coast. The yearly rainfall is barely below 1000mm or 1250mm. The dry season is intense and humidity is low. The coastal savannah covers the coastal areas of Shama district and parts of the coastal areas of Sekondi-Takoradi Metropolis. The vegetation is made up of thick scrub. The area has the lowest amount of rainfall in the country but has high humidity throughout the year.

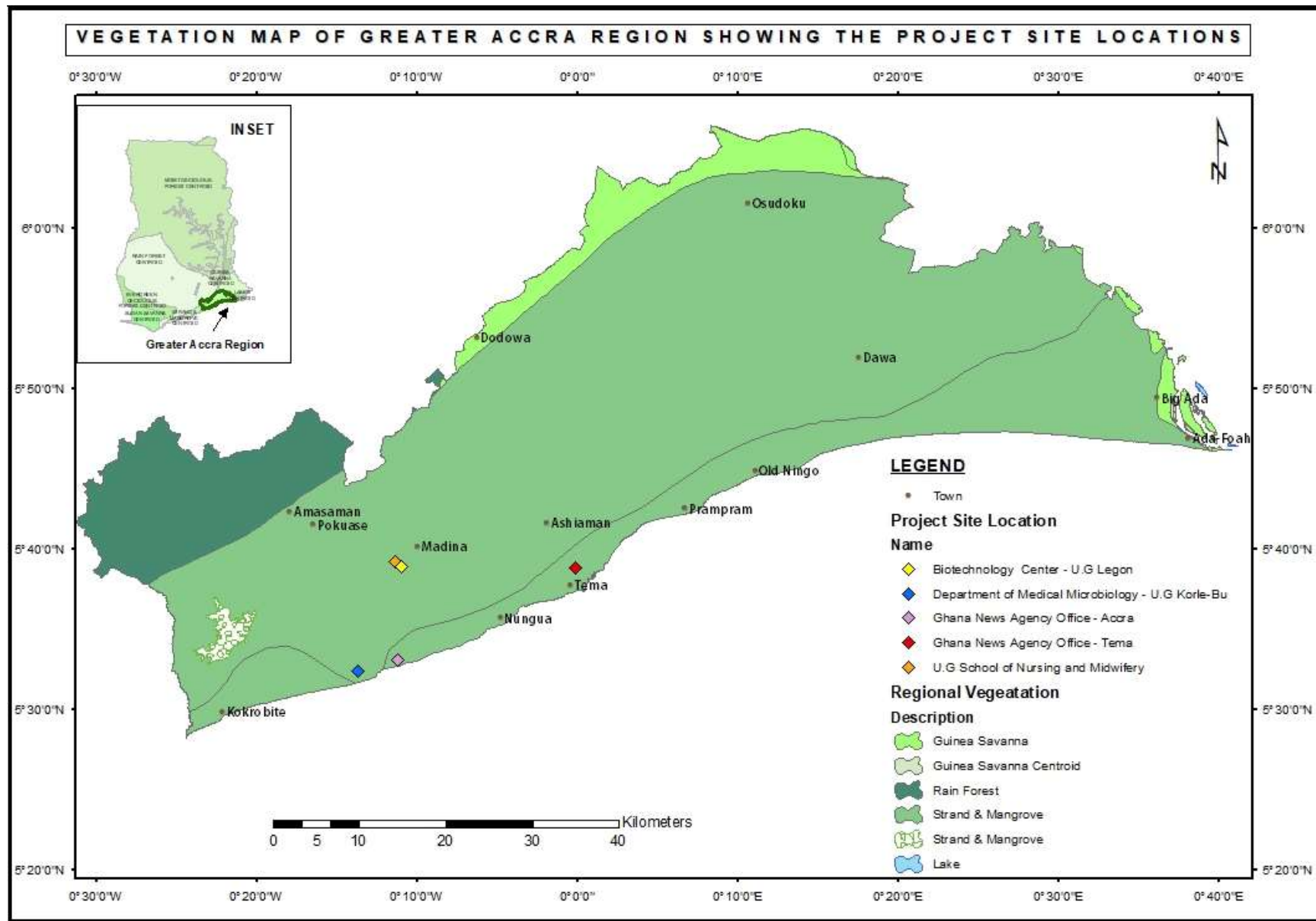
**Ashanti Region:** More than half of the region, the south-western part, lies in the semi-equatorial forest zone (moist deciduous forest) and a smaller north-eastern part lies in the savanna zone. The guinea savanna consists of short deciduous and fire resistant trees. Riverine forests also occur along the Afram River and streams of the savanna zone.

**Bono Region:** The predominant vegetation zones are the moist semi-deciduous forest, transitional and the Guinea Savanna woodland roughly representing the southern, middle and northern parts of the region respectively. The forest belt is mainly found to the south and south-western parts of the Region while the savanna wood land predominates in the eastern half of the northern third of the region.

**Eastern Region:** Three main vegetation zones: (i) semi-deciduous rain forest covering the southern and central portions of the Region (ii) transitional savanna zone covering the northern parts behind the Kwahu Scarp and (iii) coastal savanna covering the Eastern fringes behind the Akwapim Range. The forest and savannah type of soils are suitable for the cultivation of a variety of crops.

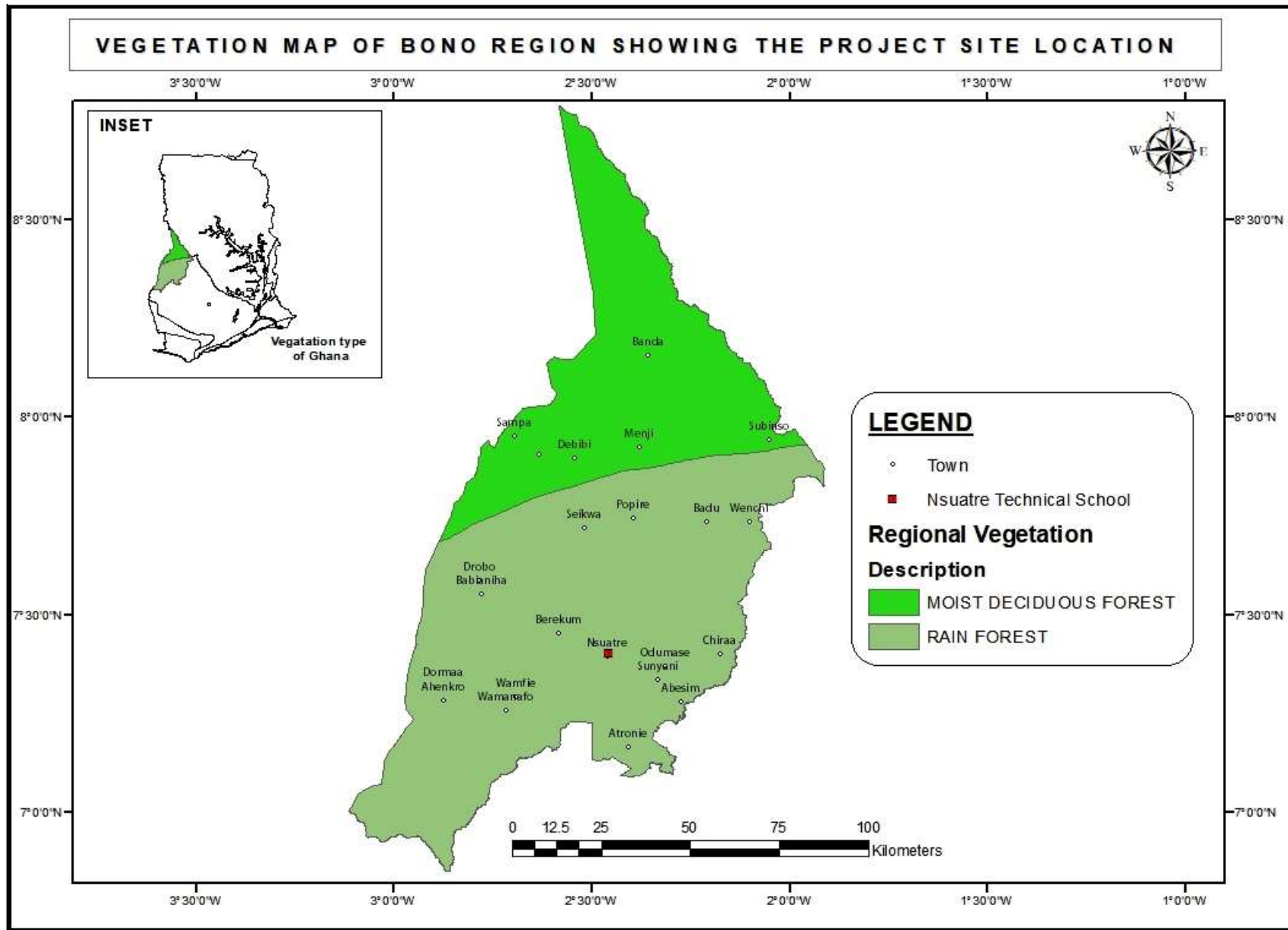
**Upper West Region:** The Upper West Region can be subdivided into two agro-ecological zones: the guinea savanna zone in the southern part and the Sudan savanna zone in the northern and north eastern part. The determining factor for this subdivision is the rainfall pattern. The borderline between the two zones runs approximately half way between Jirapa and Nadowli. The **Sudan savanna** is characterized by scattered trees and a sparse ground cover of grasses. The trees found include the following: baobab, dawadawa, shea, and acacia. In the guinea savanna, the vegetation is characterized by a higher density of pro-climax tree species. The predominant trees are mahogany, ebony as well as dawadawa and shea trees. The last two are very common, as they are protected for their economic value. In the more densely populated areas they are almost the only wild trees to be found. During the wet season, the south has a cover of bunch grasses. As a result of annual bush fires, the vegetation has been degrading in both areas. In the northern part of the region, where slopes are steeper and population pressure is higher, severe soil erosion is becoming a problem. However, primary vegetation can still be found in the south of the region, especially east of the Kulpawn River.

**Northern Region:** The main vegetation is grassland, interspersed with guinea savannah woodland, characterised by drought-resistant trees such as acacia, mango, baobab, shea nut, dawadawa, and neem.

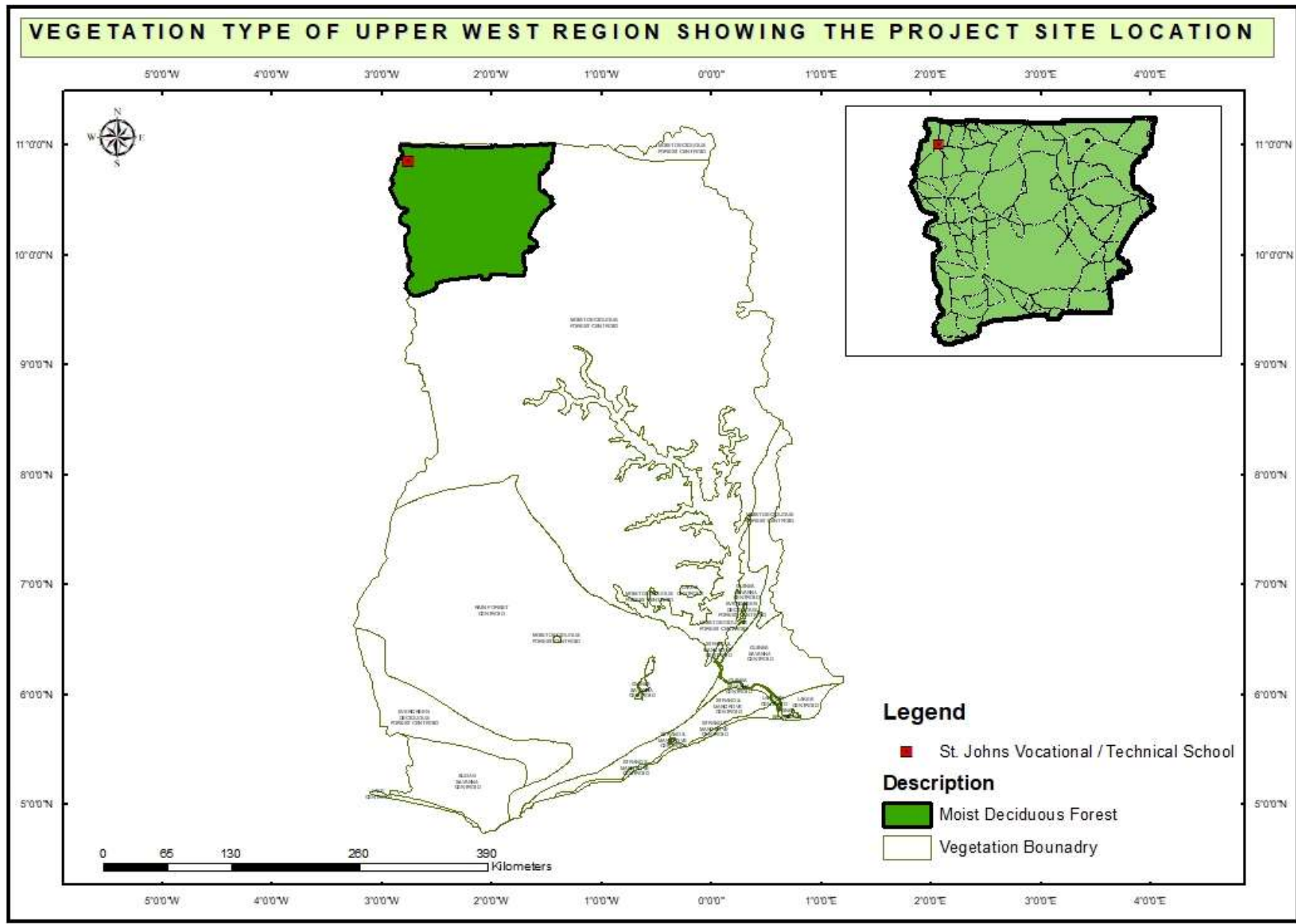




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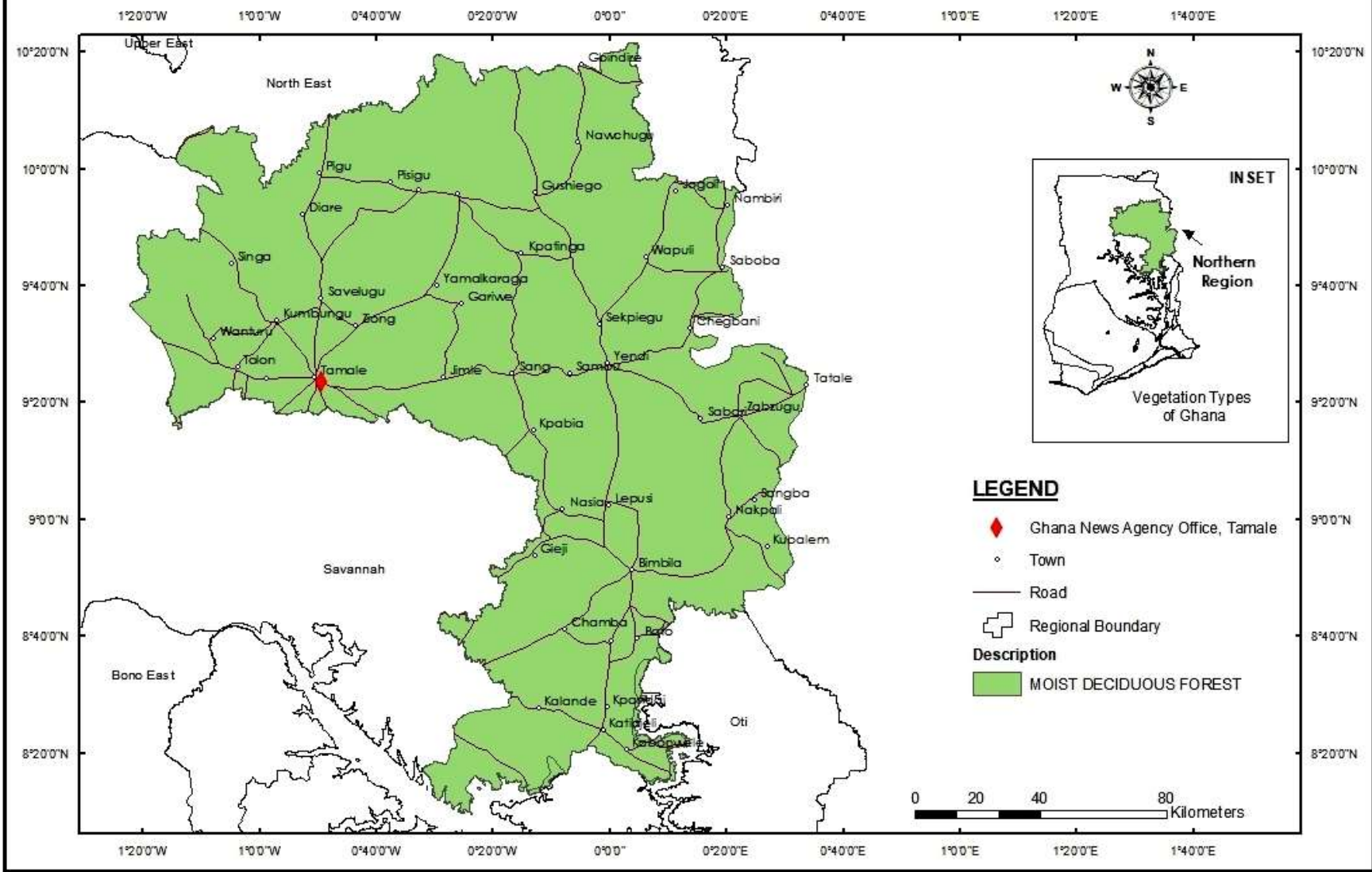
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**VEGETATION TYPE OF NORTHERN REGION - GHANA, SHOWING THE PROJECT SITE LOCATION**





### 6.2.2 Fauna Species

**Greater Accra Region:** There are no known resident species of endangered or threatened fauna within the project zone of influence due to the built-up environment. However, beyond the project zones, the natural habitat provides the necessary congenial atmosphere for various types of fauna species such as monkeys, antelopes, deers, squirrels, grasscutters, birds.

**Western Region:** The coastal marine resources of the Region include various species of pelagic and demersal fishes as in the coastal waters of other parts of the country with sardinellas (*Sardinella aurita* and *Sardinella madarensis*) as the most important. The wetlands in the Region are dominated by freshwater species notably *Chrysichthys nigrodigitatus*, and are nursery grounds for juveniles of some marine fishes. Invasive species found in the Region are the Water hyacinth *Eichhornia crassipes* in the Tano/Aby/Ehy lagoon and the seasonal blooms of the filamentous green alga *Enteromorpha flexuosa* in the coastal waters from Jomoro to Nzema East which constitute a nuisance to fishing and other economic activities. The sandy shores of the Region are important nesting areas for endangered marine turtles; dolphins are landed at Dixcove and Axim and manatees could be found in the Tano/Aby/Ehy lagoon system while the Amanzule wetlands and Cape Three Points Forest Reserve are Important Bird Areas.

**Ashanti Region:** Forest wildlife, including monkeys, buck and clouds of butterflies, can be seen all over the region. Bats, birds of prey, parrots and owls are other examples of fauna species spotted in the region.

**Bono Region:** Mona monkeys of rare breed, including species of antelopes and varieties of birds have been recorded in this region. There is a colony of hippopotamus under conservation status in the region.

**Eastern Region:** Large mammals have been recorded in the region. About, 22 species were recorded with 12, 14 and 15 species observed from Atiwiredu, Asiakwa South and Asiakwa North respectively. Of the species recorded, Pel's flying squirrel (*Anomalurus pelii*) is listed as Near Threatened, Yellow-backed duiker (*Cephalophus silvicultor*), Black duiker (*Cephalophus niger*), Bay duiker (*Cephalophus dorsalis*), Maxwell's duiker (*Cephalophus maxwellii*) and Royal antelope (*Neotragus pygmaeus*) are listed as Lower Risk/Near Threatened, and West palm squirrel (*Epixerus ebii*) is listed as Data Deficient on the IUCN Red List. In addition to these species of international conservation concern, the African civet (*Civettictis civetta*), African palm civet (*Nandinia binotata*), Long-tailed pangolin (*Uromanis tetradactyla*) and Yellow-backed duiker (*Cephalophus silvicultor*) are nationally protected in Ghana. Many illegal activities, especially related to hunting, have been observed. Moreover, deforestation along trail lines being constructed for mineral exploration and occasional illegal farms could be a significant factor affecting the conservation of large mammals in Atewa area.

**Upper West Region:** There is sanctuary for many endangered species of wildlife like hippos, and water bucks, elephants and birds of spectacular plumage. Moreover, there is seasonal migration and visits of elephants and other species from Mole. There are records for the spotting of hippos, bats, chameleons, hedgehogs and many different types of lizards and snakes, including places to see birds with over 200 species identified and new sights seen regularly.

**Northern Region:** Elephant, buffalo, kob, warthog, waterbuck, bushbuck, roan antelope, hartebeest, duikers, oribi, patas monkey and green (vervet) monkey are the species commonly seen in the region. There are over 90 species of mammals recorded in the region.

### **6.2.3 Protected and Critical Habitats**

**Greater Accra Region:** The Shai Hills Resource Reserve was declared Forest Reserve in 1962 with total area of 47 square kilometres (4,700 ha; 18 sq mi) which was later expanded to 51 square kilometres (5,100 ha; 20 sq mi) in 1973 till present. It was made a Game Production Reserve in 1971. The protected area was home to the Shai people before they were ejected by the British in 1892, remains of Shai peoples works can still be found at the reserve. It is covered with grassland and low dry forest vegetation. There are nearly 400 plant species spread on the 5 separate hills at the Shai Hills Resource Reserve. There are nearly dozens of primary animal species including antelopes, bats, birds (such as violet Turaco, Paradise Flycatcher, Green Turaco Red-billed Hornbill, Yellow-fronted Tinkerbird, and Red-necked Buzzard), baboons, cats, duiker, guinea fowls, kobs, green monkeys, monitor lizards, African python, royal python, and zebras.

**Western Region:** Nini Suhien National Park and Ankasa Resources Reserve are twin Wildlife Protected Areas that are located in the wet evergreen forest area of the Western Region of Ghana. These areas are so rich in biodiversity that about 300 species of plants have been recorded in a single hectare. The areas are largely unexplored but 43 mammal species including the bongo, forest elephant, 10 primate species including the endangered Dina monkey and the West African chimpanzee have been recorded. Bird fauna is also rich. The reserves offer very good example of the west evergreen forest to the prospective tourist. The reserve is not yet developed for large-scale tourism. For light tourism overnight facility is available at Elubo, which is, only 10 minutes drive away from the reserve. Tourists can only go on foot safaris. Accra to Elubo is by a 325km first class international road.

**Ashanti Region:** Kogyae Strict Nature Reserve is a strict nature reserve, located near Kumasi, Ghana. The Kogyae Strict Nature Reserve was established in 1971 and has an area of 386 km<sup>2</sup>. Animals present on the reserve include African buffalos, African civets, civet cats, and monkeys, as well as 85 species of birds. Bobiri Forest Reserve and Butterfly Sanctuary is an ecotourism centre in Ghana and the only butterfly sanctuary in West Africa. It has about 400 species of butterflies. It is located on the main Accra - Kumasi Highway at the village of Kubease,

about 30 kilometres from Kumasi. The region is endowed with a spectacular geography that includes lakes, waterfalls, scarps, forest reserves, national parks, birds and wildlife sanctuaries, such as Owabi Arboretum and Bomgobiri.

**Bono Region:** Nchiraa Waterfalls wedged between the mountains of the Nchiraa Settlement, the Nchiraa waterfalls is located 30 kilometres North of Wenchi. The tourist is offered a hiking adventure on a rocky and challenging footpath that leads to the waterfalls. The existence of other natural and cultural tourism within 10 kilometers radius makes the tour package exhilarating. These includes the Wurobo Ancestral Caves which is located about 8 kilometers from Nchiraa Settlement. The caves are believed to be the original dwelling place of the people of Nchiraa. Duasidan Monkey Sanctuary is located 10 kilometers Southwest of Dormaa Ahenkro. This sanctuary hosts a rare breed of Mona monkeys. The tourist is welcomed by the presence of these monkeys as you enter their forest-like abode. Bamboo trees form a canopy in the middle of the forest, which serves as a resting grounds for visitors. Monkeys can be seen swinging up and down tree branches and peeling bananas left out for them. It is quite a remarkable sight as the visitors get the chance to see how monkeys carry their babies on the move. Bui National Park / Bui Dam covers 1,821 kilometers square and covers part of the Black Volta River, the Bui National Park is endowed with several species of antelopes and a variety of birds. It is also known for its hippopotamus population. The tourist can take a cruise on the Black Volta River through the National Park. The Bui Dam is located at the base of the Banda Mountains, the dam was built to improve Ghana's energy requirements.

**Eastern Region:** Aburi is located on the Akwapim-Togo Range of Ghana. It's just three quarters of an hour drive from Accra, the capital of Ghana. The cool mountainous weather of Aburi makes it a destination for people who love the cool side of life. Located in this cool tranquil environment is the Aburi Botanical Gardens. The garden covers a total land area of about one hundred and sixty (160) acres. However it is only three (3) acres that have been developed and the remaining serving as a botanical reserve. Atewa Range Forest Reserve, in the eastern region of Ghana, is internationally recognized as one of the highest priority ecosystems in West Africa for its high species diversity, high levels of endemism and great hydrological importance. The forest was gazetted as a National Forest Reserve in 1926, then subsequently a Special Biological Protection Area in 1994, a Hill Sanctuary in 1995 and as one of Ghana's 30 Globally Significant Biodiversity Areas (GSBAs) in 1999. It is also recognized as an Important Bird Area.

**Upper West Region:** Gbelle Game Reserve, located 17km south of Tumu, is an important sanctuary for endangered species of wildlife, as well as hippos, elephants and bucks. Birdwatchers consider this an important habitat for indigenous and migratory birds.

**Northern Region:** Mole National Park covers approximately 4,840 km<sup>2</sup> and is the largest and most prestigious protected area in Ghana under the aegis of the Wildlife Department. Mole National Park was the first Wildlife Protected Area to be established in Ghana. The Park lies within

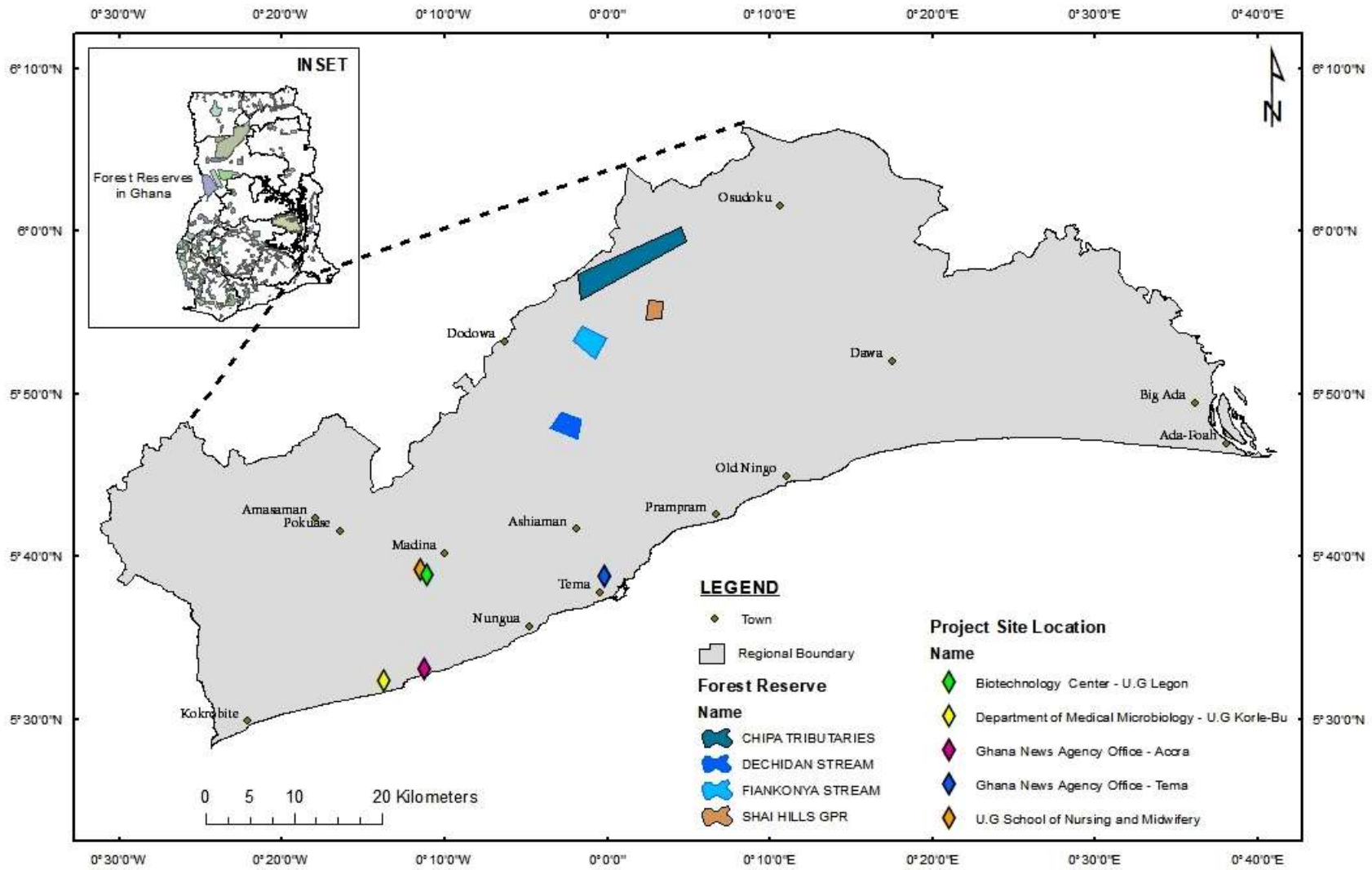
two physiographic regions - 65% lies within the Voltaian sandstones basin and 35% within the savannah high plains. The topography is generally undulating with flat topped hills which is dominated by the Konkori scarp that runs north-south through the park and reaches up to 250m. The Park forms part of the Volta River catchment and numerous rivers cross or originate in it to drain into the White Volta River. Mole National Park represents a fairly undisturbed guinea Savannah ecosystem dominated by open savannah woodland. The park has very rich flora and fauna.

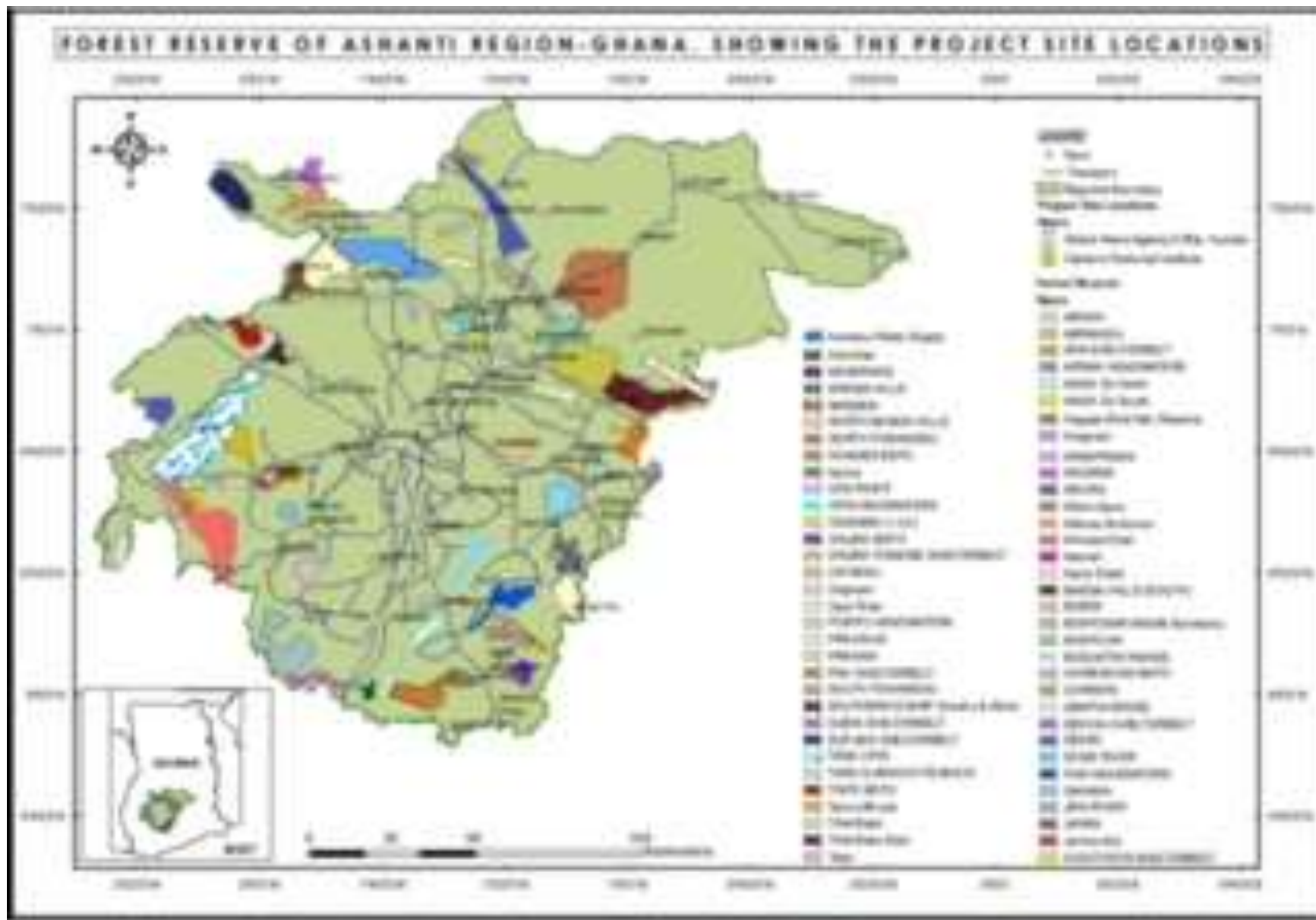
Over 93 species of mammals, about 400 species of birds, 9 amphibian, 33 reptilian and several insectivorous species and 5 endemic butterfly species have been recorded. Species of special interest include Elephant, Buffalo, Kob, Western Hartebeest, Roan Antelope, Defassa Waterbuck, Oribi, Bohor Reedbuck and Red-flanked Duiker. The riverine forests are home to rare and endangered species such as Yellow-backed Duiker and Black and White Colobus monkey. The Lion, Leopard and Hyena are important large carnivores found in the reserve. The buffalo population is of great scientific interest since both black and red colour varieties exist in the Park. With regards to vegetation, local endemism is generally low in West African Savannah, and only two endemic species *Kyllinga echinata*, a sedge and *Ancilema setiferum* var *pallidiciliatum* confined to northern Ghana, are found in Mole.

In addition, three species endemic to Ghana are recorded, namely *Gongronema obscurum*, *Raphionacme vignei* and *Phinopterys angustifolia*. Eleven (11) species of mole are confined to the savannah woodland while *Mimusops kammel*, a tree that is confined to riverine forests. To date, five species have been identified which have not been recorded elsewhere in Ghana *Croton pseudopulchellus*, *Indigofera conferta*, *Indigoera trichopoda*, *Jatropha neriifolia* and *Pleiotaxis newtonii*. *Anthocleista vogelii*, a tree of wet sites in the south-western forest zone of Ghana has been recorded for the first time in Mole. *Apodostigma palleus* is a climber that is also restricted to the forests in the south-west Ghana. *Amblygonia caracasana*, a savannah tree widespread in central, east and south tropical Africa, has been recorded for the first time in Ghana at Mole.

Mole has an important history linked to the national slave trade route project. The ancient caravan route from Salaga to Wa and beyond to Mali, passed through the heart of the park. This route was used for both trading and to transport slaves to coastal markets. The park Headquarters is located right at a place where two famous slave raiders (Samore and Babatu) raided and erased a village to the ground. The Head quarters is named after one of them - Samole. There is a cave in the Konkori escarpment that was used as a refuge from slave raiders by the local indigenes. Other important attractions in the Park include Kwomwohlogu and Asibey pools, wetland areas (unique bird-watching sites), waterfalls on the Konkori escarpments and remains of many old villages destroyed by slave raiders.

# FOREST RESERVE MAP OF GREATER-ACCRA REGION SHOWING THE PROJECT SITE LOCATIONS

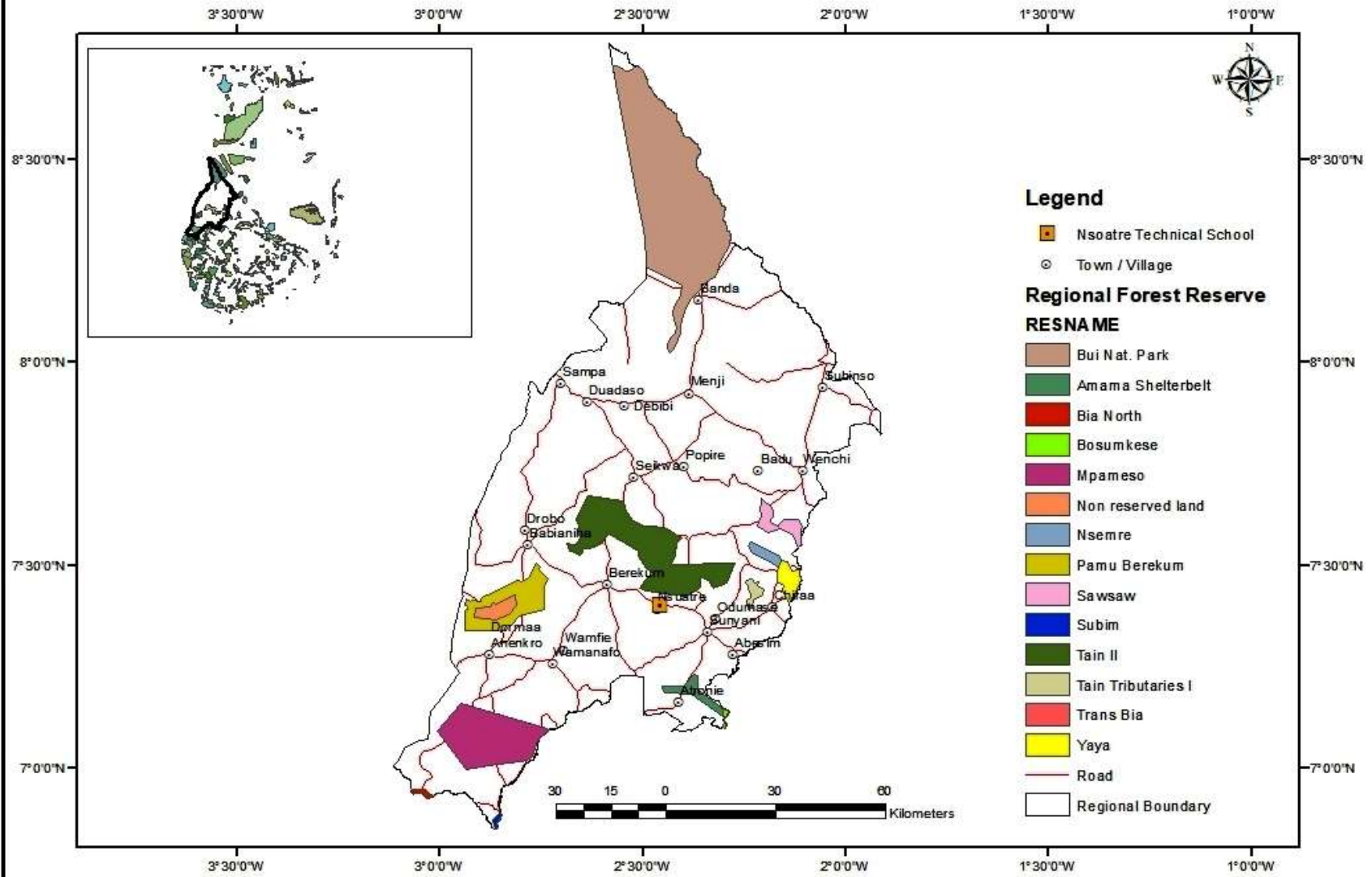


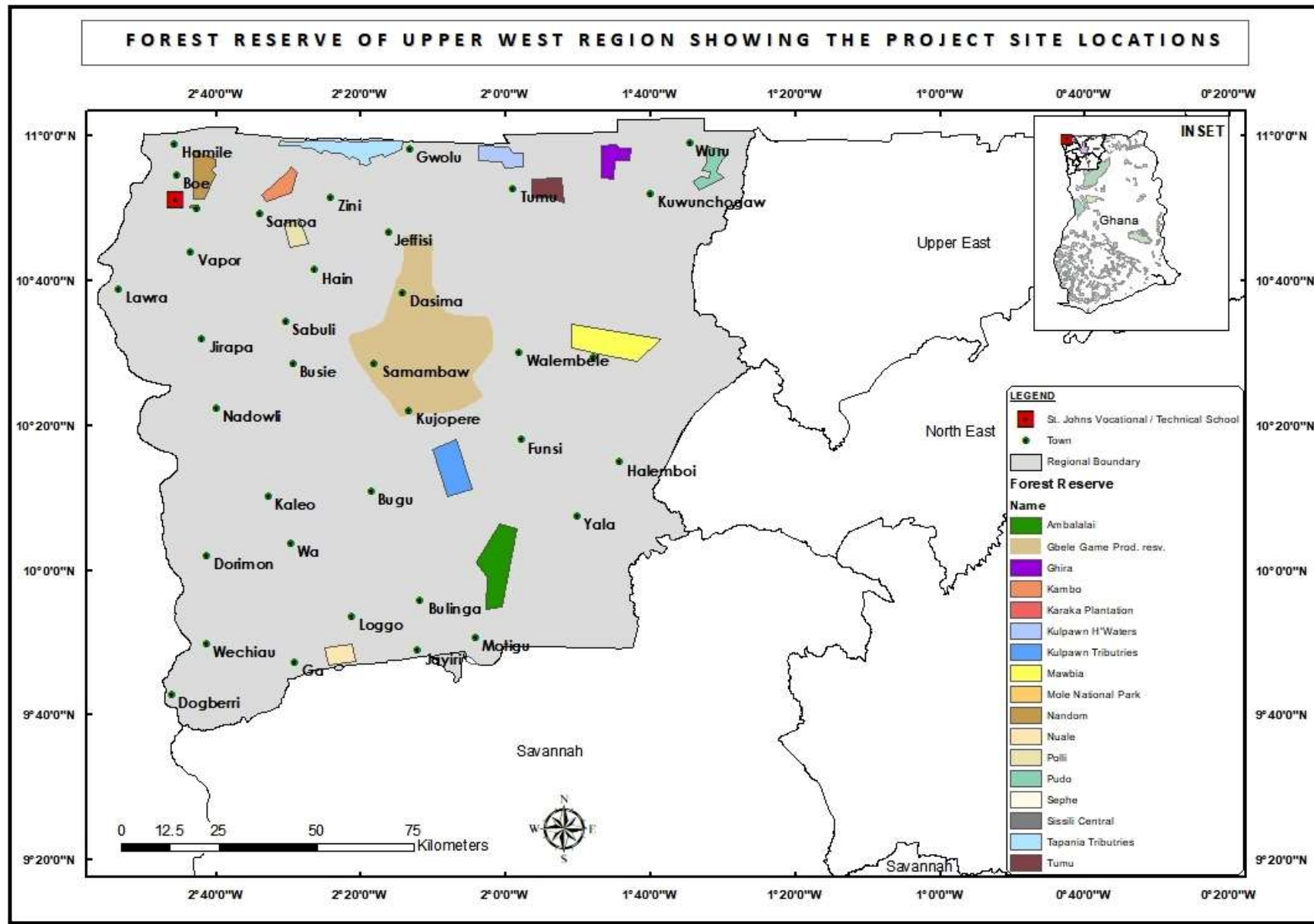


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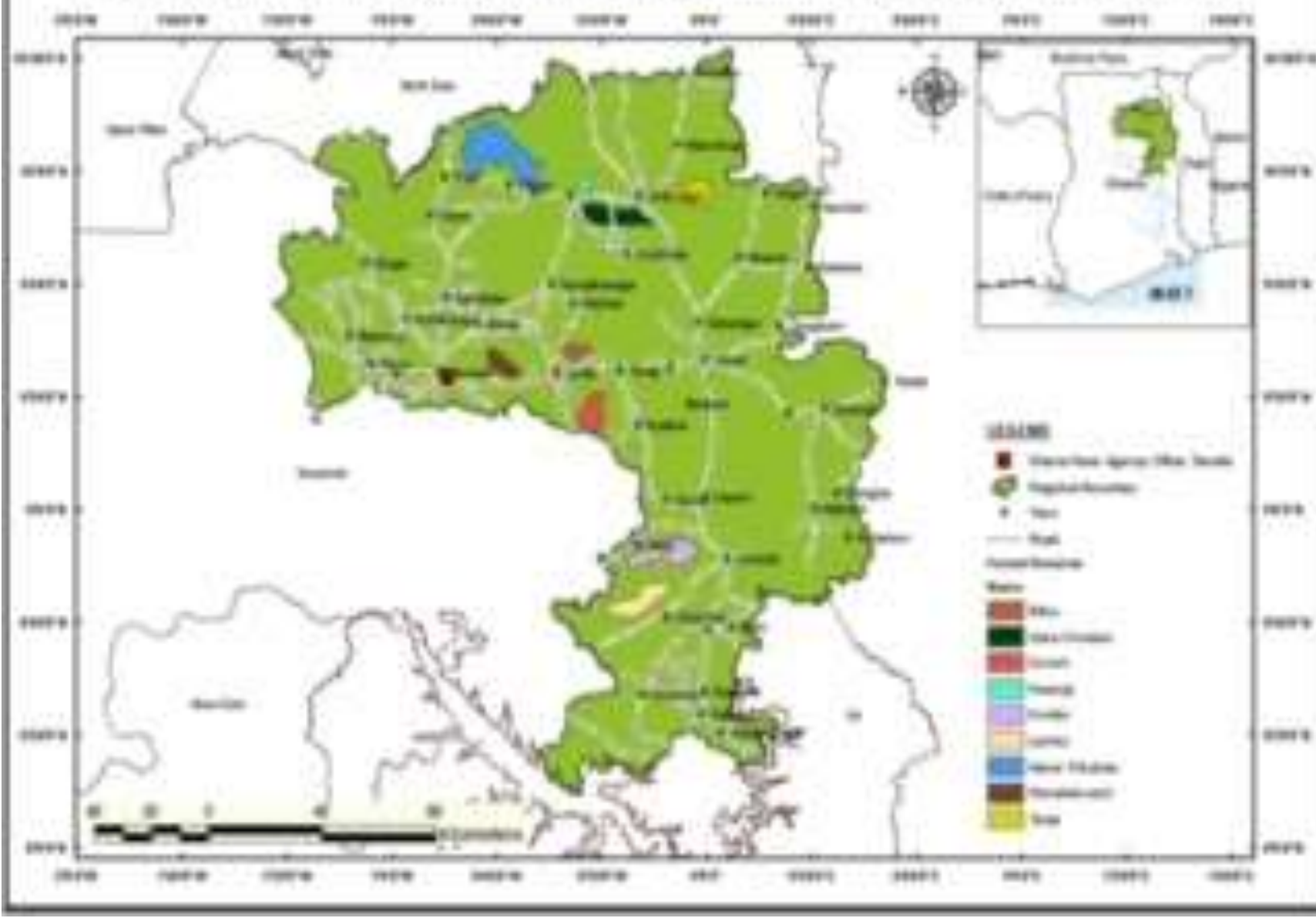
# FOREST RESERVE MAP OF BONO REGION SHOWING THE PROJECT SITE LOCATION







# FOREST RESERVE MAP OF NORTHERN REGION SHOWING THE PROJECT SITE LOCATION



#### 6.2.4 Animal Migration Routes

**Greater Accra, Western, Ashanti, Bono, Eastern, Upper West and Northern Regions:** There are no clearly defined wild animal migration routes, but there is a strong presence of animal breeding within most of the project corridors, especially in the urban centres. There is a consistent presence of domestic sheep, goats and fowls breeding along the periphery of the project boundaries in the peri-urban zones.

### 6.3 Socio-Economic/Socio-Cultural Aspect

#### 6.3.1 Demography and Settlement Pattern

**Greater Accra Region:** Greater Accra recorded a population of 4,010,054 in 2010. This is an increase from 491,817 in 1960, 851,614 in 1970, 1,431,099 in 1984, and 2,905,726 in 2000. Thus, the population of Greater Accra recorded an eight-fold increase within a period of 50 years from 1960-2010. There was a 38.0 percent increase in the population in the period from 2000 and 2010 compared with a 73.2 percent increase between 1960 and 1970, a 68.1 percent increase between 1970 and 1984, and a 103.0 percent increase between 1984 and 2000. Furthermore, Greater Accra recorded a 3.1 percent annual population growth rate between 2000 and 2010. This compares with 5.2 percent between 1960 and 1970, 3.3 percent between 1970 and 1984, and 4.4 percent between 1984 and 2000.

**Western Region:** The results of the 2010 Population and Housing Census (2010 PHC) showed that the number of persons enumerated in the Western Region was 2,376,021. The population of the Western Region almost doubled between the inter censal period, of 1960 (626,155) to 1984 (1,157,807). In a space of forty years (1970-2010), the population of the Region increased by over 300 percent. In spite of this, the percentage change dropped considerably from 66.2 percent in 2000 to 23.5 percent in 2010, while the inter censal growth rate also dropped by 1.2 to 2.0 percent during the same period. In 2000, the regional inter censal growth rate was above the national average (2.7%) but in 2010 it was below national growth rate of 2.5 percent. The population density of the Region has increased from one census to the next and by nearly fourfold over the 50 year period. The reason for this might be attributed to influx of persons to the growing cocoa areas, 'galamsay' operations and the oil and gas industry. The current Regional density of 99.3 persons per sq. km. is below the national population density of 103.4 persons per sq. km. but much more below the Region with the highest population density is Greater Accra (1,235.8 persons per sq.km).

**Ashanti Region:** The population of the region in 2010 is 4,780,280, representing 19.4 percent of the total country population. This makes it the most populous and one of the most rapidly growing regions in the country. The region's share of the national population has increased steadily from 16.5 percent in 1960 to 17.3 percent in 1970 and declined marginally to 17.0 percent in 1984. Its share continued to increase to 19.1 percent in 2000 and 19.4 percent in 2010. The region's urban population first exceeded the rural population in 2000 and increased further in 2010. The urban population rose steadily from 25.0 percent in 1960, 29.7 percent in 1970, 32.5 percent in 1984, and 51.3 percent in 2000 to 60.6 percent in 2010. The rural population on the other hand, decreased steadily from 75.0 percent in 1960 to 39.4 percent in 2010. The rapid rate of urbanization in the region is due mainly to migration from rural areas in the region as

well as from other regions, particularly the northern parts of the country. The population growth rate for the region has been higher than the national average for each census year, even though it fluctuates. It was 2.9 percent in 1970, 2.5 percent in 1984, 3.4 percent in 2000 and 2.7 percent in 2010. The 2010 population growth rate for the region is only lower than those of the Central region (3.1%) and Northern region (2.9%). Population density is measured by the population of a given area divided by the land area in square kilometres. The population density of the region is currently 196 persons per sq. km. It is the third highest after the Ashanti Region (1,235.8 persons) and the Central Region (224.1 persons) The population density in the region increased steadily from 45 persons in 1960, 61 persons in 1970 and 86 persons in 1984, to 148 persons in 2000. The rapid increase in population density is due largely to fast population growth exerting pressure on the fixed land area.

**Bono Region:** Due to scanty information on the newly constituted Bono Region, comprehensive demographic information on Brong Ahafo Region was adopted to substantiate and depict such demographic analysis. The Brong Ahafo Region has a total population of 2,310, 983. It is the second largest Region in Ghana by land size and accounts for about 9.4 percent of the population. With a land size of 39,554 km<sup>2</sup>, the population density for the region has increased from 45.9 persons/km<sup>2</sup> in 2000 to 58.4 persons/km<sup>2</sup> in 2010. The region experienced its highest growth rate of 3.3 percent in the intercensal period 1970 to 1984. The growth rates for the 1984/2000 and 2000/2010 periods fell below the respective national averages by 0.2 percentage points.

**Eastern Region:** The results of the 1960 census indicated that population size of the region was 1,094,196. It increased by 15.3 percent by 1970. Higher but decreasing percentage increases were recorded between 1970 and 1984 (38.1%), 1984 and 2000 (25.4%) and 2000 and 2010 (25.0%). The population figure also yielded increasing densities of 54, 63, 87, 109, and 136 persons per square kilometre between the five censal periods while intercensal growth rates decreased between 1970 and 2000 but increased between the 2000 and 2010 intercensal period. The decrease in growth rates between 1970 and 2000 could be attributed to factors such as out-migration (internal and international) from the region as in other parts of the country as economic conditions were not favourable.

**Upper West Region:** The population of the region as enumerated in the 2010 Population and Housing Census (PHC) is 702,110, with 48.6 percent (341,182) males and 51.4 percent (360,928) females. The population aged less than 15 years constituted 41.7 percent of the total, while those aged between 15 and 64 constituted 52.3 percent. The rest (6.0%) were persons 65 years and older. The proportion of the urban population was 16.3 percent in 2010. The regional population density was 38.0 persons per square kilometre, an increase from 31.2 persons per sq. km. in 2000.

**Northern Region:** The Northern region has a total population of 2,479,461 in 2010 with more females (1,249,574) than males (1,229,887). The population of the region increased by 36.2 percent between 2000 and 2010, making it the fastest growing region in the country after the Central (38.1 %) and Greater Accra (38.0 %) regions. In 1960, the population of the Northern region was 531,573, increased to 727,618 in 1970 and to 1,164,583 in 1984 representing over 50 percent increase in 24 years. The region recorded an intercensal growth rate of 2.9 percent between 2000 and 2010. This is a slight increase over the 2.8 percent of the period 1984 to 2000. Prior to 2000, the annual intercensal growth rate of the region has been above 3 percent (3.2 percent between 1960 and 1970 and 3.4 percent between 1970 and 1984). The region's share of the national population is 10.1 percent, making it the fourth largest in terms of population after the Ashanti (19.4%), Greater Accra (16.3%) and Eastern (10.7%) regions. The Northern region is Ghana's largest in terms of land area (70,384 square

kilometres), constituting about 30 percent of the country's land mass. As a result, population density (number of persons per square kilometre) of the region is the lowest in the country, at 35 in 2010, having increased from 26 in 2000. Population density of the region in 26 previous censuses was 8 in 1960, 10 in 1970 and 17 in 1984.

### 6.3.2 Culture, Ethnicity and Religion

**Greater Accra Region: Culture** plays an important role in shaping a people's way of life in terms of attitudes, beliefs and behaviour. Even though there are a number of ethnic groups in the region, the Ga-Dangme is the indigenous ethnic group of the region. It is a patriarchal, patrilineal and patrilocal society by birth. The language is a branch of the Kwa family and is made up of two languages, Ga and Adangme which are closely related and have sometimes been considered as a single language. There are many similarities in the basic vocabulary, but there are also differences in many of the words and the grammar, particularly in the verb phrase. **Ethnicity** refers to the ethnic group a person belongs to. Data on ethnicity in the 2010 census were collected only from Ghanaians by birth and Ghanaians with dual nationality. The classification is of major ethnic groups as officially established by the Bureau of Ghana Languages and has been in use since the 1960 census. Akan was the largest ethnic group in Greater Accra in 2010 with almost four out of ten persons (39.7%) stating they were Akan. This is followed by Ga-Dangme (27.4%), Ewe (20.1%), Mole-Dagbani (5.2%), Guan (1.9%), Gurma (1.6%), Grusi (1.3%) and Mande (0.7%). **Religion** disclosure indicated that the majority (83.3%) of the population in Greater Accra in 2010 reported an affiliation with Christianity (Pentecostal/Charismatic, 44.6%; Protestant, 22.3%; other Christian, 8.9%, and Catholic, 7.5%). The high proportion of Pentecostal/Charismatic (44.6%), in the region is probably due to the proliferation of these churches in Accra. Christians are followed by Muslims (11.8%) and traditionalists (0.5%). However, 3.4% of the population indicated they had no affiliation to any religion.

**Western Region:** The indigenous people of the region exhibit a high degree of **cultural homogeneity** in areas of lineage organization, inheritance and succession. Matrilineal descent system, where the female line is used for recruitment into the lineage or succession and inheritance is the type practised by the indigenous people. Chieftaincy succession is for instance, based on the matrilineal system of succession. However, the enstoolment of Safohene and Okyeame follows the double unilineal system of succession, where an individual can be enstooled as Safohene or Okyeame through the mother's or father's line. There are also non indigene settlers in the region whose grandparents had migrated several years back from different parts of Ghana into Western region primarily for economic reasons. These groups of people have been subsequently absorbed into the indigenous population. These are the Fantes in the then vibrant mining communities such as Tarkwa and Bogoso as well as those who engaged in trading activities in the Sekondi –Takoradi area; the Ashantis, Brongs and people from the three northern regions who migrated mostly to the cocoa growing areas of the region and Ewes and Gas in the fishing communities along the coastal belt.

The indigenes of the Western Region are predominantly Akans. There are five major sub-groups of the Akans in the Region: Ahantas, Nzemas, Sefwis, Aowins and Wassas with 21 Paramountcies. Among the Paramountcies are Nsein, Lower Axim, Upper Axim, Apatem, Gwira, Atuabo, Benyin, Aowin, Suman, Wiawso, Wassas Fiase, Upper Dixcove, Lower Dixcove and Sefwi Bekwai. Apart from these five major sub- groups, there are other indigenous minorities such as the Pepesa whose peculiar dialect is understood by the Nzemas, Ahantas, Aowins and Sefwis. Fanti is widely spoken as a second language alongside those of the

indigenes in the southern part of the region. Fante is also used as medium of instruction in lower primary classes and as examinable subject at the basic level. The ethnic majority in the Region are the Akans (78.2%) with the remainder is distributed among the Mole Dagbani (8.6%), the Ewe (6.2%), the Ga- Adangbe (3.1%) and others (3.9%). The largest ethnic minority is the Mole Dagbani who are mainly found in the northern part of the Region (Bia, Sefwi Akontombra, Aowin- Suaman, Juabeso Sefwi Wiawso and Wassa Amenfi West) where they are mainly engaged in cocoa production.

Majority of persons living in the region are Christians 82.0 percent, while Moslems 9.3 percent and Atheist 6.7 percent. Traditional and other religions constitute about one percent each. This regional pattern has remained unchanged over the decade. Among the Christians, the proportions who are Catholics and Other Christians have declined, while Protestants and Pentecostals/Charismatics have increased. The proportion of Moslems also increased while that of Atheist declined.

There are different **types of festivals** celebrated in the region. However four of such festivals dominate. These are: Kundum, Afahye (Akwantukase), Alluole, and Nkronu. With the exception of the Wassa, Sefwi, Shama and Mpohor traditional areas, all of the other traditional councils celebrate Kundum festival amidst glamorous drumming and dancing between August and November. The significance of the celebration of these traditional festivals are many. Festivals celebrated in Western like all other festivals celebrated elsewhere in Ghana serves, among others, the following purposes: To mark the beginning of a traditional year To offer thanks to the Supreme God for his care and protection and to offer thanks to the ancestors and the spirits for their protection during the past year. To renew the peoples loyalty to their chiefs by paying homage and lastly To settle family disputes, quarrels and misunderstanding. The period of celebration of these festivals in the region differs from one community to another. Usually the last day of the festivals are marked by colourful durbars.

**Ashanti Region: Chieftaincy** - the social administration of the Asante nation is through a traditional system of chieftaincy and elders. Each community in the region, like other parts of the country, has a chief of some level from Odikro (chief) to Omanhene (paramount chief). The Asantehene is the only King of Asante. Each chief has “divisional chiefs” with portfolios, similar to the national President and Ministers. The ascension to chieftaincy (except Nkosohene) is through the matrilineal system. **Festivals** are common features of all the ethnic groups in the country. In the Ashanti Region, festivals are few. The Akwasidae is a major festival held regularly at six-week intervals and nine times in a year. It is celebrated to remember past Asante leaders and heroes / heroines. If it falls on a Sunday, it is celebrated as Adaekese. **Language and ethnicity** like the other regions of the country, there are many ethnic groups in the Ashanti Region. The 2010 Population and Housing Census (PHC) shows the largest group as the Akan including Asante (74.3%), followed by the Mole-Dagbani (11.3%), Ewe (3.8%) and Gurma (2.8%). About 30.5 percent of the Akan in the country are in the Ashanti Region. The Mole-Dagbani population in the Ashanti Region is the second highest in the country after the Northern Region, their ancestral home. The populations of Mande (35.1%) and Grusi (16%) in the Ashanti Region are the highest in the country. The people of Asante speak mainly a major branch of Akan called Asante Twi. About 77.8 percent of the people in the region in 2010 are Christians of different denominations. The proportion of Muslims is 15.3 percent, the second largest, while those with no religious affiliation are 5.4 percent and 0.7 percent are traditionalists.

**Bono Region:** The Region is predominantly inhabited by the Akan ethnic group in all the Districts except Sene, where Guans constitute the largest **ethnic group**. The Mole-Dagbon group constitutes the second largest ethnic group except in Sene and Atebubu. Three out of every five Akans in the region are Brong

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(Bono). The Region upholds **chieftaincy** as an honoured and development institution. In all, there are 45 Paramount seats and traditional councils. Some owe allegiance to the Asantehene while others govern themselves. Traditionally, drumming and dancing are a medium of entertaining and unifying the population. Several traditional drumming and dancing groups are found in virtually all Districts. Following the Adinkra tradition of the Kingdom of Gyaman, visual arts are a common practice of the people of the Region. Like other Akan societies, has a **variety of festivals** the most prominent one being the Apoo Festival of Wenchi, Techiman and Nkoranza, the Yam Festival (Fo-Yawowo) of Atebubu, and Kwafie Festival of Dormaa, Nsoatre and Berekum.

A little over two-thirds are Christians. Other **religions** in the Region are Islam and adherents of African Traditional religions. One in three Christians in the Region is Pentecostal or Charismatic. Catholics are about one-fifth of the Region's population. Pru and Sene are the only Districts where adherents of African Traditional religions are relatively high. The Islamic faith is predominant in Techiman and Atebubu-Amantin.

**Eastern Region:** Consistent with past trends, the Akan (51.1%) constitute the largest **ethnic group** in the region, followed by Ewe (18.9%), Ga-Adangbe (17%) and the Guan (5.3%). The presence of diverse ethnic groups is explained by the presence of migrants who seek employment in the agricultural and other sectors of the economy of the region. Both patrilineal and matrilineal systems of kinship are found in the region because of the diverse ethnic backgrounds of the residents. The practices of inheritance are observed by the patrilineal and matrilineal systems of kinship and descent. The institution of chieftaincy is an important component of the social organization of the region as in the rest of the country. The dominant **religious group** in the Eastern Region is Christianity with more than four-fifth (84.5%) professing adherence to the Christian faith. Moslems form only 6.7 percent of the population. The adherents to traditional religion form (1.4%) and those who have no religion constitute 6.5 percent.

**Upper West Region:** The people of the Upper West Region are organized under chiefs at the lineage and settlement levels. **Chieftaincy** is a respected institution and is a major medium for community mobilization. In Sissala, the title Koro (e.g., Tumu Koro) is used for the chiefs while Na (e.g., Wa Na) is used in the other districts. There are 21 traditional paramountcies – Jirapa-Lambussie has two, Lawra three, Nadowli seven, Sissala five and Wa has four). The major ethnic groups in the region fall under the broad generic categories of the Mole Dagbon and Grusi. The major languages of the region are Dagaare, Sissali, Wale and Lobi. Inheritance is patrilineal except among the Lobi who, like the Akan in southern Ghana, have a matrilineal inheritance system. Marriage is generally polygamous, with the extended family system sharing resources. Male dominance and a relatively low status for women are common in the region.

The predominant **religions** are Christianity, Islam and traditional African religion. Traditional life and beliefs, as elsewhere in the country, are more prominent in the rural areas. Christianity (comprising Catholics, Protestants, Pentecostal/Charismatic, and other denominations) leads with 44.5 percent, followed by Islam (35.6%) and African traditional religions (13.9%). The notable **festivals** are the Damba festival in Wa, Dembenti among the Dagaabas, Kobine in Lawra and Kakube in Nandom. Festivals such as Kobine, Kakube, Zumbeti, Willa, Damba, Paragbiele, Bagre, Kala, Bongngo and Singma portray the way of life of the people of the region. For instance, the Damba, which is celebrated by the Walas, is meant to usher in the New Year. It is at this festival that the Chief is assessed as to his physical fitness to continue to rule his people. Both the Kokube festival of the people of Nandom and the Kobine of the people of Lawra are celebrated to offer thanks to God through the ancestors for blessing them with a bumper harvest.

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**Northern Region:** There are four **paramount chiefs** in the region. They are: the Ya-Na, who is the overlord of Dagbon in Yendi; the Nayiri of Mamprugu in Nalerigu; the Bimbilla Naa of Nanung in Bimbilla and the Yagbonwura of the Gonja Traditional area in Damongo. All the paramount chiefs are members of the Northern regional Chiefs and also the National House of Chiefs. The mode of ascension to the skins (thrones) of these four paramountcies is through the “gate” system (a gate being one branch of a royal family). These Paramount Chiefs, usually in consultation with the King makers and their Councils of Elders, enskin sub-chiefs who pay allegiance to them within their respective traditional areas. The eligibility or otherwise to the throne is determined by revered King makers. Upon the death of a Chief, a regent is selected from the eligible gate to act until the final funeral rites of the late Chief are performed and a new one is enskinned.

The popular **festivals** that are celebrated in the Northern region include the Bugum (fire) and Damba festivals. The Bugum festival is an annual festival celebrated by most of the ethnic groups of northern Ghana. It is celebrated in the lunar month of Bugum in Dagbani and Muharram in Arabic. Bugum is the first month of the lunar calendar of the Dagomba. The origin of the festival is shrouded in mystery as Islam and Dagbon cultures each claim to own it. There is, however, some inter-relationship between the two cultures as they have influenced each other with the passage of time. The Damba on the other hand is both a dance and a festival and is the single most important festival celebrated across the northern of Ghana by the Dagomba, Mamprusi, Gonja, Nanumba and even the Wala in the Upper West Region. Oral tradition has it that the word Damba is a Mandingo word meaning “Big Dance” but it is also strongly believed to be a Dagomba word dambahi meaning “shake oneself freely”.

The main **ethnic group** of the Northern region, the largest subgroups are the Dagomba and the Mamprusi, while the Kokomba, Basaari and Bimoba are the largest of the Gurma group. The Chokosi belong to the Akan while the Gonja and Chumburu belong to the Guan ethnic group. Mole-Dagbon is the predominant ethnic group, constituting 52.7 percent of the population. Muslims form 60.0 percent of the population the Northern region. This is followed by Christians constituting 21.0 percent. Among the Christians, the Catholics have the highest proportion (7.6%). Traditionalists constitute 16.0 percent of the population.

### 6.3.3 Economy and Employment

**Greater Accra Region:** About 55.9 percent of the population in Greater Accra is economically active and 44.1 percent is economically not active. A higher proportion of males is economically active (73.1%) than of females (68.9%). Seven of every ten economically active persons are aged between 20-44 years, with much lower proportions found in very early and late ages. Most of the economically not active are aged 5-19 years, reflecting participation in education. However, 1.3 percent of people aged less than 15 years (children) are economically active. This translates to 25,719 in absolute numbers. This has implications for schooling and the future development of the children concerned. Of the economically active population in Greater Accra, 92.2 percent are employed and 7.8 percent are unemployed. The proportion of employed males (92.6%) is slightly higher than employed females (91.8%). Among employed persons, the highest proportions are aged between 25 and 44 years. However, among unemployed persons, the highest proportions are aged between 15 and 34 years. The highest proportion of employed persons in Greater Accra is services and sales workers (35.6%). They are followed by craft and related trade workers (21.0%), workers in elementary occupations (10.7%), professionals (8.1%), plant and machine operators and assemblers (7.0%), and managers (5.2%). Other

occupational categories include skilled agricultural, forestry and fishery (4.6%), technicians and associate professionals (3.9%) and clerical and support workers (3.3%). The two leading occupational categories require neither expertise nor high educational training.

The occupations with high skill requirements such as professionals, managers, technicians and associate professionals account for relatively low proportions of employed persons. This is not peculiar to the Greater Accra Region only but to the entire country and does not augur well for the future development. Among the employed there are higher proportions of males than of females in all the occupational categories apart from clerical support, service and sales and elementary occupations. More than half (51.1%) of employed females in Greater Accra are service and sales workers. Higher proportions of those in urban localities are employed across nearly all occupational categories than those in rural localities. The clear exception is skilled agricultural, forestry and fishery which accounts for 26.4 percent of employed people in rural areas compared with 2.5 percent in urban areas.

**Western Region:** There are 2,042,645 persons in the age-group five years and older. Of these 51.6 percent are **economically active**. A breakdown by sex indicates a fairly even distribution between the sexes. For the age group under 25 years for the economically inactive, the percentage of males (26.1%) is slightly higher than that of females (25.5%). On the other hand the percentage of females is higher than that of males for age groups 25 years and older. The proportions employed in age groups 25 – 34 and 35 – 59 in urban areas are higher than the proportions for the same age groups in rural areas. For all the other age groups, the proportions are higher in rural areas. Out of the 2,042,645 persons aged five years and above in the Region, 48.8 percent are employed. The employment rates by age shows an increasing rate with age and a massive drop after age group 35 - 59. Of the total Regional population of 2,042,645 aged five years and older, 3.5 percent are unemployed. The majority of the unemployed persons (58.9%) are in urban areas.

The proportion of the unemployed as a percentage of total population in the relevant age group is 47.9 percent in urban and 25.6 percent in rural areas. Nearly 40 percent of unemployed persons are within age 15 – 24 years. There are 1,449,507 persons aged 15 years and older in the Region and 4.1 percent of them are unemployed. Over 80 percent of these are first time job seekers. About 48 percent of persons five years and older are economically not active with more females (51.1%) than males (48.9%). Within age groups, the rate for the economically not active declines with increasing age with the exception of those who are 60 years and older. In terms of the age composition of the economically not active, the proportions in the two youngest age groups (5-9 and 10-14 years) were lower in urban (49.3%) than in rural (61.5%) areas, while the reverse was true for all other age groups.

Agriculture, (including forestry and fishing) is the major industry in the Region (47.5%), accounting for the largest proportion of employed persons in all Districts except Sekondi-Takoradi metropolis. Wholesale and retail; repair of motor vehicles and motorcycles is the second largest industry in the Region. It is the most important industry in the Sekondi-Takoradi metropolis employing about 1 in 3 persons. Mining and quarrying is the second largest employer in Tarkwa Nsuaem (22.6%) and Prestea/Huni valley (18.2%). Males dominate in mining and quarrying, construction, transportation and storage, professional and technical activities and administrative and support service activities while females also dominate in wholesale and retail and accommodation and food service activities.



**Ashanti Region:** Of the population aged 5-14 years (children) in the region, about 4.7 percent are employed in 2010. An overwhelming majority (95.2%) are economically not active and 0.1 percent are unemployed. The proportion of females (4.8%) in the age group 5- 14 years who are employed is slightly higher than that of their male counterparts (4.7%). Working children are more common in rural areas (8.2%) than in urban areas (2.1%). The proportion of males (8.4%) working in rural areas is higher than that of females (8.0%) but the reverse is the situation in urban areas where females (2.4%) are more than males (1.7%). About 69.4 percent of the workforce in the region is economically active. This is a decline compared with 76.9 percent in 2000. Thus, more people in the region are economically not active in 2010 (30.6%) compared with 2000 (23.1%). The data show that males (71.4%) form a larger proportion of economically active population and also constitute the largest proportion of the economically not active population across all age groups. The 35-39, 40-44 and 45-49 years age groups have the highest proportion being economically active, ranging from 91.0 percent to 91.5 percent, while the lowest proportion is the 15-19 years age group (22.0%). There is female dominance among all age groups regarding economically active population except in the age groups 40-44, 55-59 and 60-64 years where the male proportions are slightly higher. Similarly, the economically not active population (not employed, not seeking nor available for work) shows that female proportions are higher than those of males for all age groups, ranging from 50.3 percent for the 15-19 years age group to as high as 70.7 percent among the 35-39 years age group. The high economically not active proportion among female 35-39 requires attention because these form some of the most active years of a person's life and such inactivity would be expected rather among the 70 years and older group.

More than 30 percent of employed persons aged 15 years and older are skilled agricultural, forestry and fishery workers. About one fourth (26.5%) and less than one fifth (16.9%) of the workforce are service and sales, and craft and related trades workers respectively. The proportion of the workforce in managerial (2.7%), professional (6.3%) and technicians and associate professional occupations (1.8%) is relatively low. Most managers (4.5%) are in the age group 55-59 years and the fewest are in the 20-24 age group (1.3%). Regarding professionals, the dominant age groups are 55-59 years (8.9%) and 25-29 years (8.8%) and the lowest proportion is among the 70-74 years age group (2.0%).

Agriculture, including forestry and fishing, constitutes the largest industrial sector, employing 30.9 percent of the workforce aged 15 years and older. Other major industrial sectors are wholesale and retail; repair of motor vehicles and motorcycles (25.2%), manufacturing (10.5%), other service activities (6.3%) and accommodation and food service activities (6.0%). The age groups from 25 and 44 years form the bulk of the workforce in all sectors. Their cumulative proportion is 44.2 percent in agriculture, forestry and fishing. The proportion of the workforce for real estate activities in the region is exceptionally low (4.8% and constituting 7.3%) relative to the others. The industry of employed persons (15 years and older) by locality of residence in 2010 for the region, about 59.7 percent of the workforce is employed in urban compared with 40.3 percent in rural areas. With the exception of agriculture including forestry and fishing (82.6%) and mining and quarrying (59.4%) which have a high proportion of their workforce in the rural areas, the remaining sectors have higher proportions of their workforce aged 15 years and older mostly in the urban areas. Thus, as much as 92.5 percent of real estate activities, 90.2 percent of financial and insurance activities, 85.8 percent of electricity gas stream and air conditioning supply; and 85.7 percent of professional scientific and technical activities are concentrated in the urban areas in the region. These are pulling factors in the urban areas regarding rural-urban migration especially for those seeking jobs in industries and occupations that are largely absent in the rural areas.

**Bono Region:** Using information from the Brong Ahafo Region demographic statistics, overall, 71.5 percent of the population 15 years and older indicated they were employed, while 2.9 percent were unemployed. The proportion of the economically not active population (not employed, not seeking nor available for work) were a quarter (25.6 percent) of the total population 15 years and older. There is an observed reduction in the proportions of employed (73.4 percent) and unemployed (5.8 percent) from the 2000 PHC, while an increase is observed in the proportion classified as economically not active (20.7 percent). Figures in brackets refer to the 2010 PHC. Not much difference is observed among the employed males (35.6 percent) and females (35.9 percent) and the unemployed males (1.4 percent) and females (1.9 percent). In the proportion economically not active however, there were two percent more females (13.7 percent) than males (11.6 percent) in the region. The public sector accounts for only 5.5 percent of all employed persons 15 years and older while the private formal employs only 3.5 percent. As expected, more persons in the rural areas (95.2%) were in the private informal sector compared to their urban counterparts (84.1%). Most rural dwellers (78.9%) reported that they were in the agricultural, forestry and fisheries industry compared to 37.2 percent of their urban counterparts. The next most important occupation is service and sales workers with 14.1 percent of employed persons, followed by crafts and related trade workers, 10 percent.

There has been a significant reduction from 75 percent to 62 percent in the number of self employed without employees in the region from 2000 to 2010. More females (51.3%) than males (48.7%) are self employed without employees. Contributing family workers (62.7%) and apprentice (64.2%) are also female dominated in all districts of the region. In the region as a whole, males (73.3%) are more likely than females (26.7%) to be casual workers. Six employed persons in ten are engaged in the agricultural, forestry and fishing industry; three in ten in urban areas and seven in every ten employed persons in rural areas. The wholesale and retail (68.6%), manufacturing (64.9%) and accommodation and food service activities (88.9%) industries are female dominated. The more physically intensive industries such as construction, mining and quarrying, transportation and storage are male dominated.

**Eastern Region:** On the average, a little less than 3 out of every 4 persons (73.0%) aged 15 years and older are economically active in the Eastern Region. A little more than two thirds (69%) of the population in the Eastern Region was employed while 4.1 percent were unemployed. The rest (27.3%) were not economically active. Employment rate is relatively high in the region, with an average of 94.3 percent for the Region. Differences exist among the age categories. The rate increases with age and ranges from 85.0 percent for the youth (15-24 years) to 98.0 percent for those aged 35- 59 years. The employment rate of the aged (60+ years) is higher than that of the youth. The average level of unemployment in the Eastern Region recorded at the census was 4.1 percent. Overall, economic activity rate is high in the Eastern Region. Employment rates are also relatively high, reaching 70 percent and higher in most of the districts. The levels of economic activity rate are lower for urban areas than their rural areas. The urban areas also recorded the highest rates of unemployment than the rural areas. The youth also recorded the lowest rates of economic activity as well as the highest rates of unemployment in all the districts. Sex differentials were observed with respect to the economic characteristic. Females generally recorded lower economic activity rates and higher unemployment rates than male.

**Upper West Region:** Out of the population of 409,412 aged 15 years and older in the region, 67.3 percent were employed and 2.9 percent unemployed, while 29.8 percent were not economically active. A large proportion (73.0%) of the economically not active population resided in rural areas. The proportion of the

female population (16.9%) that was economically not active in the region was higher than that of males (13.6%). The economically active population constituted 69.5 percent of the population aged 15 years and older. About 85 percent of the economically active population in the region resided in rural areas. The majority of the population 15 years and older in the region were skilled agricultural, forestry and fishery workers (72.8%). Moreover, about 10 percent were craft and related trade workers.

The proportion of the male population working as agricultural, forestry and fishery workers (77.8%) was higher than that of females (68.3%). On the other hand, the proportion of females (14.7%) engaged in craft and related work was more than double that of males (5.6%). Slightly over 50.0 percent of the employed population were self-employed without employees, with only 2 percent being self-employed with employees. Among the male employed population, 59.0 percent are self-employed without employees while the proportion is 48.7 percent for females. Only about 2 percent of employed males and females were self-employed with employees. A little more than one-third (33.9%) of the employed population were contributing family workers.

More than 70 percent of the employed population was engaged in the agriculture, forestry and fishery sector of the economy. About 9 percent was employed in the manufacturing sector while 6.1 percent was employed in the wholesale and retail and motor repairs sector. In the region as a whole, 77.0 percent of the male and 68.0 percent of the female population were employed in the agriculture, forestry and fishing sector, while the proportion of females (14.0%) employed in manufacturing was far higher than the proportion of males (3.2%). The proportion of females (7.3%) in the wholesale and retail sector was also higher than males (4.7%).

**Northern Region:** The proportion of the economically active population that is employed in rural areas is higher than in urban areas. The highly agrarian economy in rural areas might be the reason for the high proportion of persons who are employed there compared with the economically active who are employed in urban areas. The major occupation of employed persons in the region is skilled agricultural, forestry and fishery workers who constitute almost 74.0 percent, followed by craft and related workers, at 8.1 percent. Clerical support workers and service and sales workers form a minimal proportion (0.4%) each.

In the Northern region, the major industry in which employed persons work is agriculture, forestry and fishery (73.5%). Wholesale and retail; repair of motor vehicles and motorcycles forms 9.2 percent followed by manufacturing (6.2%) and accommodation and food service activities (2.4%). Agriculture, forestry and fishery remains the major industry. All five industries in addition to transportation and storage, information and communication constitute the highest proportions in the region. At regional level, 58.6 percent of the economically active population is self-employed without employees while contributing family workers constitute 28.5 percent of the employed population. The proportion of the self-employed with employees is less than 3.3 percent at regional level.

The employment sectors are in five categories: public, private formal, private informal, semi-public/parastatal and NGOs (local and international). An overwhelming proportion (94.5%) of employed persons in the region is in the private informal sector while less than 4.0 percent work in the public sector.

#### **6.3.4 Agriculture Production**

**Greater Accra Region:** Agricultural activity is not very common in Greater Accra due to its predominantly urban characteristics. Only 6.6 percent of households are agricultural households. In urban localities, only 4.4 percent of households are agricultural households compared with 31.4 percent in rural localities. Agricultural households found in the urban areas and the more urban enclaves are likely to contain individuals who work in the fishing industry and those engaged in urban agriculture, growing mainly vegetables along the major drains in Accra for the hospitality industry. The average size of agricultural households is 5.0 persons. This is higher than the general average household size in Greater Accra (3.8 persons). This is expected because agricultural household sizes are generally higher than general household sizes due to the labour requirements of agricultural activities. It could also be due to high fertility and the lack of access to clinics for contraceptive and related issues. Agricultural households are more likely to be headed by a male (69.2%) than by a female (30.8%). This situation is the same in urban and rural localities.

The highest proportion of heads of agricultural households in Greater Accra is aged 35-44 years, followed by 22.1 percent aged 45-54 years. A lower proportion of agricultural household heads in urban areas than in rural areas are in the younger or oldest age groups. About 80.2 percent of the households in agriculture in Greater Accra engage in crop farming, 35.8 percent livestock rearing, 4.5 percent tree growing and 0.5 percent fish farming. There are 121,070 farms in Greater Accra growing about 64 different crops. Based on the number of farms growing particular crops the most common crops grown are cassava, pepper, maize, tomatoes and carrots. Farming in Greater Accra is mainly by mono-cropping (49.6%), although substantial proportions of farmers also practice mixed cropping (26.2%) and inter-cropping (24.2%). Generally, chickens, goats, cattle and sheep are the four most common livestock reared in Greater Accra both by number of holdings and by total livestock.

**Western Region:** Although about half of all the 553,634 households in the Region are involved in agriculture. Over 60 percent of all households in agriculture are headed by males. This pattern is replicated in both urban and rural areas. Out of the total of 548,104 people in agriculture in the region, over 70 percent are from rural areas. The disaggregation of the population in agriculture by sex indicates that majority of the region have slightly more males than females in agriculture in both urban and rural areas. Four types of farming are considered, namely; crop, tree, livestock and fish farming. Crop farming is sub-divided by type of cropping into mixed cropping, inter cropping and mono cropping. However, crop farming is the most common involving over 90 percent of households in agriculture. Livestock rearing is also common with at least 1 in 5 households involved. Tree growing is not a common agricultural activity; less than 1% of their households are engaged in tree growing. Fish farming is a rare activity with less than 1 percent of households involved. There are no major differences in types of farming by type of locality and sex of head of household.

There are 614,106 farms in the Region growing 65 crops. The leading crops in terms of number of farms are cocoa (37.9%), cassava (23.1%), plantain (15.5%), oil palm (6.9%), cocoyam (2.9%), yam (1.9%), maize (1.9%) and coconut (1.9%). All the crops except mushrooms and sun flower are cultivated using three types of cropping (inter cropping, mono cropping, and mixed cropping). For Mushrooms and sun flower cultivation, farmers do not use inter cropping at all; for both, mono cropping is used. Other crops that also use mono cropping are carrot, cocoa, coconut, lemon grass, oil palm, rubber, shallot, sorghum and spinach. Mixed cropping is used for cocoyam, peas and yam, while inter cropping is used mainly for black pepper, tiger nut and tobacco.

There were 2,690,756 livestock in the Region. Chicken (64.0%), fish from fish farming (10.0%), goat (9.2%) and sheep (8.2%) are the four most important livestock (Table 11.7) and constitute 91.4 percent of all livestock. Apart from pigs (1.9%), ducks (1.3%) and cattle (1.2%), all other types of livestock

contribute less than one percent to the total stock. Also, apart from doves and turkey which had nearly the same numbers in both urban and rural areas, the rural area accounted for over 65 percent of all other livestock in the Region.

**Ashanti Region:** There are 412,055 **agricultural households** in the Ashanti Region, representing 16.5 percent of total agricultural households in the country. As a proportion of all households in the region, agricultural households form 36.6 percent. The average agricultural household size is 4.9 compared with an average household size of 4.2 for the region, suggesting that agricultural households are relatively larger. About 34.8 percent of agricultural households have 1-3 persons, 38.9 percent have 4-6 persons, 19.0 percent have 7- 9 and the remaining 7.3 percent have 10 persons and more. In the urban areas, 35.4 percent have 1-3 persons in a household, 38.4 percent have 4-6 persons and the remaining 26.2 percent have 7 and more persons. The average household size is 5.0. In the rural areas, 34.7 percent have 1-3 persons, 39.2 percent have 4-6 persons and the remaining 26.2 percent have 7 and more persons. The average household size is 4.9. Thus, the urban agricultural households are slightly larger than the rural agricultural households. Agricultural households in urban areas form a minority of 16.4 percent of total households, whereas in the rural areas they form a substantial majority of 71.8 percent of total households.

The distribution of **agricultural household members** who are engaged in farming activities by sex and locality indicated that, the total number of household members in agriculture is 767,942. In the region as well as in the urban and rural areas, the proportions of males and females who are in farming activities are approximately 51 percent and 49 percent, respectively. In the urban areas, the number of household members in farming activities is 214,027 or 27.9 percent of the regional total. In the urban areas, males (51.5%) are more than females (48.5%). Again, the proportion of males (51.1%) is higher than that of females (48.9%) in the rural areas.

The **heads of the agricultural households** in the region are predominantly male (67.2%). The female heads are 32.8 percent. In the urban areas, the male heads are 63.6 percent and the female heads are 36.4 percent, while in the rural areas, the male heads are relatively more than in the urban areas (68.6%) and the female heads are relatively fewer (31.4%). About 11 percent of heads are below 30 years of age, 45.5 percent are between 30 years and 50 years of age, 26.5 percent are between 50 years and 65 years of age, and the remaining 17.0 percent are 65 years and older. In urban areas, the proportion of heads aged below 30 years is 10 percent compared with 11.3 percent in rural areas. Those aged between 30 years and 50 years are 44.1 percent in urban areas, slightly less than their counterparts in rural areas who are 46.1 percent. The heads whose ages are from 50 years to 65 years are 28.3 percent in urban areas, slightly more than the 25.8 percent of those in that age group in rural areas. The proportion of heads aged 65 years and older in urban areas is 17.4 percent, also slightly more than their counterparts among heads in the rural areas who are 16.8 percent.

About 96.8 percent of the households are in **crop farming**, 25.4 percent in livestock rearing, 0.8 percent in tree growing and 0.1 percent in fish farming. In crop farming, the proportion in the Ashanti Region exceeds the national average (95.1%) and in the other farming activities the national averages (40.5% in livestock rearing, 1.1% in tree growing and 0.2% in fish farming) exceed the averages in Ashanti Region. The proportion of male-headed and of female-headed households in the region engaged in crop farming is 67.2 percent male and 32.8 percent female. For those engaged in **tree growing**, the proportions are 67.1 percent male and 32.9 percent female. The proportions of male-headed and female-headed households engaged in livestock rearing are 73.4 percent male-headed households and 26.6 percent female-headed households. In fish farming, the proportion of male-headed households is much higher than that of female-headed households, 84.2 percent against 15.8 percent.

There are 1,087,342 farms in the region, representing 16.4 percent of the 6,625,828 farms in Ghana. Among the crops, the proportion of cocoa farms is highest (22.1%), followed by cassava farms (21.6%), plantain farms (20.1%), and maize farms (11.3%). The maize farms are not many largely because their minor season coincided with the 2010 census. In the minor season, many farmers do not cultivate maize due to a high risk of crop failure as a result of inadequate and fluctuating rainfall patterns. The **major tree crops** in terms of number of farms after cocoa are oil palm and citrus, and far behind are cola, apples, mango, avocado and coffee. Among the starchy crops consumed mainly in the country, the most important is cassava, followed closely by plantain, distantly by cocoyam and yam, and far behind by banana. Maize is the most important cereal crop cultivated in the region, followed distantly by rice, millet and sorghum (only 47 farms).

Among the **vegetables** produced mainly for domestic consumption, pepper and tomato have twice as many farms as does okro and even more than garden eggs and onions. Beans are the most important pulse, followed by groundnuts; peas and soya beans are also cultivated. The number of farms for pineapple and pawpaw cultivation is relatively small, 1,188 farms and 759 farms, respectively. For most of the crops including roots, tubers, plantains, maize, millet and sorghum, mixed cropping is predominant. Intercropping is the approach used to cultivate many of the cola and shallots farms, among other crops, such as black pepper, lemon grass, and tiger nut. The crops for which mono-cropping dominate on the farms include many tree crops such as, cocoa, oil palm, citrus, mango, avocado and the forest trees. Among the other crops, mono-cropping is used in cultivating rice (44.2%) and carrots (62.2%).

The total **livestock farms** representing keepers in the region are 156,733, about 8.5 percent of the total in the country. About 71,009 or 45.3 percent of the keepers keep chicken, 40,904 or 26.1 percent keep goats and 28,172 or 18.0 percent keep sheep. The numbers and proportions of keepers who keep pigs are 3,504 or 2.2 percent, cattle are 3,376 or 2.1 percent, guinea fowls are 2,619 or 1.7 percent and ducks are 2,547 or 1.6 percent. For other livestock, the numbers of the keepers are very small and the proportions are below 1.0 percent. The total number of livestock in the region in 2010 is 3,491,423, representing 11 percent of total livestock in the country. Livestock farming is concentrated in the rural areas where 70.8 percent of the animals are kept compared to 29.2 percent in the urban areas. The important livestock in the region in terms of numbers are chickens numbering 2,235,672, or 64.0 percent of total livestock, followed by goats (478,812, or 13.7%), sheep (376,877, or 10.8%), cattle (101,862, or 2.9%) and pigs (90,271, or 2.6%). With regard to other birds, guinea fowl number 53,925 (or 1.5%), ducks (34,433, or 1.0%), doves (20,889, or 0.6%), turkeys (19,943, or 0.5 percent) and ostriches (5,456, or 0.2%). Among the other animals, rabbits number 17,996 (or 0.5%) and grasscutters are 15,546, or 0.4 percent. The number of **livestock type per farm or keeper** shows a wide range. For the ruminants, the average animals per keeper are as follows, cattle 30, pigs 26, sheep 13 and goats 12. In the birds category, the average numbers per keeper are dove 55, chicken 32, ostrich 28, guineafowl 21, turkey 18 and duck 14. For all types of livestock, the average per keeper is higher in the urban areas than in the rural areas, except for beehives and ostrich where the average numbers per keeper are higher in the rural areas. In other words, the livestock holdings are relatively larger in the urban areas than in the rural areas. Rearing of ostrich requires a large land area or farm that is not easily available in the urban areas. In the case of bees, the urban environment is not suitable partly because of stinging and the need for flowers for nectar.

**Bono Region:** More than two-thirds (68.5%) of **households** in the Region are engaged in agriculture. The average agricultural household size is 5.2. This is slightly less than the Regional average household size (5.3) is higher than that of urban agricultural households (36.2%). Rural agricultural households have relatively larger household sizes than those of urban localities. The average rural agricultural household size is 5.3 while that of the urban is 5.1. There are

654,079 household members in farming in the Region of which 52.7 percent are males. There are more males in farming than females. About 11.5 percent of the heads are below 30 years of age, 46 percent are between 30 years and 50 years of age, 26 percent between 50 years and 65 years of age, and the remaining 16.5 percent are 65 years and older. In the urban areas, the proportion of the heads aged below 30 years is 12.2 percent. The corresponding percentages for those in the age group 30-49 years are 47.7 percent, 24.5 percent for those between 50 and 65 years and 15.7 percent for those 65 years and older. The proportion of the heads aged below 30 years in the rural communities is 12.7 percent; that for those aged between 30 to 49 years is 46.2 percent and 25.4 percent for those between 50 to 64 years. The remaining 15.3 percent are for those aged 65 years or older.

The 336,097 agricultural households in the region are engaged in various farming activities. Households can be engaged in one or more activity. Crop farming is predominant among agricultural households (96.6%). The second most prominent activity is livestock rearing (34.4%). Slightly more than one thousand households are engaged in tree growing. Fish farming employs about 0.1 percent of agricultural households. As expected, the percentage of rural households is higher than that of urban households engaged in farming activities. The percentages of agricultural households are also higher than those of female-headed households for all farming activities.

**Eastern Region:** Overall, 374,257 households are engaged in agricultural activities in the region. The average household size is approximately five members (4.6). Households with 1 to 6 members constitute the majority (77.6%) of agricultural households in the Region while those with seven and more members form less than a quarter (22.4%) of all the agricultural household sizes in the Region. A total of 116,605 agricultural households have been recorded in urban areas in the Eastern Region, constituting about a third (31.2%) of the 374,257 agricultural households in the region. The pattern in urban areas also shows predominance households with 1 to 6 members. Overall, the proportion of one-member household is three times (14.5%) that of the Regional average (4.6%). The rural agricultural households in the Eastern Region constitute 68.8 percent of all agricultural households in the region.

Of the 374,257 agricultural households recorded in the Eastern Region, 69.3 percent one male and 30.7 percent are female-headed. At the Regional level, the percentage of female-headed agricultural households was higher for the urban (34%) than for the rural (29.2%) areas. The age characteristics of the urban agricultural household heads show that on the average, the majority of them are in 30- 59 years age bracket. Less than 10 percent are aged 20-29 years and 26 percent are aged 60+ years. There are 257,652 agricultural households in rural localities of the Eastern Region. This represents 68.8 percent of all the agricultural households in the region. On the average, young adults constitute a tenth (10.4%) of the rural agricultural household heads while the aged form a quarter (24.7%). The rest (64.9%) are in the 30- 59 years age category. Overall, 354,296 households in the Region are engaged in these activities. The majority of the households, 354,296 representing 68.8 percent, are involved in crop farming. A little less than a third are rearing livestock (30.2%). Very negligible percentages engage in tree growing (0.6%) and fish farming (0.2%) in the Region.

**Upper West Region:** A total of 84,931 households were engaged in agricultural activities in the region. More than 90 percent (91.4%) of agricultural households in the region are in rural areas. About 77 percent of households engaged in agriculture in urban areas are male-headed households and 80.8 percent of these households are in rural areas. Throughout the Upper West Region, an average 13.4 percent of households engaged in agriculture had a head who was 70 years and older. More than 95 percent of households engaged in agricultural activity were involved in crop farming while 63.7 percent were also engaged in livestock rearing. Only a small proportion (1.9%) was engaged in tree growing. About 81 percent of male-headed households were

engaged in crop farming compared to about 19 percent of female-headed households. About 78.3 percent of male-headed households in urban areas are engaged in various agricultural activities compared to 21.7 percent of females.

In the rural areas, except for tree growing, more than 80 percent of male-headed households are engaged in agricultural activities compared to nearly 20 percent of female-headed households. Crops cultivated by households in the Upper West Region are mainly cereals, roots and tubers and legumes. Households are either engaged in mono-cropping (single crop cultivated on farmland), mixed cropping (more than one crop on the same farmland) or crop rotation. About 84 percent of households engaged in agro-forestry (tree growing) in the region were located in rural areas. In the case of legumes, the proportion of households in the rural areas who cultivated beans and groundnuts was 97.1 percent and 93.1 percent respectively. Only 15.0 percent of households engaged in cultivating carrots lived in urban areas. Maize and millet, the two major cereal crops grown in the region, were cultivated by a high proportion of households in rural areas (93.3% and 96.2% respectively). The other crops involving the highest number of farmers were yam and rice, each cultivated by more than 95 percent of households living in rural areas. More than 93 percent of livestock holdings in the region were in rural areas. Most cattle (95.5%), goats (95.0%), chickens (93.0%) and pigs (92.2%) were in rural areas while 32.7 percent of rabbits were in urban areas. The picture was the same for the number of livestock in the region where more than 90% of most livestock were reared in rural areas.

**Northern Region:** A total of 2,503,006 households in Ghana are engaged in agriculture, of which 240,238 households are in the Northern region. This constitutes 9.6 percent of the national total. The Northern region's average agricultural household size is 8.5 compared with a national average of 5.3 persons. The Northern region has approximately 7.5 percent of the national total of urban households in agriculture. The average household size in agriculture in the urban Northern region is 8.9. Heads of households in agriculture in the Northern region are 90.7 percent male and 9.3 percent female. With respect to rural-urban distribution of sex of head of households in agriculture, 86.6 percent of urban households in agriculture are headed by males and 13.4 percent by females, while in rural areas, the percentages are even higher for male-headed (91.8%) and female-headed (8.2%) households.

Most households are in crop farming (90.5%) and livestock rearing (30.1%) while tree growing (0.9%) and fish farming (0.1%) are the least practiced agriculture activity. out of the 49,537 urban households in agriculture in the Northern region, 90.2 percent are engaged in crop farming, 1.6 percent in tree growing, 0.2 percent in fish farming and 30.1 percent in livestock rearing. It is worth noting that, some households are involved in more than one agricultural activity. For example a household could be involved in tree growing as well as livestock rearing.

There are six major holdings of livestock in the Northern region, namely. goats, chickens, sheep, cattle, guinea fowl and pigs. The rural areas of the Northern region have far more livestock holdings (86.0%) than the urban areas (14.0%). The distribution of the number of livestock also follows the same pattern, with 13.2 percent and 86.8 percent for urban and rural areas respectively.

### 6.3.5 Literacy and Education

**Greater Accra Region:** About 59.0 percent were found to have had a basic level of education, followed by 21.0 percent secondary, 7.0 percent vocational/technical/commercial, 6.0 percent tertiary, (6.0%) post-secondary diploma and 2.0 percent post-middle certificate. Among those who have ever attended school, the highest proportions have basic (52.6%), secondary (15.7%) and tertiary (5.1%) education. A higher proportion of females has never



attended school compared with males (13.4% and 6.5% respectively), whereas a higher proportion of males have higher levels of education than females. The proportion of the population that has never attended school is higher in rural localities (19.5%) compared with urban localities (9.1%). One in every ten persons (10.7%) aged 11 years and older in the Greater Accra region is not literate in any language. The proportion of non-literate females (14.7%) is more than twice that of males (6.4%). Furthermore, the proportion of non-literate people in rural localities (20.4%) is almost double that of urban localities (9.8%). More than eight in every ten people aged over 11 years in Greater Accra is literate in English and Ghanaian language (47.4%) or in English only (34.9%). This is followed by those who are literate in Ghanaian language only (4.4%), English, French and Ghanaian language (1.8%), and English and French (0.8%). There are higher proportions of literate males than literate females in all the language combinations except Ghanaian language only. Literacy in Ghanaian language only is marginally higher in rural localities than in urban localities.

**Western Region:** For both sexes, the literacy rate of the Region (76.4%) is higher than the national average (74.1%). The Regional rates for combined urban and rural (76.1%), urban (85.0%) and rural (69.5%) are all higher than the national rates of urban and rural combined (74.1%), urban (84.1%) and rural (62.8%), respectively. For urban-rural categories, the incidence of illiteracy is higher among the rural folks of the Region.

One in six primary school, (16.2%) of all persons aged six years and older, have attained or completed this Primary School. In the Region one third of all persons in the reference age have completed JHS/JSS (32.0%) in the Region. Less than one percent of persons age six years or older in the Region have post-graduate education (0.4%). Of all persons aged six and older in Region, 20.8 percent have never attended school, which is lower than the national rate (23.5%). Majority of persons in the Region have attended a Junior High or Middle school (32.7%). All the indicators except Secondary or Senior High School and a degree or higher qualification (1.1%) are better than the national rates. The proportion of males 6 years or older who have never attended school (18.3%) is lower than that of females (26.4%); its proportions are lower than the national rate.

**Ashanti Region:** About 666,091 of the population 3 years and older in the region have never been to school. For those who have never been to school, 65.4 percent are females and 34.6 percent are males. This implies that more females are illiterate, unable to read and write, than males in the region. For the 1,817,525 persons currently in school, 51.7 percent are males and 48.3 percent are females. As many as 1,902,993 persons 3 years and older or 43.4 percent, have some level of formal education in the past; with females (50.3%) slightly more than the males (49.7%). The region has an average of 15.2 per cent (10.9% of males and 19.2% of females) of the population aged 6 years and older that has never been to school compared with the national average of 23.4 per cent. There has been a drastic reduction of the population that has never been to school in the region, from 33.2 percent in 2000 to 15.2 percent in 2010. This is a positive development in formal education in the region. The population that has never attended school in rural Ashanti is nearly double (21.5%) that of the urban areas (11.2%). About 14.7 percent of this population has only primary education and 31.3 percent has JSS/JHS education. The proportion of the population in nursery is the same (3.0%) for both sexes but slightly higher for males than females in kindergarten. The proportion of females currently in primary and JSS/JHS is more than that of males in both urban and rural areas. Also, the proportion of females currently in vocational, technical and commercial schools is more than that of males in both urban and rural areas. The proportion of males is more than that of females at SSS/SHS, post-secondary diploma,

bachelor's degree and postgraduate education levels. 82.6 percent of the population 11 years and older in the region are literate. This is higher than the national proportion of 74.1 percent.

About 58 percent are literate in both English and a Ghanaian language and 10.7 percent are literate in a Ghanaian language only. Less than 1.0 percent is able to read and write in three different languages, namely, English, French and a Ghanaian language. Those who are literate in English language only constitute 13.2 per cent. A large proportion of the population (71.9%) can read and write in English language and combinations of a Ghanaian language and French and 69.2 per cent can read and write in a Ghanaian language and English or French.

**Bono Region:** About 70 percent of the population are literate. More than half are literate in both English and a Ghanaian language and a little over one-fourth are literate in only one of the two languages, English and a Ghanaian Language. Less than one percent of the population are literate in French. Persons who can speak two other languages in addition to English (e.g. English, French and a Ghanaian) language were twice as much as those who speak English and French. More than half of the population (51.7%) has attained basic education comprising of primary (26.2%), JSS/JHS (18.3%) and middle (7.2%). A little below 5 percent of the population has higher education beyond the secondary level to a first degree. One in a thousand persons in the Region has attained post-graduate education.

**Eastern Region:** On the average, a little more than a third (35.8%) of the population in the region is not literate in any of the languages. The percentages of those who are literate in English only (11.6%) or a Ghanaian language only (11.6%) are the same. In the total regional population, over a fifth (21.2%) are not literate and a little more than half (52.6%) are literate in English and Ghanaian language. The differences in the rates of illiteracy of the rural population are almost twice (26.8%) that of the urban (14.5%). As a consequence, the proportion literate in English and Ghanaian language in the urban population (60.2%) is higher than that in the rural. These differences are higher than the rates for literacy in either English language only or Ghanaian language. The proportions are literate in the combinations of English and French and English, French and Ghanaian language in the rural areas than in urban areas are lower. The differences in literacy rate between the sexes are also large. In the urban populations, less than a tenth (8.4%) of the males compared to almost a fifth (19.7%) of the females are not literate while more than two-thirds (67.9%) of the males compared with a little more than half (53.5%) of the females are literate in English and Ghanaian language. Similar differences exist in the rural populations: almost twice (34%) the proportion of the females compared with males (19.2%) are illiterates; and 55 Percent of the males compared with 38 percent of the females are literate in English and Ghanaian language. Consistently lower proportions of the females are literate in all the combinations of the languages.

**Upper West Region:** More than a half of the population (59.5%) in Upper West Region were not literate. This is more than twice as high as the national average of 25.9 percent. The data also indicate that less than one-fourth of the population were literate in English and a Ghanaian language while about 15 percent were literate in English language only. The level of literacy was higher for males (49.5%) than for females (33.5%). The data further showed that the proportion of males (51.5%) and females (66.5%) who are not literate is far higher than the national average of 19.8 percent males and 31.5 percent of females. About 14.2 percent of household heads (50-59 years) are literate. The least literate group are household heads in the age group 15-19 years (0.7%). The highest proportion of literacy among male heads is 24.6 percent for those aged 50-59 years and 5.5 percent among female household heads aged 50-59

years. Overall literacy is low and is lower among females than males. Slightly more than a third (33.5%) of the population 6 years and older had primary school education, while almost one fifth had junior high school education. The proportion with senior high education was 12.9 percent, while 4.3 percent had vocational/technical education and 2.7 percent had a bachelor's degree.

**Northern Region:** About 62.5 percent of the population are not literate in any language. About 19.2 percent are literate in English and a Ghanaian language, 16.3 percent in English only and 1.5 percent in a Ghanaian language only. Less than 1 percent can speak and write English and French (0.1%) and English, French and a Ghanaian language (0.1%). The region recorded an overall literacy rate of 4.9 percent, substantially lower than the national figure of 21.9 percent. Literacy rates in general increase by age group from 0.5 percent for the 11-19 year group to 10.7 percent for 50-59 year group and decline to 3.4 percent for 70-99 year group. With respect to differences by sex, age-specific literacy rates are higher for male heads of household (31.7%) than for female heads of the same category (12.9%).

### 6.3.6 Vulnerable Group

**Greater Accra Region:** About 2.6 percent (103,939) of the population in Greater Accra has a form of disability. Sight (42.2%) is by far the most common disability type in Greater Accra. The other types of disability include emotional (21.3%), physical (23.3%), mental (16.8%), speech (13.2%) and hearing (10.3%). Disability is highest among the population aged 65 years and above, and there are equal proportions of disabled persons in both urban and rural localities. The highest proportion of persons with disability in Greater Accra has basic level of education. One fifth of those with a disability in the region are not literate; 43.3 percent are literate in English and Ghanaian language and 29.0 percent in English only. Finally, while 43.6 percent of persons with disability are not economically active, 51.4 percent are employed and only 5.0 percent are unemployed.

**Western Region:** There are 66,016 persons with disability in the region representing 2.8 percent of the population. For the entire Region, about 40 percent of Persons with Disability (PWD) are married, 26 percent have never married, 14 percent are widowed and 10 percent are divorced. The distribution of PWD by marital status in the Districts follows this Regional pattern. Sight and physical disabilities are the two most common in the Region.

**Ashanti Region:** Persons with disability in the region form 16.9 percent of the total in the country, higher than in the other regions. As a percentage of the Ashanti Region's total population, persons with disability are 2.6 percent, slightly lower than the national proportion of 3.0 percent.

**Bono Region:** The number of persons with disability (PWDs) in the region was 54,038. This constitutes 2.3 percent of the population for the region. The male to female ratio for PWDs is eleven to twelve while urban to rural ratio is ten to thirteen.

**Eastern Region:** Overall, 3.6 percent of the total population of the Eastern Region has disability. The percentage of the total regional population with disability ranges from 1.8 percent to 6 percent. Eastern Region accounted for approximately 13 percent (94,579 out 737,743) of all the disability cases reported in the country. Disability of sight and physical disability are the most reported types in the region, constituting 42.3 percent and 29.4 percent respectively of all the cases.

**Upper West Region:** One out of every twenty-five (4.0%) persons in the Region has a form of disability. Among the age groups, it is generally high among young and older populations. In Urban-rural localities, a higher percentage of people with disability live in rural areas (3.8%) than in urban areas (3.1%). Sight problem is the common type of disability in the Region accounting for 37.5 percent of the population. A higher percentage of females (39.9%) than males (35.1%) have sight problems. About two-thirds (65.7%) of persons with disability in the region have never attended school. More than a quarter (27.4%) of persons with disability in the Region are married. More than half (54.8%) of persons with disability are employed.

**Northern Region:** The Northern region has 2.5 percent of its population to be persons living with disabilities and this is highest (31.1%) amongst persons within the 0-14 year age group. A greater proportion of the urban population (3.3%) are persons with disabilities compared to 2.7 percent of those in rural localities. The major type of disability within the region is sight disability (28.7%). More than half (51.9%) of the disabled population in the region are males. Apart from sight impairment, the next common disability type suffered by women in the region is emotional disability (24.0%). More than half (53.0%) of all persons with disability in the Northern region are married. Majority of persons with disabilities in the region (66.5%) have never attended school. The highest educational attainment for persons with disabilities in the region is basic education. The non-literate disabled population is 73.3 percent. About 13.0 percent of the disabled population are literate in English and Ghanaian language. More than 60.0 percent of the region's population of persons with disabilities are employed.

### **6.3.7 Gender Equity and Mainstreaming**

**Greater Accra, Western, Ashanti, Bono, Eastern, Upper West and Northern Regions:** Gender equality is a goal that has been accepted by governments and international organizations. It is enshrined in international agreements and commitments. There are many ongoing discussions about what equality means (and does not mean) in practice and how to achieve it. There are global patterns to inequality between women and men. For example, women tend to suffer violence at the hands of their intimate partners more often than men; women's political participation and their representation in decision-making structures fall behind men's; women and men have different economic opportunities; women are over-represented among the poor; and women and girls make up majority of people trafficked and involved in the sex trade. These issues – and others – need to be addressed in efforts to promote gender equality. Achieving greater equality between women and men will require changes at many levels, including changes in attitudes and relationships, changes in situations and legal frameworks, changes in economic institutions, and changes in political decision-making structures. **Marginalization of Women:** Generally, females are being marginalized resulting in the fact that their views not adequately captured in decision making and therefore making them vulnerable. A larger proportion of female head households exists due to migration of the male counterpart, child neglect etc. Most of the women however have no regular source of remittance. The domestic roles of women include taking care of children. Women are therefore saddled with the responsibility of providing food, clothes and in some cases the payment of school and hospital fees. The low income earned by these women, therefore inadequate to meet the needs of their households hence their disadvantaged positions economically.

## 7 Potential Impact Identification, Prediction and Evaluation

The planning of proposed project intervention points towards the impacts in the pre-construction, the construction and the post-construction phases. The prediction of impacts due to the Proposals on the natural, biological and human environments will be discussed in this section.

### 7.1 Impact Analysis

**Impact Identification and Characterization:** For each environmental and social topic, impacts will be identified and characterized. Impacts can be defined as a physical or measurable change in the environment which results from the Project. Impacts for the purposes of the ESIA are defined as set out in **Table 13.0**.

**Table 13.0** Definition of Potential Impact Types

Item number	Term	Definition
1	Beneficial / Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
2	Adverse / Negative	An impact that is considered to represent an adverse change from the baseline or introduces a new undesirable factor.
3	Direct	Impacts that arise directly from activities that form an integral part of the Project (e.g. new infrastructure).
4	Indirect	Impacts that arise indirectly from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road traffic resulting from the operation of Project).
5	Secondary	Secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements).
6	Cumulative	Impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
7	Transboundary	Impacts that extend to multiple countries but are not global in nature (e.g. air pollution extending to neighbor countries and use or pollution of international waterways).
8	Global	Impacts that, when taken together with impacts created by other human activities, can become nationally, regionally or globally significant.

### Source: Impact Assessment Data Records

Further information on some of these definitions is given below. Potential effects identified as arising from the Project are likely to cut across the topic areas identified, either intrinsically or in terms of secondary or indirect impacts.

**Cumulative Impacts:** Cumulative impacts are defined as “the combination of multiple impacts from existing projects, the Project, and/or anticipated future projects may result in significant adverse and/or beneficial impacts that would not be expected in case of a stand-alone project”. This guidance will be applied during the assessment of cumulative impacts. The Equator Principles Exhibit II also states that the Social and Environmental Assessment need to address cumulative impacts of existing projects, the Project and future projects. The ESIA considers cumulative impacts of the Project from existing and proposed developments.

**Transboundary Impacts:** Transboundary impacts are impacts that extend to multiple countries but are not global in nature. It is not anticipated that the Project will give rise to any transboundary impacts.

**Global Impacts:** The individual project impacts on climate change, ozone layer, biodiversity or similar environmental issues may not be significant, when taken together with impacts created by other human activities, they can become nationally, regionally or globally significant. An assessment of the global warming potential of the Project will be included in the ESIA document.

## 7.2 Assessment of Impacts and Identification of Significant Effects

For each of the baseline topics to be covered, the significance of potential impacts will be assessed. The determination and assessment of impacts will be based on the following criteria:

- **Magnitude:** to what extent environmental resources are going to be affected;
- **Extent:** how much area will be adversely or positively affected by the project;
- **Significance:** what value in terms of costs and benefits does society place on the resources and the different impacts affecting the resource(s); and
- **Special sensitivity:** which impacts are significant in the specific local economic, social and ecological setting.
- **Residual:** following the adoption of mitigation measures, post-mitigation impacts significance affecting the resources.

Following international best practice, significant effects will be determined by consideration of the following:

- **Sensitivity of the resource or receptor** (rated as high, medium and low) by considering the importance of the receiving environment (international, national, regional, district and local), rarity of the receiving environment, benefits or services provided by the environmental resources and perception of the resource or receptor); and
- **Severity of the impact**, measured by the importance of the consequences of change (high, medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

The following criteria are used to determine the sensitivity of the receptor/resource and severity of the impact. It should be noted that the definitions given are for guidance only, and not all the definitions will apply to all environmental/social receptors and resources being assessed. Therefore, the assessment will be further justified within each topic, referring to those in **Tables 14.0, 15.0 and 16.0** where definitions are applicable.

**Table 14.0 Determination of Receptor Sensitivity**

Rule	High	Medium	Low
Guideline Definitions	Receptor is rare, legally protected, of international or national designation.	Receptor is of regional importance. Resource may benefit the local population, but they do not rely on it for health, subsistence or livelihood. Receptor is of some cultural value.	Receptor is common or of local importance. Resource is not used or is of no value to the population now, but it will be in the future.

Source: Impact Assessment Data Records

**Table 15.0 Determination of Impact Severity**

Rule	High	Medium	Low	Very Low
Guideline Definition	Effect is transboundary or national.	Effect is regional, 25-75% of a receptor or	Effect is local, 10-25% of a receptor	Effect is too small to be measured. Less than 10% of a receptor or resource is affected. Effect is confined to construction period or is intermittent.

	Effect exceeds a national or international standard. Greater than 75% of receptor or resource is affected. Effect is long-term (greater than 10 yrs.) permanent and irreversible.	resource is affected. Effect is medium term (2-10 yrs) and reversible.	or resource is affected. Effect is short term (less than 2 yrs) and reversible.	
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Source: Impact Assessment Data Records

**Table 16.0** **Determination of Significance Criteria**

Effect	Receptor/Resource Sensitivity	Receptor/Resource Sensitivity	Receptor/Resource Sensitivity
Impact Severity	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Moderate	Minor	Minor
Very Low	Minor	Insignificant	Insignificant
No Change	None	None	None

Source: Impact Assessment Data Records

**Likelihood or Consequence:** Once a rating is determined for magnitude and likelihood, significance rating matrix for positive and negative impacts can be used to determine the impact significance. See **Table 19.0** for likelihood or consequence.

**Table 17.0** **Significance Rating Matrix Positive and Negative Impacts**

LIKELIHOOD	Unlikely	Likely	Definite
Negligible	Negligible	Negligible	Minor
Low	Negligible	Minor	Minor

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Medium	Minor	Moderate	Moderate
High	Moderate	Major	Major

Source: Impact Assessment Data Records

**Cumulative Effects:** The Proposal is being developed in the influence areas of the project boundary areas, so there is potential for cumulative effects for both construction and operation stages of the program. The impacts to be assessed are also largely qualitative in nature rather than quantitative, due to the lack of raw data from other developments at this stage. It is acknowledged that there is some uncertainty associated with cumulative effects assessment. Therefore, it does ensure that cumulative effects are captured as part of the ESIA process. A cumulative impact assessment will be undertaken and covers two aspects: **Total effects** – this is the total effect of the Project with all the other on-going developments. This approach ensures that the total impact of the development of all the projects is accounted for. **Additional effects** – this is the contribution the Project alone will make to the total effects above.

**Mitigation and Enhancement Measures:** For any significant negative impacts identified from the Project, mitigation measures will be proposed to ensure compliance with applicable Ghanaian acts and regulations, and meet the requirements of international standards, including [the AfDB OS](#). Mitigation is considered under the following classifications:

- **Avoidance** – avoiding environmental damage at source through design;
- **Minimize** – lessening the severity of an impact which cannot be avoided entirely;
- **Mitigation and compensation** – acknowledge that some negative consequences will stem from development, but provides means by which the conditions can be compensated for or improved; and
- **Enhancement** – increasing the effects of positive impacts.

Significant environmental and social impacts issues to be addressed during the pre-construction, construction and post-construction phases have been outlined under this section. The identified potential environmental and social impacts to evaluate include the following:

### 7.3 Pre- Construction Phase Impacts

The environmental and social effects before construction will cover the following:

#### 7.3.1 Survey Works

Kwaku Anim Boateng (Individual Consultant)

Professional surveyors will be engaged to survey the proposed sites for the sitting of drainage systems, building sand facilities, engineering system, security/electric and IT installations. During the survey process, a de-bushed line will be opened along the designated sites. Coordinates of the terrain to create profiles of the sites will be taken. The profile lines will be approved by the Project Engineers and Architects. Completion of the surveying and designing leads to the pillaring of the sites for excavation works to begin. Such works involve the digging of the foundations and trenching using excavation equipment or manual labour. Here, precaution will be exercised in the likely presence of cultural heritage resource's chance find, where chance find management measures will be triggered by the contractors chance find management plan document. In all cases, the accompanying environmental and social impacts will be insignificant or minimal, where are no chance finds. No mitigation measures will be required.

### **7.3.2 Work Camps/Site Offices Organization**

The creation of work camps/site offices (the work camps/site offices will not be living quarters or residential accommodation for workers or staff, both foreign and local), mobilization of machinery and equipment as well as aggregate materials handling is very likely to serve as channels for the transmission of occupational health and safety hazards. These hazards will result in injuries from handling, lifting and carrying, contact with mobile machinery, impacts from moving or falling from height, exposure to fire, explosion and harmful substances. The construction labour unit will be exposed to these hazards. The extent of injury will depend upon the severity of the hazard. Generally, the creation of work camps/site offices will be within the confines of the project institutions demarcated boundaries without any cause for land acquisitions with resultant physical and economic displacement of project-affected-populations (PAPs). The impact will be significant and moderate. Mitigation measures will be required.

### **7.3.3 Materials Mobilization and Transportation**

The transfer of large quantities of construction materials – fine aggregates, gravels, stones – by construction access roads to the project sites will disturb the normal flow of traffic on the project roads. But this impact will be short, negligible and localized between peak periods of traffic flow (morning peak period: 6:00 am to 8:00am; evening peak period: 4:00pm – 6:00pm; market days commercial activities). In all cases, the materials and equipment will be transported to the sites during the minimum peak vehicular periods. The impacts will be insignificant or negligible.

### **7.3.4 Removal of Trees and Vegetation**

Kwaku Anim Boateng (Individual Consultant)

Where the siting of the project will lead to the extensive cutting and removal of trees and vegetation cover, this will be at the following locations: **(i) Takoradi, GNA office new project site which is characterised by sloping landform from north to south at high gradient; removal of vegetation colony will lead to cutting of large and medium size trees and the displacement of thicketed coastal savannah vegetation (ii) Nsoatre, Vocational/Technical Institute five sites selection options will lead to the cutting of small, medium and large size trees forming various shades of windbreak forested canopy (iii) Nandom, Vocational/Technical Institute proposed site vegetation clearance will lead to the cutting of large and medium size trees which form windbreak buffer zone.** Case by case basis felling of trees will be considered for those trees, which are found at the very fringes of the site boundaries and at borrow areas. The clearing of vegetation at the project sites will de-vegetate the project environment within the project boundaries. There will be loss of flora species which will result in the loss of fauna habitat and natural resources. As mentioned severally, if rehabilitation and construction will happen within existing facilities then there may be no land acquisition/land take. However, there could be displacement (physical or economic) of people for which the project will be required to support their relocation. On the other hand, if land will be acquired outside the existing facilities then land may have to be acquired via “willing-buyer-willing-seller arrangement or as a “donation.” In all cases, evidence of acquisition is imminent for lands outside the project footprints.

The very removal of top soil will give rise to soil disturbance and instability episodes, most especially, at the locations where the (landform declines sharply southwards, eastwards and westwards). Moreover, such episodes will easily lead to soil erosion and sedimentation of low – lying areas during the rainy season. The impact will be significant and moderate. Mitigation measures will be required.

### **7.3.5 Demolition of Structures**

Where the siting of the proposed project facilities will lead to the demolition of various structures, this will be at the following locations: **(i) Takoradi, GNA office new project site offered by RCC will require demolition of old, dilapidated and disused wooden top and sandcrete base structure (formerly used by pre-mix fuel agency in Sekondi-Takoradi RCC office enclave) (ii) Otaakrom, Vocational/Technical Institute proposed two new site options will lead to demolition of old, dilapidated and disused school toilet facility (KVIP) and uncompleted, abandoned and neglected sandcrete frontage showroom to the left of the school entrance gate (iii) Nandom, Vocational/Technical Institute proposed site will lead to the demolition of old, disused, abandoned and dilapidated pigsty and school urinal.** All salvageable materials will be saved from destruction for reuse and recycle to divert demolition waste from landfill sites. Demolition of these structures could potentially result in exposure and mobilization of asbestos-containing material and/or lead-based paint contaminants, where asbestos and lead-based paint containing materials exist. Strategies will be adopted to reuse sandcrete blocks, concrete materials, wooden products, roofing sheets, etc., so that impact of disposal of these materials could be minimized. Hazardous materials handling and management will be undertaken to mitigate

their negative impacts on the environment. Impact from demolition is considered moderately to minimally significant. Mitigation measures are required.

### **7.3.6 Occupational Health and Safety**

All the processes involved in effecting the preconstruction phase activities are characterized by some degree of occupational health and safety implications. The extent, measure and duration of those implications will depend on the levels of severity and the cumulative effects, imposed by those hazards. Institution of maximum precautionary measures will offset any perceived impact at this phase of the program. Impacts will be negligible and insignificant.

### **7.3.7 Air Pollution**

The pre-construction stage activities will include site clearance, shifting of utilities (where applicable), removal of trees present in the corridor of impact, transportation of construction workforce and material, construction of work camp/site office, construction of stock yard/staging area, installation of construction plants and construction of proposed buildings. Dust generation during such activities will be the predominant polluting activity during pre-construction stage. Most especially when pre-construction tasks are performed in the dry season. The impacts due to the pre-construction activities are temporary and location specific with limited impacts. Therefore, the impacts at the pre-construction phase are temporary, localized and fugitive in nature.

## **7.4 Construction Phase Impacts**

### **7.4.1 Positive Impacts**

#### **7.4.1.1 Employment**

The design, feasibility and planning phase has provided employment for both local and foreign consultants. Although many of these are non-resident of project areas, it results in overall economic improvement in the lives of people. The construction phase is bound to provide more employment avenues to local people. Contract provisions for main constructions require 50% of the labour force to be drawn from the local population with particular emphasis on women. Since construction is estimated to take about 3 years, this phase will provide short-term job opportunities for local people within the project enclave. Districts within the project area have specified conditions that require labour on such

projects to be sourced within their boundaries. This should apply to this project specifically for non-skilled positions. This is an impact of minor significance.

#### **7.4.1.2 Sourcing of Building and Construction Materials**

Building construction will require considerable volumes of construction materials including gravel, aggregate (stone), sand and cement etc. Procurement of these resources will provide income to suppliers and owners of land where quarry sites will be located. However, much as this is a positive impact, procurement procedures for such big contracts do not favour local companies or even individuals in the project areas. Contractors may choose to source raw materials directly from source. Income will therefore accrue to non-resident entities with little effect on affected communities. This is a positive but short-term and reversible impact and hence of moderate significance.

#### **7.4.1.3 Improve Roadside Trading**

Projects internal road construction will promote roadside businesses mostly owned by women, such as vending food to construction workers. There will lead to upsurge of income and economic activity within the project area. Although short-term and reversible, this is a positive impact to women (and their households) who would be involved. This will be an impact of moderate significance

#### **7.4.1.4 Income to Landlords.**

Landlords will obtain revenue from renting their houses to construction workers who seek accommodation within project and its environs. This is a positive but short term and reversible benefit ceasing with project completion or whenever the project is completed. Impact duration will be short-term for each site used as workers camp or equipment yard and likelihood of occurring is high but benefit will be to a few landowners hence minor impact significance

#### **7.4.1.5 Public Safety and Security**

Third party or private security company will be engaged to provide security, safety and protection of life and properties of the project throughout both construction and operation phases of the project life cycle. The Security Services Unit (SSU) of the contractor(s) will not be armed but will be expected to provide safety, security, law enforcement, crime prevention and emergency response services on the project 24 hours a day, seven days week. The SSU personnel will provide public safety services during large scale sporting and political events; assist project emergency

preparedness efforts; and provide training and presentations on a variety of topics including: crime prevention, personal security and behavioural threat assessment. The SSU will work closely and cooperatively with the MMDA Divisional Unit of Ghana Police Service on issues of mutual concern by sharing information and resources as needed. Any arrests or prosecuting efforts stemming from activities occurring on project will be submitted to the MMDA Divisional Unit of Ghana Police Service which possesses the legal authority to prosecute violations of the law. The SSU will have staff strength of about 30 personnel.

## **7.4.2 Negative Impacts**

### **7.4.2.1 Air Quality Deterioration**

Short term air quality impacts from fugitive dust may be expected during excavation, demolition and the early phases of construction of the Project. Major sources of dust emissions from construction activities have been identified to include:

- ❖ Delivery, unloading, storage and use of construction materials, notably, aggregates and earth.
- ❖ Movement of construction vehicles on untarred internal site roads.
- ❖ Dust generation from the access roads to the soil borrow-areas, aggregate quarries construction plants and construction camp sites.
- ❖ Operation of the construction plants such as hot mix plants and concrete batching plants.
- ❖ Asphalt/ bitumen odour during paving of asphalt / bitumen layers.
- ❖ Exhaust emissions from construction vehicles, machinery and equipment containing concentrations of carbon monoxide, nitrogen oxide, hydrocarbons, specific particulate matter and lead.
- ❖ Deep to moderate excavations, filling and compaction of foundations, movement of heavy duty construction truck to and from the project site.

Other source of dust includes wind induced emissions from exposed surfaces and stockpile of construction material and surface cleaning before application of bitumen/asphalt on internal site roads. All neighbourhood residences, which are very close to the project site will be exposed to degraded air quality, affecting their aesthetic amenities.

Construction workers and visitors within the project zone will be exposed to degenerated air quality which could be life threatening. Respiratory and bronchial infections or disease will be common in the neighbourhood community. And residents who already have respiratory and bronchial problems are particularly vulnerable. It is worthy of note that, high levels of pollutant emissions will give rise to the following concerns:

- ❖ Eye irritation, coughing and sneezing by the project residents close to the project site(s).
- ❖ Defoliation of flora species through the plugging of flora leaves.
- ❖ Defacing and tainting of aesthetic forms of building structures within the project corridor of impactation.

Generally, the shortness, in terms of duration, of the degradation of the air quality will not cause any significant forms of human health hazards. In the dry season, however, dust nuisance will be pronounced but will subside in the rainy season. The construction period dust impacts will be non-beneficial and minor in significance. Mitigation measures are required.

#### **7.4.2.2 Noise and Vibration Nuisance**

Noise and vibration nuisance will occur from vehicular movement, drilling and concrete mixing. Moreover, there will be noise and vibration pollution from loading of construction spoil, tipping of raw materials (gravel, sand and aggregate) and soil compacting machines. Noise pollution levels will depend on the intensity of these noises coming from all the sources. Noise levels of excessive intensity will become a nuisance and pose serious health hazards to students, lecturers, staff and visitors within the Project impactation zone. Moreover, noise pollution will impact construction workers, buildings, fauna, burrowing wildlife (e.g. snake), other nocturnal fauna and break the synchrony of natural ecosystem. Therefore, effects of noise pollution from all general sources to reception zones are directly negative, minor, significant, temporary and of short duration. Noise generation from the construction period will also be intermittent.

#### **7.4.2.3 Borrow Pits Generation**

Existing mines for borrow areas and quarry sites will be identified for sand and stone aggregates. The materials will be used exclusively for the proposed project. These will be commercial ventures operated by private third-party companies, which the contractor(s) will purchase the sand and stones materials from. The ESIA Report will capture the mitigation, management and monitoring measures for borrow areas in accordance with local laws. Generally, the generation and development of borrow pits will start with the removal of vegetation cover. This activity will lead to the loss of production land, loss of vegetation cover, soil erosion induction, water courses siltation and loss of aesthetic value (visual impairment of landscape quality). Use of heavy construction machinery at borrow areas during the Project works, will lead to entrenched soil disturbance. When these activities are poorly supervised and uncontrolled, the extent soil disturbance and vegetation cover removal will be very devastating. Furthermore, any precipitation event will initiate soil erosion with destructive dimension. Such destruction will affect surface water resources adversely. Moreover, all borrow pits remaining open and operational, during such rainy season, will all collect water. Such waterlogged

receptacles of borrow pits, may become a breeding ground for mosquitoes and other waterborne disease vectors. Also, the potential for land acquisition conflicts for selected borrow areas could result in social upheaval or disturbance of the construction phase. The Contractor(s) will locate borrow areas which will be approved by the Resident Engineer before material mining takes place. Impacts from borrow pits generation are significant and moderate to major. Mitigation measures are required.

#### **7.4.2.4 Disruption of Natural Ecosystem**

Generally, the basic construction activities will involve these logical steps: vegetation cover removal for soil materials; excavation of soil materials and transportation of soil materials. Large amount of excavation, earth movement and clearing of vegetation cover, during the construction phase is necessary. With low-lying locations for the Proposal, soil erosion and gulling may occur, particularly with their sloping topography. These will also result in the loss of topsoil, diminishing soil fertility and ultimately, siltation of waterways and wetlands in the rainy season.

De-vegetation events at the project sites will introduce removal of top soil and destabilization of soil stability structures. The exposed soil character becomes disturbed by both actions of wind and rain. These incidents will lead to soil erosion and sedimentation of low-lying zones of the project sites. Moreover, excavation works will let loose, the surface soils at the sites. Without any protective cover of vegetation, the loosened soils will be exposed to severe storm run offs from precipitation events.

Excavation works with its resultant erosion effects will disrupt the integrity of existing ecology and natural ecosystem and biodiversity. Vegetation clearing will impact shelter, feeding and/ or breeding and / or physical destruction and severing of habitat zones within the project sites. This however is a short term impact and insignificant

#### **7.4.2.5 Surface and Groundwater Pollution**

Eroded sediments into surface water facilities or resources will deteriorate surface water quality, including domestic waste from construction camps and site offices. Erosion effects will transform groundcover and topography, which will result in changes in surfaces water drainage patterns, including infiltration and storage of storm water. Runoff from material stockpiles will also increase sediment delivery and contaminant loading of surface water systems. The direct impact from soil erosion and siltation are moderate to major, significant and negative. Mitigation measures are required

#### **7.4.2.6 Waste Generation and Disposal**

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Construction spoil or waste will be produced in the form of excavated soils, pieces of discarded wood and sandcrete blocks, paper, nails, glass or other used building materials. Construction workers will also produce solid and liquid wastes. Waste or spoil generation will also be in the form of spilled or discarded oil or lubricants. In all cases, the direct impact on the aesthetic values of the project landscape will be negative, moderate to major, significant and non-beneficial, with human hazard implications in the long-term through disease spread and infections. Mitigation measures are required

#### **7.4.2.7 Concrete Batch Plant Waste**

The erection of foundations and pillars will lead to the development of concrete floors foundation and pillars. The strength of the concrete floors and pillars will depend on the quality of concrete mix. And the actual composition of the concrete will also depend on the sizes of aggregates (gravel, sand, cement and additives). The project sites will incorporate concrete batching plants area, where necessary. Any leftovers of contaminated cement materials will have to be disposed of. The impact from waste disposal will be negative, minor and insignificant.

#### **7.4.2.8 Biodiversity Loss (Fauna and Flora)**

The selective and extensive removal of trees, shrubs, brush-land and thicketed foliage at locations for the Proposal will devastate existing ecological integrity, natural ecosystem and biodiversity disintegration. Vegetation cover clearing will impact flora species, including medicinal plants. Feeding and / or physical destruction and decimation of fauna habitat and food resources will ensue through impaction. In all cases, the removal of vegetation colony is non-beneficial, negative. But the direct impact will be significantly moderate. Mitigation measures will be required

#### **7.4.2.9 Traffic Nuisance**

The conveyance of large quantities of construction materials to the project sites(s) will not create traffic blockage, congestion and nuisance on accessible internal and external roads, except during peak period traffic flows in the morning and evening. Resultant traffic hazards and accidents at such times will be eminent.

Moreover, more pedestrian – vehicular conflicts, vehicular – vehicular conflicts with greater and dangerous consequences will also occur project roads and at sensitive areas as crosswalks within the project catchment zone. Admittedly, neighbourhood students riding bicycles to schools, face the risks of accidents.

Furthermore, any mechanical breakdown of construction trucks or vehicles in the construction fleet will pose as a potential for serious accident hazard, on any of the neighbourhood roadways. Lastly, public safety will be compromised if open trenches are left unprotected within the project area. Acceptably, in all cases traffic nuisance impact will be negative, significant and moderate in the construction phase. Mitigation measures will be required.

#### **7.4.2.10 Public, Occupational Health and Safety**

Construction workers and visitors to the project zone will be exposed to noise, dust and construction vehicular movements. These impacts will lead to work related accidents and hazards resulting in severe injuries and death in extreme cases. Moreover, public safety will be compromised in the inter-locking incidence of construction workers and other pedestrian vehicular conflicts within the project envelope. Construction activities have the potential to transmit disease like malaria, diarrhoea and dysentery exacerbated by inadequate health and safety practices. The population in the proximity of the construction area will be exposed to biophysical health risk factors (chemicals, construction materials, solid waste, wastewater, vector transmitted diseases, etc). Other risk factors will result from negative human behaviour (STDs, Covid-19/HIV/ AID). Lack of first aid and health care facilities, water and sanitation facilities will affect construction workers personal health and hygiene delivery. The impacts are major, significant and negative. Mitigation measures are required.

#### **7.4.2.11 Erosion and Sedimentation**

One of the most important issues of socio-environmental impacts in the Project is soil erosion. Erosion is a function of the stage of construction and the physical environmental condition (geology, climate, soil, topography). Erosion with building construction is often associated with unstable geologic conditions.

#### **7.4.2.12 Visual Impairment and Intrusion**

The proposal will effect a visual change to the existing landscape character. Construction material pile up within the project zone of influence as well as broken down construction machinery, vehicles and equipment, undisposed waste on site, including dust pollution, will reduce the aesthetic conditions of the project environment. Moreover, the erection of the project structures will pose an obtrusive hindrance to the visual quality of the project landscape. Sight distance will be impaired by the imposition of the project structures in the line of vision. The impact will be moderate and significant. Mitigation measures necessary.

#### **7.4.2.13 Fire Prevention and Control**

The key features of the proposed Project designs are expected to meet all fire safety provision at the construction certification stage. Areas prone to spontaneous fire combustion activities will include: fuel storage, mechanical workshop with welding and steel cutting facilities, smoke from burning garbage/ refuse, cigarette smoking sections, carpentry shops, and asphalt / bitumen production plants. Smoking will be prohibited at the construction stage. Potential impacts from spontaneous fire combustion are significant, direct, moderate and non-beneficial. Mitigation measures are required.

#### **7.4.2.14 Influx Population Surge**

The influx of imported labour into the project zone for the program implementation, most especially at the construction stage, will cause an increase in population change within the project corridor. Moreover, effective demand on the provision of non-farm service will usher in higher numbers of itinerant service providers, businessmen and women, traders, sex workers and other service providers into the peri-urban centres within the project zone. This addition will swell the local populations within the larger project catchment areas outside the immediate periphery of the project corridor. The sociological implication of such population changes will upset the prevailing social harmony, causing adverse social disequilibrium and disharmony among the foreign and local residents. Such conflicts will be negative, significant, minor to moderate and non-beneficial. Mitigation measures will be required.

#### **7.4.2.15 Water and Energy Consumption**

At the construction stage, major sources of water consumption will come from concrete mixing at the concrete batch plants, flushing of toilets or use of potty toilet facilities, drinking, washing and bathing, washing of vehicles, machinery, equipment and plant. But the key sources of energy consumption will emanate from electric power demands for lighting, air conditioning, refrigerator use, welding machines radio communications, computers, printers, mobile phone charging, diesel fuel demands for construction vehicles running, standby generators, etc. Water and Energy consumption at the construction phase will be controlled through management measure expected to be instituted by the Contractor(s), especially in Takoradi, Kumasi, Nandom and Tamale where these areas face severe water shortages. The potential impacts in water and energy consumption at the construction phase will be significant, minor to medium and manageable.

#### **7.4.2.16 Hazardous Solid Waste Stream**

The inventory of hazardous material at the construction and operational periods are shown in **Table 18.0**. All hazardous waste stream materials will be collected and stored in temporary hazardous waste storage areas in drums and containers. There should be great concern for the management of waste from labs researching into and manufacturing vaccines for pandemics. Mitigation measures are called for. Certainly, these labs should develop biosafety protocols or biodiversity management plans to be reviewed and approved by the EPA. The direct impact from mishandling of hazardous solid waste stream will be significant, moderate and non-beneficial. Mitigation measures will be necessary.

**Table 18.0 Profile of Hazardous Solid Waste Stream Inventory**

No	Project Phasing	Hazardous Materials Generation
1	Construction	<ul style="list-style-type: none"> <li>• Floor Sweepings from Material storage yard.</li> <li>• Oil Sludge.</li> <li>• Contaminated Soils from Spills.</li> <li>• Lubricating Oil.</li> <li>• Waste Batteries.</li> <li>• Air, Fuel, Oil Filters</li> <li>• Solvent rags from Maintenance</li> <li>• Empty Drums of Solvents/ Additives.</li> <li>• Empty Paint / Solvent Cans.</li> <li>• Lubricant Boxes/ Tubes.</li> <li>• Fluorescent Lamps / Tubes.</li> <li>• Wasted Printers Cartridges.</li> <li>• Electrical and Mechanical Components.</li> <li>• Accumulators of Communication Devices</li> <li>• Electronic Equipment (e-waste)</li> </ul>
2	Operation	<ul style="list-style-type: none"> <li>• Fluorescent Lamps/ Tubes</li> <li>• Wasted Printers Cartridges.</li> <li>• Electronic Equipment (e-waste).</li> <li>• Broken Bunsen / Plastic Tubing's for LPG Lines at the Laboratories.</li> </ul>

		<ul style="list-style-type: none"> <li>• Broken Distillation Columns</li> <li>• Broken Conical Jars, Flask, Beakers, Pipettes, Cylindrical Jars, etc.</li> <li>• Broken Bottles of Solid Chemical Substances</li> <li>• Spilled Solid Chemical Compounds or substances.</li> </ul>
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Source: Individual Consultant Data Records.

#### 7.4.2.17 Hazardous Liquid Waste Stream

The profile of hazardous liquid waste stream to be generated at the construction and operation phases is shown in **Table 19.0**.

**Table 19.0** Profile of Hazardous Liquid Waste Stream Inventory

No	Project Phasing	Hazardous Liquid Generation
1	Construction	<ul style="list-style-type: none"> <li>• Effluent from Vehicles Washing Bays</li> <li>• Oils, Grease, Battery Fluids (acids), radiator Fluids, gear box fluids, automatic transmission fluids, etc.</li> <li>• Fuel Storage Tanks (above and below ground) Leaks, Fuel Dispensing Machines Leakages.</li> </ul>
2	Operation	<ul style="list-style-type: none"> <li>• Spent Chemicals from laboratories (metal oxides and carbonates, organic acids, solvents and acids, photographic chemicals (e.g silver initiates), potassium nitrate, chlorinating agents (calcium hypochlorite used in swimming pool and water purification), mordents (e.g. potassium dichromate.</li> <li>• Gas leakages from LPG tubing/plastic lines in the laboratory.</li> <li>• Spilled liquid chemical substances on laboratory floors.</li> </ul>

Source: Individual Consultant Data Records:

All hazardous liquid waste stream materials, spillage or spent will be collected and disposed of as regulated by Ghana EPA and international performance standards to protect and secure the environmental and social integrity of the campus landscape. Potential impacts emanating from

hazardous liquid waste streams at the construction phase will be direct, significant moderate and non-beneficial. Mitigation measure will be necessary.

## **7.5 Operation Phase**

### **7.5.1 Positive Impacts**

#### **7.5.1.1 Human Resource Development**

There are five (5) basic components of human resource development - education, health and nutrition, environment, political and economic freedom. These components are interdependent, but education is the basis for the other four (4). Education is an essential factor in the improvement of high quality environment, for expanding and improving labour pools, and for sustaining political and economic responsibility. Improved education and literacy levels are necessary in opening access to greater opportunities for improvement in the individuals living conditions. Moreover, the project aims to contribute to Ghana's post-COVID-19 recovery in the health sector through climate-resilient infrastructure improvements and skills development in higher education institutions and the restoration of livelihoods and income and employment opportunities through entrepreneurship and jobs among youth and women.

Some of the significant benefits to be realized from the project include: improved quality of learning in the Project through improved teaching quality; strengthen teachers / students development; enhance good teaching, research and learning; creating a "student teacher friendly " enabling learning, teaching and research environment with particular attention to the academic and sustainability foot printing environment; removal of levels of serious deprivation and lowest literacy achievement; and recruitment of brilliant teaching members and students to enhance teaching staff and student levels.

#### **7.5.1.2 Expansion of Educational Infrastructure**

The expansion of educational infrastructure will lead to the realization of the following benefits: upgrading of physical facilities through expansion; supporting the goal of providing career-focused education in today's marketplace due to global competition and the rapid pace of change and innovation; providing well planned, good value educational infrastructure that meets the needs to users and contributes to better teaching, learning and research; removal of overcrowding in instructional spaces due to inadequate provision of educational infrastructure; improve the total number of instructional space availability and space occupancy ratios, including adequate seating and uniting places to meet

national and international rates; enhance the use of modern student focused support services and state-of – the - art educational technology; increasing teaching, researching and learning effectiveness by employing interactive, student – cantered strategies that engage students in the learning process and provide them with the opportunity to reflect on their own learning as they pursue their academic goals

### **7.5.1.3 Employment**

The contractor(s) will be expected to create job opening and employ a sizeable number of the project population on the periphery of the campus for various aspects of skilled and unskilled activities. Both skilled and unskilled job or will be involved in the operation of the university. Most of the unemployed and under-employed youth in the campus neighbourhood communities will be gainfully employed during as staff, teaching assistants, lecturers, sanitary workers etc.

### **7.5.1.4 Rural and Peri-Urban Woman**

Additional educational infrastructure and growth in students, teachers and staff populations will enhance the free movement of student population, goods and services and visitors into the project enclave. Trading activities, such as food vending, sales of sachet water, printing and photocopying services are expected to increase within the project enclave. Provision of goods and services will enhance trading, leading to raised profit. Profit margins which in turn will contribute to poverty reduction of the project zone and neighbouring project communities. Beneficial impact on the project zone local economies will be positive and significant.

## **7.5.2 Negative Impacts**

### **7.5.2.1 Influx Population surge**

At the operation phase, construction activities will come to a stop. All imported labour units will leave the project catchment zone. Hawking activities and other service provisions will cease. Depopulation of the project catchment areas will ensure, thus depleting the temporary increase or surge in population change during the construction phase. However, the original figures in the local population before the commencement of the program will indirectly be increased, not quite substantially, by the presence of illegitimate children left behind by the imported labour crew. This scenario will cause insignificant changes in the population, but will, however, raise a social issue of tremendous social intervention concerns. Impact will be minor and insignificant

### **7.5.2.2 Green House Gas Emission**

At the operation phase, activities of the construction truck fleet will cease. The concomitant increase in exhaust fumes and emissions from construction traffic and other machinery that run on fuel will abate. Levels of GHG emissions from construction traffic will abate. Levels of GHG emissions will be expected to decrease with significant decrease in associated construction traffic and machinery abatement. However, operational traffic flow will also increase due to increase in students, faculty and staff numbers on campus who will swell transportation vehicular movement patronage. The expected GHG emissions at the operation phase will have to be determined scientifically by field monitoring to establish GHG footprint record at the operation stage.

### **7.5.2.3 Hazardous Solid Waste**

At the operation phase, the hazardous solid waste stream to be generated will be made up to fluorescent lamps/tubes, wasted printers' cartridges, electronic equipment (e-waste), broken Bunsen burners, damaged rubber tubing at the laboratory, broken distillation columns, broken conical, cylindrical jars, flasks, pipettes, etc. All laboratory chemicals in solid state / form will be treated as hazardous solid waste stream and appropriate precautions will be taken as such in the disposal. There should be great concern for the management of waste from laboratories researching and manufacturing vaccines for pandemics. Mitigation measures are called for. Certainly, these laboratories should develop biosafety protocols to be reviewed and approved by the Ghana EPA. Impact potential associated with the operational hazardous solid waste stream will be direct, significant, moderate to major and non-beneficial. Mitigation measures are needed.

### **7.5.2.4 Fire Prevention and Control**

Provision of fire suppression equipment will be made available at the operational phase, to control spontaneous combustion of fire outbreaks. Operationalization of automatic fire alarm systems, smoke detectors, smoke alarms, fire extinguishers, fire sprinkler systems, evacuation plans will be effected at the operation stage of the Projects. Fire suppression training will be part of the knowledge base of the campus students, faculty and staff. The techniques, means and methods of preventing spontaneous combustion will be utilized. Sites fires will be prevented by effective sites management, especially in the laboratories. Aside drills, assembly places should be constructed. Impacts will be significant, direct and moderate to major. Mitigation measures are required.

### **7.5.2.5 Water and Energy Consumption**



The water and energy expenditure pattern at the operation phase will be expected to increase, because of the expected increase in student, faculty and staff populations. Demands for energy in lighting, laboratory equipment and machinery running, refrigeration, air conditioning and other facilities running will be higher than current baseline provisions and demands. Similarly, water consumption at the operational phase will go up beyond the baseline demands on record, because of increased population expectancy in students, faculty and staff numbers. In all cases, the potential impacts will be significant, minor and controllable with mitigation measure.

## 7.6 Summary of Social and Environmental Impacts

**Table 20.0** presents the general environmental and socio-cultural impacts expected due to the proposed project. Impacts have been assessed based on the information collected from the screening and scoping of socio-environmental attributes at feasibility stage. There will be socio-economic impacts as well due to disruptions on the social and economic in interaction of project communities.

**Table 20.0 Overview of Potential Impacts Due to the Proposed Project**

#	Impact	Negative Impacts		Positive Impacts		No Impact
		Short Term	Long Term	Short Term	Long Term	
<b>A</b>	<b>PRE-CONSTRUCTION PHASE</b>					
1	Survey Works	✓				
2	Work Camp/ Site Office	✓		✓		
3	Materials Mobilization/ Transportation	✓				
4	Removal of Trees/Vegetation	✓				
5	Demolition of Structures	✓			✓	

6	Air Quality Deterioration	✓				
<b>B</b>	<b>CONSTRUCTION PHASE</b>					
1	Air Quality Deterioration	✓				
2	Noise and Vibration	✓				
3	Borrow Pit Generation	✓				
4	Erosion and Sediment	✓				
5	Waste Generation/ Disposal	✓				
6	Water Supplies	✓				
7	Concrete Batch Plant	✓				
8	Construction Sites / Offices	✓				
9	Biodiversity Loss (Flora and Fauna)				✓	
10	Traffic Nuisance	✓				
11	Public, Occupational Health and Safety	✓				
12	Visual Impairment	✓				
13	History, Archaeology					✓

14	Construction Materials Waste	✓				
15	Hazardous Solid Waste		✓			
16	Hazardous Liquid Waste		✓			
17	University Users Access	✓				
18	Fire Prevention / Control				✓	
19	Water and Energy Consumption				✓	
20	Cumulative Impacts				✓	
<b>C</b>	<b>OPERATION PHASE</b>					
1	Air and Noise Levels		✓			
2	Waste Generation and Disposal		✓			
3	Increased Water and Energy Use Efficiency				✓	
4	Traffic Safety and Security				✓	
5	Public Health and Safety				✓	
6	Visual Impairment		✓			
7	Hazardous Solid Waste		✓			
8	Hazardous Liquid Waste		✓			

9	Fire Prevention / Control				✓	
10	Biomedical Waste		✓			
11	Influx Population Surge		✓			
12	Green House Gas (GHG) Emissions		✓			

Source: Individual Consultant Data Records

### 7.7 Cumulative Impacts and Strategic Considerations.

Cumulative impacts are impacts on the environment that result within the effects of implementing the Project activities are added to analogous effects of other past, present and reasonably foreseeable future actions. Cumulative impacts are important because impacts of individual projects may be minor when considered in isolation, but significant when the projects are viewed collectively. Cumulative effects can be: additive (the simple sum of all the effects); neutralizing (where effects counteract each other to reduce the overall effect); synergistic (where the effects interact to produce a total effect greater than the sum of the individual effects). Examples of Cumulative effects are given in **Table 21.0**.

**Table 21.0**

**Examples of Cumulative Effects**

No.	ESIA Topic	Cumulative Effectives (can be positive as well as negative)
1	Schools Population	<ul style="list-style-type: none"> <li>• Schools Community Severance.</li> <li>• Sections of Schools Population Cumulatively affected by the Projects Development and Associated Traffic.</li> <li>• Inequalities in Access to Schools Utility services, where applicable</li> </ul>
2	Human Health	<ul style="list-style-type: none"> <li>• Incidences of Malaria, HIV/ AIDS/ STDs/TB/Covid-19</li> <li>• Changes in Crime Levels</li> <li>• Changes in Accident Levels</li> </ul>
3	Biodiversity (Fauna & Flora)	<ul style="list-style-type: none"> <li>• Fragmentation of habitats</li> <li>• Changes in biodiversity</li> <li>• Species extinction</li> <li>• Loss of High Quality Landscape</li> <li>• Soil Erosion, Flooding and Landslides</li> </ul>
4	Climatic Factors	<ul style="list-style-type: none"> <li>• Effects of Climate change (high winds, temperatures extremes, etc.</li> </ul>
5	Material Assets	<ul style="list-style-type: none"> <li>• Rural-Peri – urban Diversification</li> <li>• Changes in Services Provision</li> </ul>

6	Landscape	<ul style="list-style-type: none"> <li>• Changes in land use.</li> <li>• Changes in Landscape character.</li> </ul>
7	Water	<ul style="list-style-type: none"> <li>• Pollution</li> <li>• Eutrophication, Acidification</li> </ul>
8	Interrelation between Factors	<ul style="list-style-type: none"> <li>• Loss of Tranquility</li> <li>• Social stratification enhancement</li> </ul>

**Source: Individual Consultant Data Records**

Cumulative factors will result from air quality deterioration from heavy vehicular traffic emissions, surface and groundwater systems. Other cumulative impacts could come from illegal disposal of waste, poor waste management practices and poor location of existing facilities with regards to future land use and zonal plans.

## **8 Impact Mitigation and Management Measures**

### **8.1 Overview**

Following the successful identification of the potentially significant impacts of the Project, appropriate mitigation measures are outlined in this chapter. The potential interactions between project activities and environment and social receptors are subject to either standard recognized best practice mitigation measures or to impact specific. In general, the mitigation proposed will be sufficient to reduce the effects of activities to below levels impact. In some case, additional socio-environmental value – components have been mentioned to buttress the importance SIF attaches to them and their potential effects to the proposal. Construction contractors performance of functions will continue within the defect liability period of one year. Right after the defect liability period, SIF will officially take over the project (where applicable).

### **8.2 Pre-Construction Phase Mitigation**

#### **8.2.1 Work Camps/Site Offices Creation**

The selection of work camps/site offices location will be approved by the Project Engineer/ Resident Engineer. The contractor(s) will follow these strategic mitigation measures:

- Camp sites/ site offices location selection to involve a fairly flat terrain.
- Storage and nurturing of removed vegetation cover for future use.
- Provision of mobile toilet and other sanitary facilities.
- The toilet facilities will be emptied at approved MMDA sites.
- Daily collection of generated social waste.
- Equipment and machinery will be handled with maximum maintenance care.
- Land acquisition handling by contractor(s) when there is the need for siting these facilities outside institution’s land:
  - ❖ Location of landowner.
  - ❖ Request for land deed or indenture from the landowner.
  - ❖ Verification of landownership from the chiefs, elders, district/municipal assemblies and finally the lands commission.
  - ❖ Short-term lease of land for siting of facilities.
  - ❖ Payment of monetary compensation, including performance of traditional rites for the use of the land.

- ❖ Fencing of acquired land to ward off encroachers and stray animals.

### 8.2.2 Removal of Trees and Vegetation

Terrestrial impacts are also another changer of development activities. They include potential impacts to soil arising from three (3) basic sources: physical disturbance as a result of construction; contamination resulting from spillage and leakage or solid waste; and indirect impact arising from open access roads and social change. Potential impacts may result from poor designs and construction induced soil erosion due to soil structure, slope or rainfall. Left undisturbed and vegetated, soils will maintain their integrity, but, once vegetation is removed and soil is exposed, soil erosion may result.

Where notable woodlands and bush lands – lowland woodland, shrubs and wooded grassland represent a variety of woody vegetation types that will be affected by the project, this will be disclosed. The affected locations to experience trees falling will be at selected project facilities locations. The contractor(s) will have clear guidelines for vegetation management and trees conservation and protection. These guidelines will include the following:

- Fully abide by and comply with the formal landscaping plan that have been developed by SIF in consultation with campus residents, which includes provisions mandating the replacement with three (3) new saplings for each tree cut (provision mandated by Ghana EPA and Forestry Commission).
- Implement all aspects of the landscaping designs set forth in the Grounds, Parks and Gardens Operational Guidelines, as supplemented by SIF Schools Aesthetics and Landscape designs, including the planting of indigenous and drought resistant trees, shrubs and plants.
- New trees will be promptly planted to fill any gaps on the proposed project sites and along the perimeter of the project zone.
- Trees not to be out will be identified and such information packaged to the contractor(s).
- Avoidance of clearing vegetation when start of construction is not known.
- Preferred methods for tree felling will be specific and indicative; in consonance with Ghana Forestry Commission Tree Cutting Guidelines.
- Working methods for tree felling will be indicated or specified to reduce the degree of damage to surrounding vegetation.
- No burning of vegetation for the purposes of site clearance will be allowed, especially in areas prone to bush trees (especially in the dry season).
- Establishment of vegetation cover immediately after construction on embankments, slopes and borrow areas.
- Removal and stockpiling of vegetation cover topsoil to re-contour sites to blend with surmounting areas will be instituted. Use of local plant species will be advisable and recommended.



- Measures will be instituted to ensure that all natural processes of vegetation cover restoration or regeneration through biochemical/ecological reactions within the ecosystem take place unrestrained.
- The removal of trees and vegetation will be kept to the minimum necessary to accommodate the permanent works as indicated by design drawings. The Contractor(s) will be responsible for ensuring that any exposed surfaces are reregulated as construction progresses in accordance with design drawings.

### **8.2.3 Demolition of Structures**

Prior to the demolition of structures at the proposed site all related asbestos survey and abatement documents will be reviewed and, if necessary, complete asbestos – containing materials and lead – based paint will be removed in accordance with all applicable Ghana EPA and MMDA Bye-Laws. Added to the asbestos containing material and lead–based paint surveys, all water and electrical systems will be disconnected. These activities will be followed by the removal of all salvageable materials for reuse or recycle. The following recyclable materials will be reused: sandcrete blocks, concrete materials woody products, electrical fittings, roofing tiles, etc. Even though, the contractor(s) will be required to be certified by all the relevant utility companies. However, it is important that disconnection and removal of utilities such as of water and electricity is supervised by the relevant utility companies.

## **8.3 Construction Phase Mitigation**

### **8.3.1 Air Quality Degeneration**

- **Construction Period**

Every effort will be made by the Contractor(s) to observe Ghana EPA guidelines for ambient air quality for the project catchment areas. Any conscious effort will be made to maintain the ambient project sites air quality levels. This strategic measure will be adopted by the contractor(s):

- Work sites and access roads to borrow areas will undergo watering on continuous basis. This will be done three (3) times a day - morning, afternoon and evening - to keep them moist for dust control.
- Bituminous / asphalt plants will be maintained to reduce hydrocarbon and particulate matter emissions.
- Construction vehicles will also be maintained regularly to minimize diesel particulate emissions.
- Earthmoving trucks with loads of sand, stones and spoil will be covered during haulage.

- Using wetting agents on areas of exposed soil on a scheduled basis.
- Covering soil and material stockpiles on sites.
- Minimizing spoils on the construction sites.
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized.
- Restrict dust generated activities to sheltered areas or use windbreaks, netting screens, semi-permeable fences, if these devices are considered practicable for the sites.
- Revegetated exposed surfaces progressively such as overburden mounds, to minimize dust emissions.
- Potential significant adverse impacts to adjacent project community residents and site employees during construction will be mitigated by either discontinuing until favourable conditions are restored, or if warranted, sites may be watered to prevent dust generation, particularly at concrete batch plant areas.
- Operators will be required to install emission controls.
- Open burning will be prohibited and requirements for spraying and related dust control measures and the proper use of solvents and volatile materials will be incorporated in the contract provisions.

The SIF will require the contractor(s) meet all Ghana EPA emission standards at ambient conditions for non-road construction. If specific equipment does not meet those standards, the contractor(s) will be required to retrofit the equipment using after-engine emission controls such as oxidation catalysts or diesel particulate filters in order to meet the standard. Contractor(s) will be required to submit to SIF a certified list of the non-road diesel-powered construction equipment that will be retrofitted with emission control devices.

- **Operation Period**

Dust emissions from construction activities will end at the operational phase. Moreover, construction vehicular traffic emission will cease. Increase in traffic volume within and around the proposed project sites will lead to corresponding increase in vehicular exhaust emissions, which could exceed Ghana EPA ambient air quality standards significance thresholds. However, dilution and dispersion fact inducing traffic management improvements and interventions will ensure free flow of traffic; leading to reductions in carbon monoxides, hydrocarbons, nitrogen oxide and lead levels in the atmosphere Operational Phase air pollution monitoring will underscore the extent of reductions in baseline ambient air quality levels and magnitude of the impacts so determined.

### **8.3.2 Noise and Vibration Effects**

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- **Construction Period**

All construction activities will be undertaken in such a manner as to not cause undue or unnecessary disruptions to or interference with, the campus residents or the surrounding project communities. The term “Construction activities” will be interpreted in broadest prescribe sense, and will include, without limitation, construction, grading or landscaping work, construction materials to the Projects, and the hauling of soil or construction debris away from the projects. To that end, all appropriate reasonable steps will be taken by the contractor(s) to minimize the amount of any noise pollution generated by construction activities and all feasible mitigation measures will be implemented to protect the projects and neighbouring communities against any potentially harmful effects of such pollution. Without limiting the generality of the foregoing, the contractor(s) will adopt these strategic measures:

- Employ noise-reducing construction practices to comply with Ghana EPA ambient noise standards as well as existing applicable District/ Metropolitan Assembly Byelaws on noise standards.
- Construction activity, at or in the vicinity of the project zone, will be limited to the hours of 8:00am to 5:00pm weekdays and 7:30am to 5:00pm on Saturday with construction prohibition on Sunday. The Contractor(s) may engage in reasonable construction activities at other times to the extent those activities are necessary to address unexpected and unplanned emergencies that threaten life or property.
- All equipment will have sound control devices on less effective than those provided on the original equipment. No equipment will have an unruffled exhaust.
- Appropriate mitigation measures will be implemented relating to changing the location of stationary construction equipment, shutting off idling equipment, rescheduling construction activity or installing acoustic barriers around stationary construction noise sources or construction sites.
- No construction equipment or vehicles operating or traveling on or in the vicinity of the campus will utilize a system that sounds warning beeps when the vehicle backs up, rather SIF will require that the use of addition all personnel or other means to assure backup safety.
- Noise monitors will be installed at a minimum of two (2) locations on each site. Said monitors will be operated continuously throughout the construction phase (and subsequent operation phase). The data from these monitors (showing sound levels at 15 seconds intervals throughout the day and night) will be provided online and will be made available to the campus and neighbourhood populations. Should such data indicate that projects noise creates a noise environment at the stations in excess of applicable Ghana EPA standards, noise mitigation measures will be increased until such standards are met.
- All construction activities will be undertaken in total and complete conformity with all laws, rules and regulations imposed by Ghana EPA on construction activities taking place within the campus boundaries.

- No construction vehicles (which will include all vehicles participating in any construction work on project and all vehicles hauling materials, debris or other items relating to the construction projects to or from the campus) will be permitted in the construction zone until 8:00am Monday through Friday and 7:30am on Saturday. Sundays are not statutory working days, unless the contractor(s) and workers agree otherwise. And no construction vehicles will be permitted, at any time, to stand, park or stage at any location other than the construction staging and parking areas.
- SIF will appoint an individual from amongst the GRM committees to serve as an Ombudsperson during the period of construction of the projects to respond to questions and concerns from the surrounding project and project communities on noise and vibration impacts, to ensure that all mitigation measures adopted by the contractor(s) and sub-contractor(s) are fully complied with and to facilitate, to the extent feasible, the prompt resolution of any other construction activities issues that may arise relating to the construction or the mitigation measures. The name, title and mobile telephone number of the Ombudsperson will be distributed twice per year to the project and neighbourhood communities and to representatives of associations, NGOs and will be prominently displayed on the SIF website. The Ombudsman is appointed as and when certain disputes could not be resolved at the community and project level GRM. It may also make sense to hire an individual to audit the GRMs on annual basis. This report should be annexed to the annual E&S implementation report that the SIF prepares and submits to the lender.

The IFC Noise Level Guidelines indicated in **Table 22.0** will be adhered to by the Contractor(s) in addition to Ghana EPA Ambient Noise Guidelines.

**Table 22.0** IFC Noise Level Guidelines

Receptor	One Hour Leq dBA Day Time (07:00 to 22:00)	One Hour Leq dBA Night Time (22:00 to 7:00)
Residential, Industrial, Educational	55 (free-field)	45 (façade)
Industrial, Commercial	70 (free-field)	70 (free-field)

Source: IFC Data Records

Moreover, the Contractor(s) will adopt these strategic generic measures to control noise and vibration pollution:

- Minimize height at which materials drops from trucks or plant.
- Minimize distance between loading and emptying operations.
- Use rubber linings in chute, dumpers, trucks and transfer points.

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- Switch off equipment when not in use.
- Reduce propagation of noise by use of temporary bunds and portable screens if the noise may be a nuisance to campus residents.
- Maintenance of all vehicles and machines to minimize noise pollution.
- Provision of earmuffs to construction workers to suppress noise pollution from constructions machinery and trucks.
- Provision of padded, comfortable seats and gloves on construction plant and machinery to control vibration effects.

Typical noise levels of principal construction equipment and machinery are indicated in **Table 23.0**. **Table 23.0** provides a general indication of the noise impacts that can be anticipated. In assessing potential noise impacts, one must be mindful of the fact that, in addition to being dependent on the type of equipment used. Construction noise is generally intermittent and attenuates quickly with distance. Potential construction related noise levels of 85-90dBA at 18 meters from the source would be reduced to less than 62 dBA at 67 meters from the source. Excavation noise levels, for example, assuming bulldozer and dump truck activity only, would yield a Leq of approximately 85 dBA at 18 meters. These noise levels would decrease by about three to four dBA with every doubling of distance.

**Table 23.0 Typical Noise Levels of Principal Construction Equipment (Noise Level in dBA at +/- 18 meters)**

<b>Clearing</b>	<b>Noise Level (dBA)</b>	<b>Structure Construction</b>	<b>Noise Level (dBA)</b>
Bulldozer	80	Crane	75-77
Front End Loader	72-84	Welding Generator	71-82
Jack Hammer	81-98	Concrete Mixer	74-88
Crane with Ball	75-87	Concrete Pump	81-84
<b>Excavation &amp; Earth Moving</b>	<b>Noise Level (dBA)</b>	Concrete Vibrator	76
Bulldozer	80	Air Compressor	74-87
Front End Loader	72-84	Pneumatic Tools	81-98
Dump Truck	83-94	Bulldozer	80
Jack Hammer	81-98	Cement and Dump Trucks	83-94
Scraper	80-93	Front End Loader	72-84
<b>Grading and Compacting</b>	<b>Noise Level (dBA)</b>	Dump Truck	83-94
Grader	80-93	Paver	86-88

Roller	73-75	<b>Landscaping and Clean-Up</b>	<b>Noise Level (dBA)</b>
<b>Paving</b>	<b>Noise Level (dBA)</b>	Bulldozer	80
Paver	86-88	Backhoe	72-93
Truck	83-94	Truck	83-94
Tamper	74-77	Front End Loader	72-84
		Dump Truck	83-94
		Paver	86-88
		Dump Truck	83-94

Source: U.S. EPA, Noise Form Construction Equipment and Operations, Building Equipment and Home Appliances, NJID, 300.1, December 31, 1971.

- **Operation Period**

The SIF will ensure the minimization of noise pollution to Ghana EPA approved guidelines on ambient noise levels through these measures:

- Erection of no horn signs postings at very sensitive receptor zones within the project catchment areas.
- Encouragement of trees shrubs planting within the project enclave to serve as noise control barriers
- Compliance with relevant legislations associated with noise and vibrations including any health impacts.
- Conduction of noise and vibration surveys both inside and outside of sensitive receptors to check on noise sensitive receptors sensitivity to noise and vibration nuisance permissible limits to Ghana EPA baseline day time noise and vibration levels.

### 8.3.3 Borrow Pits Generation

- **Construction Period**

All borrow areas and their access roads will be considered as one site. This will allow the Resident Engineer/Project Engineer to exercise his authority on environmental and social protection measures. The contractor(s) will give the Resident Engineer/ Project Engineer details of any borrow pit operational plan for approval. The submission has to show the following:

- Exact location (markers to be placed in the field).
- Plan of the area showing type and size of trees (if any);

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- Excavation plan (management of vegetation and topsoil, volume and depth of excavation);
- Traffic Management Plans, and
- Rehabilitation plan for the pit and access roads.

The Contractor(s) will follow these strategic guidelines:

- Access roads to site will avoid farms and settlements;
- Stock piles of topsoil will be protected by regular watering for re-vegetation; and
- Creation of stagnant water bodies will be avoided through improved landscaping of the site.

- **Operation Period**

Strict reclamation measures will be followed by the contractor(s) at the operation al phase. Generally, borrow areas are considered as very sensitive landscape systems. The contractor(s) will carry out these reclamation measures:

- All stagnant pools and ponds will be filled up with spoils. These spoils will come from cuts, re-alignments and vegetation removal operations.
- Backfilling of all excavations will be undertaken.
- Stocked up topsoil will be utilized to re-contour the borrow areas.
- Restoration and revegetation.

#### **8.3.4 Erosion and Sedimentation**

- **Construction Period**

Soil erosion and associated sediment transport may adversely impact adjacent vegetation, water quality in water courses and aquatic flora and fauna. Moreover, failure to prevent erosion may result in a loss of surface soil thus reducing rehabilitation prospects. These guidelines will be strictly undertaken by the contractor(s) to minimize erosion and sedimentation issues at the construction phase. Most of the measures will curb excessive removal of vegetation cover. The contractor(s) will follow these strategic measures:

- Execution of earthworks will be done with due diligence and skills to control soil erosion and sedimentation.
  - Operations involving extensive earth movement will be done, preferably, in the dry season to control erosion and sedimentation.
  - Clearing will be kept to the minimum necessary for construction works.
  - Clearing will be conducted in such a manner that minimizes the potential for erosion or harm to flora and fauna, and maximizes potential for successful rehabilitation post construction.
  - All clearing activities will have approval to commencement of the activity.
  - All illegal clearing to be documented.
  - Preservation of ecological biodiversity will be maximized.
  - Development of a detailed management manual that will include preservation of biodiversity.
  - Placement of sandbags around basins, the use of proper grading techniques, appropriate sloping, shoring and bracing of the construction site and covering or stabilizing topsoil stockpiles.
  - Temporary sediment control by use of hydraulic mulch, hydro-seeding and geotextiles.
  - Temporary soil stabilization by use of straw barriers, straw bale barriers, sediment traps and fiber rolls.
  - Wind erosion control by use of portable water and straw mulch.
  - Tracking control by use of street sweeping and entrance and out let tire washing.
- **Operation Period**

More mitigation measures will be necessary at the operational phase. Effective controls will be **instituted**. After the improved surface conditions of the project zones the contractor(s) will carry out the following to minimize erosion and sedimentation events. These strategic measures are:

- Use of vegetation cover on exposed surfaces around the project sites.
- Use of improved drainage and storm-water structures to minimize runoff during precipitation events.
- Direct turnouts from drains into approved water systems through the use of silt traps.
- Educate the project populations to continuously desilt drains and other drainage structures from choking.

### 8.3.5 Waste Generation and Disposal

- **Construction Period**



Potential issues will arise from inappropriate management of domestic and industrial wastes such as tires, used oils, chemical containers, scrap-metal and used spares, used office supplies, cleaning supplies, sewage, hazardous materials and domestic waste (food, bottles, plastic, paper, etc.). Moreover, potential for the production, transport, recovery and disposal of waste will cause pollution of the environment or become detrimental to campus and neighbouring communities health and safety.

The Contractor(s) will adopt these strategic measures:

- Minimize wastes generation.
- Separation of waste like materials that may be re-used/recycled and those requiring disposal by appropriately approved disposal channels.
- Storage, handling, transport and disposal in accordance with relevant legislation.
- No legitimate unresolved complains due to inappropriate waste management.
- Implementation and documentation of waste reduction practices.
- Temporary waste storage areas are established that ensure appropriate sorting of waste eg. Re-usable, recyclable and hazardous.
- Establishment of a possible resource exchange and reuse with the campus and neighbourhood communities.
- Provision of waste bins to be used by the workforce.
- Toilet /portable toilet facilities will be provided as required.
  
- **Operation Period**

Discretionary disposal of construction waste at operational phase will enhance the aesthetic amenities of the project corridor. However, the deliberate refusal to dispose of towering construction spoil will intrude on the visual quality/ gastric amenities of the project environment.

The SIF will implement these strategic measures:

- Completion and development of an Antilitter Program campus wide.
- Treated leachate and other liquid effluents from the central wastewater and sewage treatment plant will meet sound Best Industrial Practice Guidelines requirements,
- Chemicals and oils to be delivered in bulk where possible to reduce the number of containers requiring disposal.

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- Establish appropriate temporary areas and facilities that are clearly signed and comply with relevant legislation (including environmental licenses), codes and standards, including:
  - ❖ A designated disposal site for soil contaminated by spills of hazardous substances and materials.
  - ❖ Separated bins/areas for recyclables and usable wastes.
  - ❖ Separated bins/areas for dangerous hazardous liquids and solid wastes.
  - ❖ Separate areas for vegetation waste as necessary; these will be composted whenever possible.
- Establish a recycle program use standard colours and signs for recycling bins and training of the system.
- Review the impact of litter on sites and establish recycling points as “hot spots”
- Investigate market for surplus and used solid waste. Stockpile, salvage and arrange for collection reusable and recyclable wastes, such as timber skids and scrap metal
- Waste oil to be collected, stored, and recycled on site if practicable. Alternatively, to be sold to certified companies.
- Materials that cannot be recycled, and that do not pose a potential leachate problem are to be disposed of to a suitable landfill.
- All human waste will be disposed of at septic tanks operating to sound design standards.
- Health and hygiene issues will be considered for disposal of food and other putrescible wastes.
- All campus students, faculty and staff will be instructed in project waste management as a component of the Environmental and Social Responsibility Program.

### 8.3.6 Concrete Batch Plant

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Incorporate concrete batching plant areas into the work zone.
- Locate concrete batching plant at least 100 m away from any sensitive receptors.
- Detailed design of the concrete batching plant area to be segregated into “clean” and dirty areas.
- Dirty areas to contain contaminated cement materials collected for reuse.
- Clean area as reminder of the site without contaminated cement materials.
- Recycle for reuse all cement materials classified as contaminated or waste or spoil.

- Prevent dumping of concrete waste, indiscriminately, at the project sites.
- **Operational Period**

Concretized materials decommissioned at the operation phase have the potential to adversely affect receiving waters. The contaminants in the runoff will contribute sediment to any runoff from the site which should be collected and treated prior to discharge. The Contractor(s) will adopt these strategic measures:

- Remove all damaged topsoil from the concrete batch plant site and dispose of in accordance with Ghana EPA regulations and district / metropolitan Bye-Laws.
- Implement Concrete Waste Management and contained Soil Management Plans where applicable.

### 8.3.7 Biodiversity Loss (Fauna and Flora)

- **Construction Period**

The Contractor(s) will adopt these strategic measures:

- Control all clearing activities.
- Minimize number of trees to be felled.
- Reduce potential impacts on flora and fauna habitats.
- If an active nesting effort is confirmed or considered very likely by the biologist, a fence barrier will be erected around the rest site to provide a minimum – 50m barrier between the rest and construction activities. A 200m buffer will be required for any maximum barrier allowable. No habitat removal or any other work will be allowed to occur with the fenced next zone until a qualified biologist confirms that the young have fledged and have left the nest.
- **Operation Period**

The contractor(s) during the immediate post-construction period, when the contractor is still on site, will adopt these strategic measures:

- Revegetated areas monitored and maintained until there is evidence of community.
- Weed management plan implementation and on new weeds or increase in weed cover during monitoring period.
- Ensure stable landform without significant soil erosion.
- Develop and implement Revegetation Action Plans.

### 8.3.8 Traffic Nuisance

- **Construction Period**

The Contractor(s) will adopt these strategic measures:

- Conduction of contractor(s) operations in such a manner as to maintain the existing flow of project sites and neighbourhood traffic flow.
- Deployment of warning and directional sign at vantage points and approaches to the sites.
- Provide busing, rideshare and transit incentives to construction personnel.
- Configure construction parking to minimize traffic interferences.
- Provide a flag person with radio communication to guide traffic properly when and if necessary
- Parking for construction vehicles (i.e. construction trucks and construction staff vehicles) will be restricted to the designated construction staging and parking sites. No construction vehicles will be permitted to stand, park, or stage on the campus other than at construction staging and parking areas. No construction vehicles will be permitted to stand, park/or stage on the streets surrounding the project site. All vehicles carrying workers or other people, who are involved in the proposal, must park in project site parking lots (or in designated construction staging and parking sites) and will be absolutely prohibited from parking on main project roads, or on neighbourhood streets.

- **Operation Period**

It assumed that the contractor(s) will leave site once the handing over of the facility has been done unless decommissioning activities are allowed to continue. Under such conditions, the contractor(s) will adopt these strategic measures:

- Construct and monitor internal roads to a safe and stable flow standard.
- Minimize the erosion caused by the operation of the internal roads.
- Minimize the impact on flora and fauna during maintenance of internal roads and water course crossings.

### 8.3.9 Public, Occupational Health and Safety

The contractor(s) will adopt these strategic measures:

- Provision of protective clothing, helmets goggles, earplugs, wellington boots and other Personnel Protective Equipment (PPE) and safety devices to construction workers.
  - Ensure adequate provision and stocking of appropriate PPE at all times by the Project Engineer/ Resident Engineer.
  - Use directional and reflectorized warning signs and diversion, speed ramps, etc., will be adequately provided and established where work is in progress to avoid any form of accidents and delay to motorists.
  - Provide first aid boxes, sick bays.
  - Have contractual agreement with a local health center/facility to provide emergency care to contractor workers who may fall ill or be injured during working time.
  - Use of public education campaign through press and radio to brief the general public, project neighbourhood residents, visitors on the dangers of works being carried out.
  - Provision of temporary pedestrian ways and where crossings are provided, new drains will be covered
- **Operation Period**

The contractor(s) will adopt these strategic measures:

- Use of adequate internal roads improvement measures to reduce accident rates.
- Minimize risks/hazards to internal road users.
- Strengthen road safety campaigns programs to be run in collaboration with National Road Safety Campaign (NRSC).

### 8.3.10 Visual Impairment

- **Construction Period**

The contractor(s) will adopt these strategic measures:

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- Fence in project sites and open spaces to prevent visual impairment and intrusion on the project site and project neighbourhood populations.
- Water exposed areas to prevent air quality degradation.
- Control the tipping of sand, stone/gravel aggregates to minimize dust intrusion of the project ambient air.
- Control the loading and unloading of cement bags to reduce/minimized fugitive cement dust pollution of the project ambient air.
- **Operation Period**

The Contractor(s) will adopt these strategic measures:

- Ensure compatibility and cohesion in terms of architectural design, scale, massing and **siting** of the new buildings.
- Ensure that all the proposed projects will comply with the Schools Aesthetic and Landscape designs.
- Follow a Lighting Plan developed by MoE (in consultation with stakeholders) for the project prior to the installation or replacement of any light standards on and around the schools (including but not limited to the new and existing parking areas and streets surrounding the new building sites).
- Ensure that all modifications to internal roads within and surrounding the project that are located near residential areas of staff will be designed so as to minimize the impact from lights on them.

### **8.3.11 Construction Materials Waste**

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Implement an on-site recycling system for construction materials waste by separating waste streams (timber for reuse, concrete and bricks for crushing and steel and copper for recycling).
- Reuse or recycle demolition materials.
- Recycle wastepaper, cardboard, metals, concrete brick, asphalt, bitumen, beverage containers, clean dimensional wood, plastic, glass, gypsum board and carpet.

- Provide on – site rubbish sorting facilities like waste receptacles for collection of solid waste.
- Collect solid waste separately on daily basis and disposed of in suitable manner.
- Remove at regular intervals, all solid waste which could not be, reused or recycled, to an appropriate location authorized to reuse or recycle or dispose of the waste material.
- Excess or unsuitable materials are to be disposed of offsite but before that, sampling or analysis will be undertaken if materials are suspected to be contaminated. If contaminants are found, it will be disposed of to an authorized facility.
- Special types of construction materials waste will be generated and disposed of in compliance with Ghana EPA Regulations.
- **Operation Period**

The contractor(s) will adopt these measures as strategies:

- Use appropriate environmentally friendly construction materials which do not cause indoor and outdoor pollution.
- Use environmental and health conscious construction materials in building construction that protects and improves indoor and outdoor air quality levels.

### **8.3.12 Hazardous Solid Waste Stream**

- **Construction Phase**

The contractor(s) will adopt these strategic measures:

- Educate his/her construction crew and subcontractor(s) workforce on the hazardous materials inventory list at the construction and operation stages of the project – implementation.
- Collect and store all hazardous waste stream materials in temporary hazardous waste storage areas in drums and containers.
- Protect all hazardous waste from precipitation, in compliance with Ghana EPA/ Ministry of Health Service Regulatory Division (Hazardous Waste Control Regulations).
- Hazardous waste will not be stored more than 180 days.
- Transfer all stored hazardous waste to firms licensed for collection of hazardous waste as qualified hazardous materials conveyors and treaters in Ghana.

- Follow contractor(s) Waste Management Plan (WMP) for both hazardous and low-hazardous waste as part of the EHS Construction Management Plan to be developed by the contractor(s).
- **Operation Period**

The SIF will adopt these strategic measures:

- Identify all hazardous solid waste to be generated are of the following stock: fluorescent lamps/ tubes, wasted printers' cartridges, electronic equipment (e-waste), broken Bunsen burners, damaged rubber/plastic tubing's for LPG lines at the laboratory, broken distillation columns, broken conical, cylindrical jars, flasks, pipettes, glasses, etc. dispose of them by channels that meet Ghana EPA Regulatory Guidelines.
- Identify all laboratory chemicals in the solid state/ form and treat them as hazardous solid waste stream and adopt appropriate precautions for their disposal to meet al Ghana EPA standards.
- Adopt appropriate methods for storage and disposal of hazardous solid waste.
- Prepare a Hazardous Solid Materials Management Manual.
- Regular record keeping and reporting.

### **8.3.13 Hazardous Liquid Waste Stream**

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Educate his/ her construction crew and sub-contractor(s) workforce on the profile of hazardous liquid waste stream to be generated at the construction and operation phases of the project.
- Dispose of all hazardous liquid waste stream materials, spilled or spent, as regulated by Ghana EPA and International Performance Standards by AfDB to protect, secure and conserve the environmental and social integrity of the project landscape.
- Follow Contractor(s) Waste Management Plan (WMP) for both hazardous and non-hazardous waste as part of the EHS Construction Management Plan to be developed by the Contractor(s).



- **Operation Period**

It will be important to request the institutions that will be dealing with vaccine research and manufacture to prepare and implement biosafety protocols for approval by Ghana EPA. The SIF will adopt these strategic measures:

- Identify all hazardous liquid waste streams as spent chemicals from laboratories, gas leaks from LPG tubing / plastic lines, spilled liquid chemical substances. Dispose of them by channels that meet Ghana EPA Regulatory Guidelines.
- Adopt appropriate methods for storage and disposal of hazardous liquid waste.
- Prepare a Hazardous Liquid Materials Management Manual.
- Adopt appropriate and regular staff training.
- Appropriate health and safety standards adoption.
- Regular record keeping and reporting.
- No contamination of the environment caused by hazardous liquid waste streaming.
- Evidence from audits that procedures and handling of hazardous liquid waste are carried out in accordance with prescribed Ghana EPA guidelines.

### **8.3.14 Fire Prevention and Control**

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Deploy fire prevention and control measure at fire susceptible and/or vulnerable points such as fuel storage, mechanical workshop, carpentry workshop, asphalt/bitumen production plant.
- Treat all wires as live wires and all pipes under pressure as unsafe and fire combustion sources.
- Deploy Fire Detection and Protection Systems and monitor them to identify any abnormal conditions which could start fire.
- Provide fire extinguishers, fire alarms, smoke detectors and other hand-held portable devices for fire controls.
- Train selected personnel for Fire Prevention and Fighting Techniques.
- Organize periodic fire drills.
- Establish fire assembly place.

- **Operation Period**

The SIF will adopt these strategic measures:

- Ensure that all the buildings constructed under the proposal will be accessible to Fire Station apparatus by way of access roadways, with an all-weather surface, unobstructed, and clear to the sky.
- Ensure operability and functionality of automatic fire alarm systems, smoke detectors, smoke alarms, fire extinguishers, fire sprinkler systems, evacuation plans

#### **8.3.15 Influx Population Surge**

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Educating contractor's workers on the need to maintain prevailing social harmony and peace within the project neighbouring communities of project enclave where most of the workforce will reside upon employment.
- Establish effective interactions and integration of foreign workers and local hiring's on the Project.
- Avoidance of violating child labour laws through illegal employment of children below the age of 18 years.

- **Operation Period**

The SIF will adopt a strategic measure:

- The SIF will develop and operate Influx Management Plan (IMP) to address project induced migration incidence.

#### **8.3.16 Greenhouse Gas (GHG) Emissions**

Contractor(s) will adopt these strategic measures:

- Service equipment, machinery and plant, vehicles regularly according to manufacturer's recommendations control release of contaminants into atmosphere such as carbon monoxide, hydrogen, oxides of nitrogen, lead, particulate matter and other volatile organic compounds to check excessive GHG emissions.
- Capture GHG emissions before the start of construction activities and during the peak of construction activities to check the GHG accounting footprint from construction vehicular activities to guide the construction process in carbon accounting principles.
- **Operation Period**

The SIF will adopt the following strategic a measures:

- Meet GHG requirements by completing GHG analysis and a discussion of the energy improvement related to the Project.
- Include an assessment of GHG emissions generated by both stationary mobile sources using standard methods and modelling assumption.

### **8.3.17 Water Supplies**

- **Construction Period**

The contractor(s) will adopt these strategic measures:

- Develop a water user management plan as standalone or part of the CC-ESMP
- Responsibility to Contractor(s) to make their own arrangement for water supply usage for construction works
- Contractor(s) arrangements for water supply usage must not affect the quality or availability of groundwater or surface water resources existing campus community users.
- In the event of ensuing valid disputes regarding the effect of contractor(s) arrangement have had on the water supply of the project zones, the Contractor(s) would be responsible, at t heir our expense, for providing an alternative supply of the same quality as previously enjoyed by the campus community users.

- **Operation Period**

At the operation phase, and during the defect liability period, potable water supporting staff will be provided by SIF through existing dedicated potable water supply pipelines, if the students, teachers and supporting staff desire at the laboratories. Intermittently, the quality of drinking water will be tested to ensure International Standards compliance such as Ghana EPA/WHO and other regulatory compliance requirements. **Table 24.0** provides information of the summary of environmental and social impacts and mitigation measures.

**Table 24.0 Summary of Environmental and Social Impacts and Mitigation Measures**

Potential Impact	Mitigation Measures	Significance	Source of Impact	Receptor	Responsibility
<b>PRE-CONSTRUCTION PERIOD</b>					
Survey Works	<ul style="list-style-type: none"> <li>• Limited, localized opening of de-bush line</li> <li>• Limited vegetation cover removal.</li> </ul>	Minor	De-bush line clearing	Land	Contractor(s)
Work Camp/Site office	<ul style="list-style-type: none"> <li>• Provision of mobile toilet and sanitary facilities</li> <li>• Daily collection of solid waste</li> <li>• Selection of fairly flat location</li> <li>• Removal of vegetation cover.</li> </ul> <p>Where involuntary resettlement, land acquisition, displacement becomes an issue, these measures will be adopted: (identify all affected properties in the RoW; hold consultation and engagement meetings with PAPs; mark out boundary reservation corridor; make payment of compensation monies to PAPs).</p>	Moderate	Vegetation cover removal waste generation	Air, water, land construction workers;	Contractor(s)

Removal of trees/vegetation	<ul style="list-style-type: none"> <li>• Cutting and removal of large number of neem trees in Takoradi, Nsoatre, and Nandom as selected option.</li> <li>• Removal and stockpiling of vegetation cover topsoil</li> <li>• New trees to be promptly planted</li> </ul>	Moderate	Vegetation cover removal; trees cutting	Air, water, land, construction workers	Contractor(s)
Air Pollution	<ul style="list-style-type: none"> <li>• Fugitive emissions, localized.</li> <li>• Dust generation, limited.</li> <li>• Site clearance, limited.</li> </ul>	Minor	Site clearance; vegetation cover removal	Air, construction workers	Contractor(s)
Demolition of structures	<ul style="list-style-type: none"> <li>• Reuse salvageable materials.</li> <li>• Conduct asbestos and lead-bases point survey.</li> <li>• Use health and safety controls.</li> </ul>	Moderate -Minor	Demolition activities;	Air, land water, construction workers	Contractor(s)
<b>CONSTRUCTION PERIOD</b>					
Air Quality Deterioration	<ul style="list-style-type: none"> <li>• Construction vehicles maintenance.</li> <li>• Watering of exposed surfaces.</li> <li>• Cover vehicles carrying spoil and construction material.</li> <li>• Install and maintain equipment mufflers.</li> </ul>	Minor	Dust nuisance	Air, Flora, Project Residents, Construction Workers	SIF/Contractor(s)
Noise and Vibration	<ul style="list-style-type: none"> <li>• Install sound control devices.</li> <li>• Switch-off idling machines.</li> <li>• Provide ear-plugs to workers.</li> </ul>	Minor	Noise nuisance	Air, Fauna, Project Residents, Construction Workers.	SIF/Contractor(s)
Borrow Pits Generation	<ul style="list-style-type: none"> <li>• Access vector ecology in work areas.</li> <li>• Employ adequate drainage.</li> </ul>	Moderate –Major	Stagnant pool or depressions suited to mosquito breeding	Land, Project Residents around borrow areas construction workers	SIF/ Borrow Areas Population Contractor(s)

	<ul style="list-style-type: none"> <li>• Fill methodology to avoid creating mosquito habitats.</li> <li>• Where land acquisition, displacement may be issues to mitigate as well, if material is not sourced from certified companies, contractor(s) will operate Borrow Pits Management Plan.</li> </ul>				
Erosion and Sedimentation	<ul style="list-style-type: none"> <li>• No major earthworks during the rainy season.</li> <li>• Limit vegetation cover removal.</li> <li>• Use adequate drainage structures.</li> </ul>	Moderate – Major	Erosion, siltation and land slip from cuts slopes, grubbing, and vegetation removal.	Land, Water Bodies, Aquatic Fauna	SIF/Contractor(s)
Waste Generation and Disposal	<ul style="list-style-type: none"> <li>• Minimize waste generation.</li> <li>• Segregate waste for re-use;</li> <li>• Provide waste bins;</li> <li>• Develop waste disposal policy.</li> <li>• Contract certified firms for collection, transport and disposal of harmful, hazardous wastes.</li> </ul>	Moderate -Major	Excavated spoil, building materials, oil, lubricants	Land, Water bodies, Aquatic Fauna, Constriction workers, campus residents	SIF/Contractor(s)
Concrete Batch Plant	<ul style="list-style-type: none"> <li>• Reuse concrete products.</li> <li>• Prevent dumping of concrete waste.</li> <li>• Segregate areas into ‘clean’ and ‘dirty’ sections</li> </ul>	Minor	Concrete mixing and resultant contamination	Land, water-bodies, Aquatic fauna; construction workers	SIF/Contractor(s)
Construction Camps and Offices Creation	<ul style="list-style-type: none"> <li>• Carefully site, construct and manage construction camps.</li> <li>• Control erosion and dust.</li> </ul>	Moderate	Environmental and social disruption	Land water bodies, Air, Aquatic fauna,	SIF/Contractor(s)

	<ul style="list-style-type: none"> <li>Plan and carry out post-construction site clean-up.</li> <li>Provision of mobile toilet and sanitary facilities</li> <li>Daily collection of solid waste</li> <li>Selection of fairly flat location</li> <li>Removal of vegetation cover.</li> </ul> <p>Where involuntary resettlement, land acquisition, displacement becomes an issue, these measures will be adopted:</p> <ul style="list-style-type: none"> <li>(identify all affected properties in the RoW; hold consultation and engagement meetings with PAPs; mark out boundary reservation corridor; make payment of compensation monies to PAPs).</li> </ul>		caused by construction camps	campus residents, construction workers.	
Biodiversity Loss (Fauna and Flora)	<ul style="list-style-type: none"> <li>Control all clearing activities.</li> <li>Minimize number of trees to be felled.</li> <li>Reduce potential impact on flora and fauna.</li> <li>Replace and plant more trees, hedges, etc.</li> <li>Avoid use of invasive plant species to revegetate cleared areas.</li> </ul>	Moderate	Clearing, destruction and decimation of fauna habitat and food resources	Land, plant and animals, Aquatic Fauna	SIF/Contractor(s)
Traffic Nuisance	<ul style="list-style-type: none"> <li>Develop and implement traffic management plan</li> <li>Set and enforce speed limits.</li> </ul>	Moderate	Accidents risks associated with vehicular traffic	Project residents, construction workers and public	SIF/Contractor(s)

	<ul style="list-style-type: none"> <li>• Regulate transport of toxic materials.</li> <li>• Reduce accident risks by safe driving speeds.</li> </ul>				
Public Occupational Health and Safety	<ul style="list-style-type: none"> <li>• Use of PPE by workforce.</li> <li>• Collect and recycle lubricants and streams of waste.</li> <li>• Take precaution to avoid accidental spills.</li> <li>• Carry out periodic tool box meetings.</li> <li>• Setup health education, malaria prevention programs.</li> <li>• Install first aid boxes</li> <li>• Maintain sanitation and hygiene at campsite and active working/construction areas</li> </ul>	Major	Creation of diseases vectors affecting humans, plants and animals.	Project resident's construction workers general public.	SIF/Contractor(s)
Visual Impairment	<ul style="list-style-type: none"> <li>• Fence in project sites and open spaces to prevent visual intrusion.</li> <li>• Water all exposed areas.</li> <li>• Ensure that new developments are culturally sound, environmentally appropriate and aesthetically acceptable.</li> </ul>	Moderate	Aesthetic impact of areas development; visually offensive structures	Architectural aesthetics of the skyline	SIF/Contractor(s)



Construction Materials Waste	<ul style="list-style-type: none"> <li>• Implement on-site recycling system.</li> <li>• Reuse recycled demolition materials</li> <li>• Remove at regular intervals, all solid waste not recyclable for special disposal.</li> </ul>	Moderate	Environmental effects of construction materials waste	Land, Air and Water; Humans, plant and animals	SIF/Contractor(s)
Hazardous Solid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous solid waste material inventory</li> <li>• Collect and store hazardous materials in temporary hazardous waste storage.</li> <li>• Protect all hazardous waste from rainy events.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous solid waste stream	Land, Air, Water, plant, animals humans	SIF/Contractor(s)/ Ghana EPA
Hazardous Liquid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous liquid waste stream inventory.</li> <li>• Follow waste management plan for hazardous liquid waste stream.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous liquid waste stream	Land, Air Water, Plant, Animals, Humans	SIF/Contractor(s)/ Ghana EPA
Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide five extinguishers, fire alarms, smoke detectors.</li> <li>• Treat all wires as live wires.</li> <li>• Train selected personnel for Fire Prevention and Fighting Techniques.</li> <li>• Organize periodic fire drills.</li> </ul>	Moderate	Areas of eminent fire suppression and spontaneous combustion	Assets, properties, humans, plants, animals	SIF/Contractor(s)/ Fire Station, Ghana National Fire Service

	<ul style="list-style-type: none"> <li>Establish fire assembly places</li> </ul>				
Influx Population Surge	<ul style="list-style-type: none"> <li>Develop a labor management plan .</li> <li>Educate workforce on social harmony.</li> <li>Establish positive relation between workers and local residents.</li> <li>Avoid child labor.</li> </ul>	Minor – Moderate	Creating of social disharmony between local and workforce	Project Residents, Local populations Construction Workforce	SIF/Contractor(s), District/Metropolitan Assemblies
Green House Gas (GHG) Emissions	<ul style="list-style-type: none"> <li>Service construction vehicles, machinery and equipment regularly.</li> <li>Capture GHG missions for mobile construction vehicles.</li> </ul>	Unknown	Mobile and stationary equipment and machines	Plants, Animals, Humans	SIF/Contractor(s)/ Ministry of Health
<b>OPERATION PERIOD</b>					
Air and Noise	<ul style="list-style-type: none"> <li>Monitor periodically ambient areas.</li> <li>Provide barriers in front of sensitive receptors.</li> <li>Enforce Ghana EPA guidelines for air and noise emissions.</li> </ul>	Minor	Traffic flow noise and air pollution	Air, project residents, plants and animals.	SIF/Contractor(s)
Waste Generation Disposal	<ul style="list-style-type: none"> <li>Recycle all surplus solid waste and demolition waste.</li> <li>Decommission camp sites/offices adequately and</li> </ul>	Moderate	Dismantling of work camp and site offices	Land water bodies, aquatic fauna, construction workers, campus residents.	SIF/Contractor(s)

	dispose of waste properly in a lawful manner.				
Traffic Safety and Security	<ul style="list-style-type: none"> <li>• Maintain diversion signs with reflective materials.</li> <li>• Provide adequate number of signage.</li> <li>• Prohibition of unnecessary honking of horns by motorists cyclists.</li> </ul>	Minor	Traffic flow from vehicular traffic	Animals, humans (project residents, neighborhood residents)	SIF/Contractor(s)
Public Health and Safety	<ul style="list-style-type: none"> <li>• Cover all stagnant pools and ponds from breeding mosquitoes.</li> <li>• Educate project populations on HIV/AIDS/Malaria Presentation.</li> <li>• Ensure safe traffic control signs.</li> </ul>	Moderate	Vehicular traffic flow stagnant water pools or ponds	Land, Animals and Humans	SIF /Contractor(s)
Visual Impairment	<ul style="list-style-type: none"> <li>• Ensure that new developments are culturally appropriate, environmentally sound and aesthetically acceptable.</li> <li>• Note observation and feedback from campus residents, government agencies, NGOs.</li> </ul>	Minor	Visually Offensive Structures	Legon Campus skyline	SIF /Contractor(s)

Hazardous waste	<ul style="list-style-type: none"> <li>• Hazardous waste storage and disposal in a lawful manner.</li> <li>• Monitor areas of hazardous waste storage of concern by regulatory agencies.</li> <li>• For vaccine research and development/manufacture, develop biosafety protocols to cover the entire lifecycle including waste generation, collection, transport and disposal.</li> </ul>	Moderate – Major	Environmental effects of hazardous waste stream	Land, water, air, plants, animals and humans	SIF /Contractor(s)
Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide all weather access to the new buildings without obstruction.</li> <li>• Satisfy functionality of fire extinguishers, fire alarms, smoke detectors, etc.</li> <li>• Organize periodic fire drills. Establish fire assembly places.</li> </ul>	Moderate - Major	Areas of spontaneous fire combustion incidence	Land, assets, properties, air, water, plants, animals, humans	SIF/Contractor(s)
Influx Population	<ul style="list-style-type: none"> <li>• Conduct Epidemiological studies to track new infections in the project populations.</li> </ul>	Minor	Disease spread in the project communities	Air, water, land plants animals, humans	SIF/Contractor(s)

Source: Individual Consultant Data Records

#### 8.4 Additional Mitigation and Enhancement Strategies

- Overview

Kwaku Anim Boateng (Individual Consultant)

The importance of environmental conservation, social harmonization and peace building within the project site and neighbouring community is the focus of the SIF management team.

Furthermore, key environmental issues such as safer use of toxic chemicals, management of hazardous wastes, management of solid waste, sewage and management of radioactive waste that are crucial to sustainable management during the Project implementation have also been integrated into the sustainability footprint of SIF development projects. Finally the important dimensions of social change and the impact on cultural values that accompany development projects have been captured by SIF through participatory approaches. The adoption of this inclusive approach to development was the main objective of the UN Conference on Environment and Development (UNCED) in Rio De Janeiro-Brazil in 1992. Principle 4 of the Rio Declaration states clearly that “in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it”. This document discusses additional mitigation and enhancement measures for environmental conservation to achieve high environmental and social performances amidst Project activities. The SIF does not need to re-invent the wheel because a number of best technologies, management systems, procedures and practices that can be applied by the Project Implementation Committee to prevent or mitigate possible impacts of project activities do exist. The adherence to these best practices and systems include the following:

#### **8.4.1 Weed Control / Potential Introduction of Invasive Alien Species**

The potential issues emanating from weeds are that, weeds can cause significant impact on native ecosystems and may potentially impact fallow vegetated landscape. Additionally weeds can be imported to and exported from the sites on equipment and/or materials.

The operational policy of SIF to the Contractor(s) is as follows:

- ❖ To operate with good soil hygiene practices in order to prevent potential import of weed materials to /from the sites on materials, personnel and machinery.
- ❖ To control any problem weeds on the sites using methods that will not cause environmental harm/damage. The preferred strategy in Ghana is the use of integrated pest management technologies. Chemical application should be the last resort.
- ❖ Certify that machinery is weed free.
- ❖ Use machine wash-down facilities for the importing and exporting of machinery/equipment.
- ❖ Control the spread of common weed species by personnel induction on all the sites.

Invasive alien species (flora and fauna) can be introduced outside of their natural habitats where they have the ability to establish themselves, out-compete natives and take over the new environments. The United Nations Environment Program (UNEP) considers the introduction of alien species a serious impediment to conservation and sustainable use of global, regional and local biodiversity. This impact, unless adequately mitigated, is thus potentially major, significant and negative.

#### **8.4.2 Surface and Groundwater Management**

Potential issues likely to arise from surface and groundwater contamination include the following:

- ❖ Exceeding water quality parameters and measured baseline water quality values and Ghana EPA guidelines.
- ❖ None diversion of clean surface water away from contaminated sites in the rainy season.
- ❖ Uncontrolled erosion and sedimentation events.
- ❖ Contaminated water mismanagement and non- prevention of pollution.
- ❖ Uncontrolled off-site discharges.
- ❖ Seepage of contaminated water from contaminated water storage areas.
- ❖ Communication disconnect with downstream stakeholders concerning contaminated water management issues, where applicable.

The operational policy to the contractor(s) is as follows:

- ❖ Control operational activities without excessive surface and groundwater disturbance and negligible changes in water quality.
- ❖ Ensure water quality in impacted watercourses meet Ghana EPA guidelines regulatory regime.
- ❖ No adverse impacts occur to downstream watercourse, water quality and water users.
- ❖ No uncontrolled discharges of contaminated surface water from the sites.
- ❖ No detrimental effects to the environment as a direct result of the failure of surface water management control structures, including diversion channels and drains.
- ❖ No negative impacts on aquatic flora and fauna from discharges of surface water from the sites.
- ❖ No legitimate complaints are received from downstream users.

The potential issues likely to arise will include safety hazards/risks to students, staff and lecturers at the various new laboratories to be set up. There will also be the issues of environmental management of wastes, spillages and leakages from the laboratories. The operational policy of the SIF at the post-construction will be as follows:

- ❖ Improve procedures for laboratory waste characterization.
- ❖ Expand laboratory waste characterization procedures to plug all data gaps.
- ❖ Connect analytical laboratory waste characterization with logical interpretation and waste management to reduce the potential impact association.
- ❖ Identify laboratory waste sources and develop management plans.
- ❖ Ensure that all data (hard and soft copies) are stored safely.
- ❖ No lost time due to accidents or injuries.
- ❖ No legitimate complaints by stakeholders.
- ❖ Development of standard operating procedures for the operation of the laboratories (**biosafety protocols/procedures**). They should include: obligations, requirements, process and systems for managing safety hazards and statutory requirements and waste management procedure for laboratory waste.
- ❖ Provide PPE to students, staff and faculty lecturers to execute their tasks in a safe manner.
- ❖ Run trials to test Emergency Response Plans at least once every six (6) months.

#### **8.4.3 Re-vegetation or Restoration of Vegetation Cover**

The restoration of stable, self-sustaining native vegetation cover for most large areas of the sites, without erosion and sediment control, will be a potential issue to be addressed. Therefore, the storage of surface soil and storage and reuse of any cleared vegetation could facilitate revegetation and vegetation regrowth.

The SIF will require the Contractor(s) to do the following:

- ❖ Growth trials conducted for all media initiated at commencement of operations.
- ❖ Seed collection and nursery established within six (6) months of completion of works in that area.
- ❖ Revegetated areas monitored and maintained until there is evidence of stable cover by self-sustaining vegetation community.
- ❖ Weed management implemented and no new weeds or increase in weed cover during monitoring period.

- ❖ Stable landform without significant soil erosion.
- ❖ Evidence of natural recruitment of native species.
- ❖ Establishment of a diverse species mix within each structural layer commensurate with nearby natural vegetation communities.
- ❖ Develop Revegetation plans for approval, to consider these parameters:
  - Structural stabilization and erosion control necessity.
  - Alleviation of any compaction and scarification to create a surface conducive to vegetation growth.
  - Treatment of surface soils to promote vegetation growth in accordance with the results of chemical investigation and growth trials for the soil type.
  - Spreading of available surface soil.
  - Application of mulch, brush matting or logs sourced from areas cleared for the sites.
  - Planting specifications, including application methods.
  - Protection of vegetated areas from disturbance (fencing and other access restrictions).



## **9 Environmental, Climate and Social Management Plan (ECSMP)**

### **9.1 Introduction**

The Environmental, Climate and Social Management Plan (ECSMP) presents the implementation schedule of the proposed mitigation measures to both environmental, climate and social impacts as well as planning for long-term monitoring activities. The ECSMP also includes the associated environmental, climate and social costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations are provided in the ECSMP to enable the proposed project to be environmentally and socially friendly. The implementation steps will involve the Contractor, the Resident Engineer, Project Financier, SIF, project users and the local communities within the project corridor.

### **9.2 Implementation of ECSMP**

The environmental, climate and social mitigation and enhancement measures incorporated in the detailed engineering design will be attached to the Contract Documents. The Contractor will take stock of the contents of the ESIA Report of the Project. The Contractor will have an Environmental Expert with at least ten (10) years' experience in projects of similar nature. The expert will be familiar with the scientific measurement of environmental and social impacts and remedies and enhancement.

The Contractor(s) will be supervised by a selected consulting firm (Engineer). One of the team members of the supervision team will be an Environmental Specialist who is an expert in Environmental Management issues especially of construction projects (with at least 10 years' experience in projects of similar nature). One of his tasks will be to oversee contractor implementing the mitigation measures proposed by the ECSMP during pre-construction, construction and operation phases. His other duties will be to assist the contractor(s) in the implementation of the Environmental Monitoring Plan during pre-construction, construction and operation stages.

### **9.3 Construction Specific ECSMP**

The project specific environmental, climate and social construction guidelines (also known as contractor's specific construction environmental and social management plan (CESMP)) will be developed by the contractor's Environmental Expert. These guidelines will specify precautions and mitigation measures for pre-construction, construction and operation activities inclusion in the CESMP. The ECSMP developed in the project ESIA will serve as a reference material to comprehend the scope of the CESMP.

#### 9.4 Institutional Arrangement for Monitoring

The institutional arrangement for monitoring the performance and compliance at national and district/municipal assemblies is summarized in Table 25.0. The following institutions will play key roles in the project monitoring program:

- **National Level** – Social Investment Fund (SIF), Environmental Protection Agency (EPA), Electricity Company of Ghana (ECG), Ghana Water Company Limited (GWCL), Forestry Commission (FC), Land Valuation Division (LVD) of Land Commission (LC), Water Resources Commission (WRC), Ministry of Health (MoH), Ghana Health Services (GHS).
- **District/Municipal Assemblies** – Environment and Health Division, Waste and Sanitation Division, Public Works Department, Land Use and Special Planning Authority (LUSPA), Community-Based Organizations (CBOs).

**Table 25.0 Institutional Monitoring Arrangements**

Report	Main Themes Objectives	Responsibility	Frequency	Method of Communications
Stakeholder Engagement and Consultation Report	To get better understanding and validation of the potential environmental, climate and social issues that have been identified in ECSMP and /or for new sites to solicit stakeholders' views and narrowing-down potential and significant environmental and social impacts	SIF (PIU)	During pre-construction, construction, and operation phases.	Applicable means of consultation (including focused group, seminar, local meeting with chiefs and elders) and to be approved by SIF, District and Municipal Assemblies, NGOs.

	of project of significance.			
Monitoring Reports	Measuring project indicators and mitigation measures.	SIF (PIU)	Annually	Wide dissemination to relevant parties.
Baseline Survey Report	Collecting information/data on existing social and physical conditions	SIF (PIU)	Once during operation of the project.	Consultation and participatory workshop and dissemination to relevant parties.

Source: Independent Consultant Data Records

## 9.5 Capacity Development

Various gaps and opportunities have been identified to develop and strengthen existing capacities to ensure effective implementation of the ECSMP at both national and district/municipal assemblies' levels. Such capacity development is summarized in Table 26.0.

**Table 26.0** Capacity Development Training Plan

Training Topic	District/Municipal Assemblies Approval Authorities	District/Municipal Assemblies Staff	NGOs/CBOs	Community Leaders & Contractors
Environmental and Social Assessment	Awareness-raising	Detailed Training	Sensitization to the Issues	Awareness-raising
Environmental Assessment legislation and relevant Environmental	Awareness-raising	Detailed Training	Sensitization to the Issues	Awareness-raising

and Social Policies				
Potential Impacts of Projects and Mitigation	Awareness-raising	Detailed Training	Detailed Training	Sensitization to the Issues
Use of the Environmental Guidelines & AfDB Safeguard Policies	Awareness-raising	Detailed Training	Detailed Training	Awareness-raising
Monitoring and Evaluation	Awareness-raising	Detailed Training	Awareness-raising	Awareness-raising
Supervision	Awareness-raising	Detailed Training	Detailed Training	Awareness-raising

Source: Independent Consultant Data Records

## 9.6 Estimated Cost of ECSMP

The breakdown of estimated costs for putting the ECSMP into operation is provided in Table 27.0. The total estimated costs for facilitating the use of the ECSMP (excluding RAP implementation costs) during project period is at **USD 573,500.00**. About 40.0% of this cost is related to the required mitigation measures for some activities which will be assessed and incurred as part of the contract's cost.

**Table 27 .0 Environmental, Climate and Social Management Plan**

Potential Impact	Mitigation Measures	Significance	Source of Impact	Receptor	Responsibility and Cost of ECSMP (USD)
<b>PRE-CONSTRUCTION PERIOD</b>					
Survey Works	<ul style="list-style-type: none"> <li>Limited, localized opening of de-bush line</li> <li>Limited vegetation cover removal.</li> </ul>	Minor	De-bush line clearing	Land	Contractor(s); USD 12,000.00

Work Camp/Site office	<ul style="list-style-type: none"> <li>• Provision of mobile toilet and sanitary facilities</li> <li>• Daily collection of solid waste</li> <li>• Selection of flat location</li> <li>• Removal of vegetation cover.</li> </ul>	Moderate	Vegetation cover removal waste generation	Air, water, land construction workers;	Contractor(s); USD 35,000.00
Removal of trees/vegetation	<ul style="list-style-type: none"> <li>• Cutting and removal of large number of neem trees in Takoradi, Nsoatre, and Nandom as selected option.</li> <li>• Removal and stockpiling of vegetation cover topsoil</li> <li>• New trees to be promptly planted</li> </ul>	Moderate	Vegetation cover removal; trees cutting	Air, water, land, construction workers	Contractor(s); USD 8,000.00
Air Pollution	<ul style="list-style-type: none"> <li>• Fugitive emissions, localized.</li> <li>• Dust generation, limited.</li> <li>• Site clearance, limited.</li> <li>• Watering of exposed earth surface.</li> </ul>	Minor	Site clearance; vegetation cover removal	Air, construction workers	Contractor(s); USD 30,000.00
Demolition of structures	<ul style="list-style-type: none"> <li>• Reuse salvageable materials.</li> <li>• Conduct asbestos and lead-bases paint survey.</li> <li>• Use health and safety controls.</li> </ul>	Moderate -Minor	Demolition activities;	Air, land water, construction workers	Contractor(s); USD 35,000.00
<b>CONSTRUCTION PERIOD</b>					
Air Quality Deterioration	<ul style="list-style-type: none"> <li>• Construction vehicles maintenance.</li> <li>• Watering of exposed surfaces.</li> <li>• Cover vehicles carrying spoil and construction material.</li> <li>• Install and maintain equipment mufflers.</li> </ul>	Minor	Dust nuisance	Air, Flora, Project Residents, Construction Workers	SIF/Contractor(s); Captured in BoQ

Noise and Vibration	<ul style="list-style-type: none"> <li>• Install sound control devices.</li> <li>• Switch-off idling machines.</li> <li>• Provide ear-plugs to workers.</li> </ul>	Minor	Noise nuisance	Air, Fauna, Project Residents, Construction Workers.	SIF/Contractor(s); Captured in BoQ
Borrow Pits Generation	<ul style="list-style-type: none"> <li>• Access vector ecology in work areas.</li> <li>• Employ adequate drainage.</li> <li>• Fill open pits to avoid creating mosquito habitats.</li> <li>• Where land acquisition, displacement may be issues to mitigate as well, if material is not sourced from certified companies, contractor(s) will operate Borrow Pits Management Plan.</li> </ul>	Moderate –Major	Stagnant pool or depressions suited to mosquito breeding	Land, Project Residents around borrow areas construction workers	SIF/ Borrow Areas Population Contractor(s); Captured in Contractor CESMP
Erosion and Sedimentation	<ul style="list-style-type: none"> <li>• No major earthworks during the rainy season.</li> <li>• Limit vegetation cover removal.</li> <li>• Use adequate drainage structures.</li> </ul>	Moderate – Major	Erosion, siltation and land slip from cuts slopes, grubbing, and vegetation removal.	Land, Water Bodies, Aquatic Fauna	SIF/Contractor(s); USD 23,000.00
Waste Generation and Disposal	<ul style="list-style-type: none"> <li>• Minimize waste generation.</li> <li>• Segregate waste for re-use.</li> <li>• Provide waste bins.</li> <li>• Develop waste disposal policy.</li> <li>• Contract certified firms for collection, transport, and disposal of harmful, hazardous wastes.</li> </ul>	Moderate -Major	Excavated spoil, building materials, oil, lubricants	Land, Water bodies, Aquatic Fauna, Construction workers, campus residents	SIF/Contractor(s); USD 80,000.00

Concrete Batch Plant	<ul style="list-style-type: none"> <li>• Reuse concrete products.</li> <li>• Prevent dumping of concrete waste.</li> <li>• Segregate areas into 'clean' and 'dirty' sections</li> </ul>	Minor	Concrete mixing and resultant contamination	Land, water-bodies, Aquatic fauna; construction workers	SIF/Contractor(s); (Part of waste generation and disposal cost)
Construction Camps and Offices Creation	<ul style="list-style-type: none"> <li>• Carefully site, construct and manage construction camps.</li> <li>• Control erosion and dust.</li> <li>• Plan and carry out post-construction site clean-up.</li> <li>• Provision of mobile toilet and sanitary facilities</li> <li>• Daily collection of solid waste</li> <li>• Selection of flat location</li> </ul>	Moderate	Environmental and social disruption caused by construction camps	Land water bodies, Air, Aquatic fauna, campus residents, construction workers.	SIF/Contractor(s); USD 35,000.00
Biodiversity Loss (Fauna and Flora)	<ul style="list-style-type: none"> <li>• Control all clearing activities.</li> <li>• Minimize number of trees to be felled.</li> <li>• Reduce potential impact on flora and fauna.</li> <li>• Replace and plant more trees, hedges, etc.</li> <li>• Avoid use of invasive plant species to revegetate cleared areas.</li> </ul>	Moderate	Clearing, destruction and decimation of fauna habitat and food resources	Land, plant and animals, Aquatic Fauna	SIF/Contractor(s); USD 15,000.00
Traffic Nuisance	<ul style="list-style-type: none"> <li>• Develop and implement traffic management plan</li> <li>• Set and enforce speed limits.</li> <li>• Regulate transport of toxic materials.</li> <li>• Reduce accident risks by safe driving speeds.</li> </ul>	Moderate	Accidents risks associated with vehicular traffic	Project residents, construction workers and public	SIF/Contractor(s); Captured in BoQ

Public Occupational Health and Safety	<ul style="list-style-type: none"> <li>• Use of PPE by workforce.</li> <li>• Collect and recycle lubricants and streams of waste.</li> <li>• Take precaution to avoid accidental spills.</li> <li>• Carry out periodic toolbox meetings.</li> <li>• Setup health education, malaria prevention programs.</li> <li>• Install first aid boxes</li> <li>• Maintain sanitation and hygiene at campsite and active working/construction areas</li> </ul>	Major	Creation of diseases vectors affecting humans, plants, and animals.	Project resident's construction workers, public.	SIF/Contractor(s); USD 100,000.00
Visual Impairment	<ul style="list-style-type: none"> <li>• Fence in project sites and open spaces to prevent visual intrusion.</li> <li>• Water all exposed areas.</li> <li>• Ensure that new developments are culturally sound, environmentally appropriate, and aesthetically acceptable.</li> </ul>	Moderate	Aesthetic impact of areas development; visually offensive structures	Architectural aesthetics of the skyline	SIF/Contractor(s); USD 20,000.00
Construction Materials Waste	<ul style="list-style-type: none"> <li>• Implement on-site recycling system.</li> <li>• Reuse recycled demolition materials</li> <li>• Remove at regular intervals, all solid waste not recyclable for special disposal.</li> </ul>	Moderate	Environmental effects of construction materials waste	Land, Air and Water; Humans, plant, and animals	SIF/Contractor(s); USD 25,000.00



Hazardous Solid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous solid waste material inventory</li> <li>• Collect and store hazardous materials in temporary hazardous waste storage.</li> <li>• Protect all hazardous waste from rainy events.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous solid waste stream	Land, Air, Water, plant, animals' humans	SIF/Contractor(s)/ Ghana EPA; USD 20,000.00
Hazardous Liquid Waste Stream	<ul style="list-style-type: none"> <li>• Undertake hazardous liquid waste stream inventory.</li> <li>• Follow waste management plan for hazardous liquid waste stream.</li> <li>• Contract certified firms to collect, transport and dispose these wastes.</li> </ul>	Moderate	Environmental effects of hazardous liquid waste stream	Land, Air Water, Plant, Animals, Humans	SIF/Contractor(s)/ Ghana EPA; USD 20,000.00
Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide five extinguishers, fire alarms, smoke detectors.</li> <li>• Treat all wires as live wires.</li> <li>• Train selected personnel for Fire Prevention and Fighting Techniques.</li> <li>• Organize periodic fire drills.</li> <li>• Establish fire assembly places</li> </ul>	Moderate	Areas of eminent fire suppression and spontaneous combustion	Assets, properties, humans, plants, animals	SIF/Contractor(s)/ Fire Station, Ghana National Fire Service: USD 17,000.00
Influx Population Surge	<ul style="list-style-type: none"> <li>• Develop a labor management plan .</li> <li>• Educate workforce on social harmony.</li> </ul>	Minor – Moderate	Creating of social disharmony between local and workforce	Project Residents, Local populations Construction Workforce	SIF/Contractor(s), District/Metropolitan Assemblies ; USD10,000.00

	<ul style="list-style-type: none"> <li>Establish positive relation between workers and local residents.</li> <li>Avoid child labor.</li> </ul>				
Green House Gas (GHG) Emissions	<ul style="list-style-type: none"> <li>Service construction vehicles, machinery and equipment regularly.</li> <li>Capture GHG missions for mobile construction vehicles.</li> </ul>	Unknown	Mobile and stationary equipment and machines	Plants, Animals, Humans	SIF/Contractor(s)/ Ministry of Health; USD 19,000.00
<b>OPERATION PERIOD</b>					
Air and Noise	<ul style="list-style-type: none"> <li>Monitor periodically ambient areas.</li> <li>Provide barriers in front of sensitive receptors.</li> <li>Enforce Ghana EPA guidelines for air and noise emissions.</li> </ul>	Minor	Traffic flow noise and air pollution	Air, project residents, plants and animals.	SIF/Contractor(s); USD 5,000.00
Waste Generation Disposal	<ul style="list-style-type: none"> <li>Recycle all surplus solid waste and demolition waste.</li> <li>Decommission camp sites/offices adequately and dispose of waste properly in a lawful manner.</li> </ul>	Moderate	Dismantling of work camp and site offices	Land water bodies, aquatic fauna, construction workers, campus residents.	SIF/Contractor(s); USD 8,000.00
Traffic Safety and Security	<ul style="list-style-type: none"> <li>Maintain diversion signs with reflective materials.</li> <li>Provide adequate number of signage.</li> <li>Prohibition of unnecessary honking of horns by motorists cyclists.</li> </ul>	Minor	Traffic flow from vehicular traffic	Animals, humans (project residents, neighborhood residents)	SIF/Contractor(s); USD 7,000.00

Public Health and Safety	<ul style="list-style-type: none"> <li>• Cover all stagnant pools and ponds from breeding mosquitoes.</li> <li>• Educate project populations on HIV/AIDS/Malaria Presentation.</li> <li>• Ensure safe traffic control signs.</li> </ul>	Moderate	Vehicular traffic flow stagnant water pools or ponds	Land, Animals and Humans	SIF /Contractor(s); USD 3,500.00
Visual Impairment	<ul style="list-style-type: none"> <li>• Ensure that new developments are culturally appropriate, environmentally sound and aesthetically acceptable.</li> <li>• Note observation and feedback from campus residents, government agencies, NGOs.</li> </ul>	Minor	Visually Offensive Structures	Legon Campus skyline	SIF /Contractor(s); USD 5,000.00
Hazardous waste	<ul style="list-style-type: none"> <li>• Hazardous waste storage and disposal in a lawful manner.</li> <li>• Monitor areas of hazardous waste storage of concern by regulatory agencies.</li> <li>• For vaccine research and development/manufacture, develop biosafety protocols to cover the entire lifecycle including waste generation, collection, transport, and disposal.</li> </ul>	Moderate – Major	Environmental effects of hazardous waste stream	Land, water, air, plants, animals, and humans	SIF /Contractor(s); USD 30,000.00
Fire Prevention and Control	<ul style="list-style-type: none"> <li>• Provide all weather access to the new buildings without obstruction.</li> </ul>	Moderate - Major	Areas of spontaneous fire combustion incidence	Land, assets, properties, air, water, plants, animals, humans	SIF/Contractor(s); USD 6,000.00

	<ul style="list-style-type: none"> <li>• Satisfy functionality of fire extinguishers, fire alarms, smoke detectors, etc.</li> <li>• Organize periodic fire drills. Establish fire assembly places.</li> </ul>				
Influx Population	<ul style="list-style-type: none"> <li>• Conduct Epidemiological studies to track new infections in the project populations.</li> </ul>	Minor	Disease spread in the project communities	Air, water, land plants animals, humans	SIF/Contractor(s); USD 5,000.00

Source: Individual Consultant Data Records

## **10 Disaster Management Plan**

### **10.1 Overview**

Disaster is an unexpected event occurrence, due to sudden of installed systems, external threats, internal disturbances, fire and accidents. The following subsections describe the measures to be taken by the project proponent to prevent/ minimize risk of unexpected event.

### **10.2 Preventive Action**

Once the likelihood of a disaster is suspected, action will be taken to prevent failure. Engineers responsible for preventive action will identify sources of repair equipment, materials, labour and expertise for use during emergency situations.

### **10.3 Reporting Procedures**

The level at which a situation will be termed disaster will be specified. This will include the stage at which the surveillance requirements should be increased both in frequency and details. The person in charge should notify the officer on duty for the following information:

- Exit points for the public.
- Safety areas in the facilities.
- Nearest medical facilities.

### **10.4 Communication System**

An efficient communication system is absolutely essential for the success of any disaster management plan. This has to be worked out in consultation with the district assembly. More often than not, the entire communication system gets disrupted when a disaster occurs. The damage area needs to be clearly identified and provided with temporary ad full proof communication system.

### **10.5 Disaster Action Committee**

To ensure coordination of action, a Disaster Action Committee will be constituted. This Disaster Action Committee will prepare the evacuation plan and o procedures for implementation based on local needs and facilities available. The plan will include:

- ❖ Demarcation of the areas to be evacuated with priorities.
- ❖ Safe areas and shelters.
- ❖ Security of properties left behind in the evacuation areas.
- ❖ Functions and responsibilities of various members.
- ❖ Setting up of joint control action.

All personnel involved in the Disaster Action Plan should be thoroughly familiar with all the element of the project area and their responsibilities. The staff at the site will be trained for problem detection, evaluation and emergency remedial measures. Individual responsibility to handle the segments in disaster plan will be allotted. Success of the disaster plan depends on public participation, their response to warning notifications and timely action. Public has to be educated on the hazards and key role in disaster mitigation by helping in the rescue operations. It will be necessary to indicate by whom and how a declared emergency will be determined. There will be proper notification by the public on e-alert signals regarding occurrence of the emergency. The notification will be clear so that the evacuees know precisely what to do when re-entering or approaching the affected areas.

## **11 Decommissioning and Emergency/Fire Response Plan**

### **11.1 Decommissioning Plan General Requirements**

In general, during decommissioning phase all work areas and offices and workshops/ garages and other temporary installations must be cleaned up and the site restored. These include removal or re-use of temporary buildings, materials, wood, refuse, surplus materials, embankments or any other material that is not in the area before construction works.

All natural drainage systems must be restored and excavated materials must be used to fill excavated areas and spread. The damaged areas must be restored to make it compatible with future use. However, the contractor must consult the district assemblies to obtain information about the envisaged use of the area.

Natural drainage must be preserved during rehabilitation and restoration works, ditches must be created to facilitate water run-off by installing drains and derivation ditches perpendicular to the slopes. All superfluous temporary drainage elements must be removed. Permanent installations must be restored/ repaired to their initial state.

The compacted soil must be scarified to at least 15cm deep to loosen it and facilitate vegetation growth. Concrete surfaces, paving stones and flagstones must be removed or broken and covered with 1m of topsoil.

Damaged trees must be chopped/ lopped and crosscut after completion of construction works. The site must be cleared of equipment, materials, provisional installations, wastes, debris and overburden resulting from construction works. The adjacent strip of vegetation must be cleaned.

### **11.2 Emergency/ Fire Response Plan**

#### **Purpose and Objectives**

The emergency response plan is designed to address any potential accident during the operational phase. The plan has been designed to anticipate potential emergencies from fire explosions and bulk oil spills and is intended to minimize hazard to human health and the environment.

The emergency response action plan to be adopted by Management will have four main objectives. These include the following:

- Education and Awareness Creation;
- Emergency Preparedness;
- Emergency Management; and
- Damage Control

Education and Awareness Creation will involve raising awareness about the procedures to be followed in the situation of an emergency. Emergency preparedness will include activities and programs by which emergency responders can quickly assume specialist roles to deal with situation.

Emergency Management includes identifying the participants, their roles and duties and the way they might operate together. Damage control will ensure that any harm incurred is mobilize and that even related needs are properly addressed as well as normal operations are quickly restored.

### **Responsibilities**

Management team is responsible for implementation of the Plan including allocation of adequate resources to ensure adherence to applicable state and local regulations as well as corporate policies.

### **Notification**

Management will always report major fire outbreaks or any emergencies to the following:

- The EPA;
- Factories Inspectorate; and
- Ghana National Fire service (GNFS).

A report of the emergency/fire shall include:

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- Location of the emergency/fire;
- Type of emergency/fire;
- Severity of the emergency/fire; and
- Employee injuries and property damage.

The Director of Operations (DOO) or in his absence the Environmental and Safety Officer (ESO), is responsible for initiating emergency procedures and ensuring that fire prevention systems and procedures provide sufficient protection of employees and facility assets.

### **Emergency and Fire Response Team**

Management shall continue to train and maintain an Emergency and Fire Response Team (EFRT), a role which will be played by the Ghana National Fire Service. The EFRT shall be called immediately into action on any fire case or other emergencies. The DOO shall head the EFRT and will be assisted by the ESO. The EFRT shall undergo periodic training from the Ghana National Fire Service to equip and enhance their preparation for firefighting action.

### **Monitoring of Fire Detection and Protection System**

The Fire Detection and Protection Systems will be monitored to identify any abnormal conditions, which could prevent fire protection systems and equipment from performing their intended function. All inspection records will be kept in Maintenance Department and will be reviewed by the DOO/ESO.

Included in this program are inspections for:

- Hand-held portable extinguishers located throughout the plant/site;
- Fire detection, alarm and systems;
- Fire/emergency exit doors, and
- Accessibility and functionality of water storage systems.

### **Testing, Inspection and Maintenance**

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Upon installation, all fire protection systems shall be inspected and acceptance tested by a competent person before being put into operation. All fire protection systems and equipment shall be inspected as required by Factories Inspectorate, generally on quarterly basis, with follow-up corrective actions recorded and tracked for completion. This is the responsibility of the ESO and will be tracked in Maintenance long.

### **Portable Extinguishers**

All fire extinguishers will be visually inspected and checked in designated locations every monthly by Security personnel. This will be recorded on a monthly checklist.

### **Fire Detection Alarm**

The fire alarm systems will be inspected and tested every 6 months. An external expert will inspect fire systems frequently.

### **Fire / Emergency Doors**

Fire/ Emergency doors will be inspected and tested frequently.

### **Emergency Response Action**

This section describes the response actions that will be taken in the event fire / explosion is discovered or occurs at the site.

- Step 1 -Activate site emergency alarms
- Step 2 -Evacuate the site and do not re-enter
- Step 3 -Report to your supervisor or call DOO/ ESO from a safe location
- Step 4 - In the event that step 3 does respond immediately, alert security.

### **General Evacuation Procedures.**

When evacuating the sites:

- Stay calm, do not rush or panic;

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- Safely stop your work;
- Gather your personal belongings if it safe to do so;
- If safe, close your office door and window, but do not lock them;
- Use the nearest safe stairs & exit doors and proceed to the nearest exit;
- Proceed to the designated Emergency Assembly Area (EAA) and wait for any instruction from the emergency respondents;
- Do not re-enter the building or work area until you have been instructed to do so by the emergency responders.

## **Emergency Procedures**

### Emergency Procedure for Bulk Oil Spills

1. The DOO/ ESO shall immediately alert and assembly the EFRT at an emergency point and give instructions for the operation
2. The DOO/ESO shall stop all operations at the oil spill area
3. The team shall make sure that the drain from the tank farm area is closed to confine the oil within the catchment area around the storage tank.
4. The spilled oil shall be pumped or scooped into containers or drums.
5. Oil contaminated soil/ sludge shall be incinerated or disposed of at organized landfill sites.

### Emergency Procedure for Fire Outbreak

1. Upon receiving information of fire outbreak at the plant, the ESO shall cause the emergency siren to be blown.
2. The DOO/ ESO shall immediately instruct all operations to be stopped and call for external assistance (nearest Ghana Fire Service) if necessary.
3. The DOO/ ESO shall mobilize the EFRT and issue instructions for the firefighting operation.
4. All persons not assigned to the EFRT shall move orderly to specified emergency assembly points.

## **12 Principal Issues Arising from the Scoping**

### **12.1 Overview**

Significant topical issues which are expected to emerge as principal issues arising from the scoping exercise phase during the field studies will include the following:

- Sustainability Plan Issues to be addressed by SIF;
- Good Infrastructure Design;
- Site Location and Layout Issues;
- Maintenance Regime of Facilities; and
- Considering Environment and Climate.

#### **12.1.1 Sustainability Plan Issues to be addressed by SIF**

The SIF has elected to undertake the following tasks as principal issues emanating from consultations and field studies findings at the scoping phase of the Program, before project implementation where necessary:

- Identify gaps in current policies and procedures, review and/or develop new policies and procedures as required;
- Incorporate sustainability footprints into all operational plans;
- Develop a reporting capacity to monitor performance;
- Incorporate sustainability in staff induction, training and development programs where relevant;
- Learning, Teaching and Research Committees to identify where sustainability initiatives can be focused;
- Incorporate sustainability principles into program delivery and teaching practice;
- Embed and deepen sustainability principles in research practices. This includes waste minimization, energy and water conservation and other sustainability practices as relevant;
- Establish a register of relevant partnerships and seek out new opportunities to strengthen regional and community outcomes;
- Landscaping throughout the project built environment to be consistent with regional ecosystems;
- Apply effective waste minimization strategies in line with waste hierarchy (avoid, reduce, reuse, recycle, disposal);

- All planning and development considers the environmental and social sensitivities of the campus and incorporate principle of sustainability;
- Integrate principles of sustainability into the SIF's procurement processes;
- Develop and deepen Transportation Management Plan; and
- Raise the viability of SIF sustainability commitment, internally and externally.

### **12.1.2 Good Infrastructure Design**

- **Building design**

Consideration of good infrastructure design incorporates the “whole project environment” but not just the building facilities. Spaces provision should be very accommodating and functional for the intended purposes. All the facilities should be accessible and appropriate in scale and attraction to all users. The design should respond to the local climate, topography and any potential hazards. Simple and cost-effective designs would ensure minimization of maintenance costs. The structure should be durable and accept high levels of light and air (ventilation) and provide good acoustics and high level of comfort.

- **Materials of Construction**

Use of locally available building materials and skills and techniques of local artisans would reduce costs of construction and provide better quality buildings. Moreover, chances of repair and maintenance regimes are likely to be improved. Furthermore, the use of local building materials and local artisanal skills will help generate employment and income in the project neighbouring communities. On-the-job training would enhance the pool of local skills.

- **Lighting and Power Provision**

Lighting and power provision for the project sites are all within on grid locations. Use of ceiling fans and air conditions (where applicable) will provide more comfortable, accommodation, teaching, learning and research environment. Electricity network facilities will facilitate the use of lap-tops, desk-top computers and mobile phones to aid teaching, learning and research. Tremendous benefits accruing from the use of lighting and power systems can be realized.

- **Toilets/Lavatories and Bathrooms Design**

Toilets/lavatories and bathrooms designs should feature complete segregation of the sexes (males and females). They should be well designed and effectively functional to reduce contamination with good housekeeping practices. Major considerations in the design should include:

- Floor of the facilities should be made of reinforced concrete for strength and ease of maintenance.
  - Male and female facilities should be separated by at least 10meters and preferably screened from each other.
  - Religious and cultural traditions need to be taken into account in design and location of these facilities.
- 
- **Disability Consideration**

Disable persons are one of the largest single groups of chronically poor and excluded in society. As a result, inclusive school education should involve participation of students, including students with special needs, with disable access provision factored into the designs. Accessibility to the Project facilities should allow persons with disabilities to participate in the use of those facilities to their mutual benefits. The final designs of the Project facilities should have a limited access provision, at least, to cater to the disable population within the project communities.

- **Climate Effect on Designs**

Climate influences the comfort levels of students, teachers and staff in school educational facilities. Therefore, the layout and design of such buildings needs to reflect this. The following issues are of tremendous concern:

- Correct orientation of buildings to allow in breeze and keep out the sun.
- Ventilation, light levels intrusion into buildings by proper use of design elements such as roof overhangs, window openings and roof construction.
- Use of flora planting saplings to provide shade and keep buildings cool. Trees usage should be at a safe distance from buildings to provide shade.

### **12.1.3 Site Location and Layout Issues**

Basically, the sites need to be suitable in sizes and shapes to allow for flexibility and future expansions and promote safety and security. The sites should be well drained, level, not subject to flooding and have good soil conditions to allow for simple foundations. The tenure of the land should be well established.

#### **12.1.4 Maintenance Regime of Facilities**

To avoid any unsanitary, poorly maintained facilities, the following measures should be adopted:

- Day-by-day maintenance of clean facilities, by use of cleaners.
- Female students' menstrual periods are an important issue in toilet/lavatory maintenance. Soiled materials used for menstrual hygiene should be safely placed in special disposable containers instead of the water closets, need to be considered.
- Continuous supply of water for hand washing and good housekeeping practices

#### **12.1.5 Considering Environment and Climate Change Factors**

There is the need to develop a risk and vulnerability assessment methodology to assist decision-makers and decision-takers in evaluating their investment options effectively, taking into account long-term environmental, social and climate change factors. The SIF needs to acknowledge hazard risk levels to high frequencies of severe storms in the project zones. These areas, as a result need ecosystem hazard mitigation and protection often neglected by development planners.

- **Vulnerable Geographic Location**

Particular attention should be given to climate proofing and disaster resilient materials usage to withstand high frequencies of severe storms.

- **Green Building Facilities**

The buildings should be designed and constructed as green buildings so that they could serve for well ventilation, provide healthy environment and allow maximum levels of daylight for energy conservation.

- **Disaster Risk Reduction**

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The most common hazards related to project infrastructure facilities construction are earthquakes, windstorms, bushfires, lightning, floods and land instability. Any disaster risk assessment should take into account the possible effect of climate change anticipated over the life of the facilities. Effective disaster risk reduction approaches are these:

- For windstorms, the use of sheltered sites and windbreaks and the construction of properly braced buildings with wind resistant roofs are the best protection.
- For earthquakes, the strength of the building and the use of lightweight roofing are the best alternatives – i.e. use of effective seismic resistant building material stock.
- For lightning, site location consideration and use of lightning conductors are important.
- For bushfires, creation of firebreak buffer zones around the boundaries of the structures to shield them from bush fire incidences is the best protection.
- Developing a high flood risk map as well as establishing evacuation and response procedures to reduce and eliminate long-term risks caused by natural hazards.



## 13 Site Management Roles and Responsibilities with Respect to Management Procedures

### 13.1 Overview

The relevant stakeholders to be involved in the ESIA implementation during project execution will most likely be: Client (SIF); Financiers(AfDB); Project Consultants; Ghana Water Company Limited (GWCL); Electricity Company of Ghana (ECG); Ghana Health Services (GHS); Ghana Environmental Protection Agency (EPA); Forestry Commission (FC); District/Metropolitan Assembly; Ministry of Science and Technology; Ministry of Energy; and Non-Governmental Organizations (NGO's)

The organizational and staffing structure identifying the personnel (by job title and name) and relevant institutions to be assigned for ESIA implementation issues with responsibility assignment to the Project is shown in Table 28.0

**Table 28.0 Organization and Staffing Structure with Site Management Roles and Responsibilities**

Number	Designation	Roles and Responsibilities
1.	Project Environmental Coordinator	<ul style="list-style-type: none"> <li>• Responsible for day-to-day environmental and social management of project sites</li> <li>• Organize activities to motivate and maintain the interest of project staff in environmental and social issues.</li> <li>• Create awareness of environmental and social issues through training programs and review meetings.</li> <li>• Coordinate investigations on all types of accidents.</li> <li>• Conduct environmental and social audit in line with project monitoring guidelines.</li> <li>• Produce environmental and social reports on the project.</li> <li>• Coordinate with EPA and other relevant institutions.</li> <li>• Develop work plan for the implementation of the PECSMP</li> </ul>
2.	Project Manager (Contractor)	<ul style="list-style-type: none"> <li>• Construction methods and standardized materials under contract usage</li> <li>• Overall supervision of project implementation work program, contract specifications and conditionality's attainment.</li> <li>• Liaison with Client on project implementation challenges, and timeliness of project execution.</li> </ul>

3.	Project Manager (Consultant)	<ul style="list-style-type: none"> <li>Ensures that Contractor(s) meets its environmental, social, health and safety obligations to the project implementation work program.</li> </ul>
4.	Client (SIF) Representative	<ul style="list-style-type: none"> <li>Ensures that project execution meets specified environmental, social, health and safety guidelines contained in the contract documents and PECSMP.</li> </ul>
5.	Ghana Health Service	<ul style="list-style-type: none"> <li>Change of frequency of diseases.</li> <li>Occurrences of new diseases in the project catchment areas.</li> <li>Seminar/lectures on Covid-19/ HIV/AIDS, STDS and health care and diseases prevention.</li> </ul>
6.	ECG	<ul style="list-style-type: none"> <li>Public Education and Awareness on power consumption and conservation.</li> <li>Monitoring of transmission lines and structures (poles ) failure</li> <li>Ensure safety system deployment during project implementation.</li> <li>Ensure use of standard wiring cables, materials/ components by Contractors.</li> </ul>
7.	EPA	<ul style="list-style-type: none"> <li>Overall supervision of environmental and social performance of PECSMP and Project</li> </ul>
8.	Forestry Commission / Ghana Wildlife Society	<ul style="list-style-type: none"> <li>Supervision of cutting of trees within and outside the right-of-way for the project</li> <li>Maintenance of fauna habitat to prevent degradation and decimation of fauna biodiversity.</li> </ul>
9.	Campus Organizations Project Community Opinion Leaders/NGOs	<ul style="list-style-type: none"> <li>Expression of concerns/issues on environmental protection and sustainability measures enshrined in the PECSMP and by the Contractor(s) own PECSMP documentation.</li> </ul>
10.	SIF Environmental and Social Assessment Unit	<ul style="list-style-type: none"> <li>Lead the internal monitoring day-to-day and periodically of PECSMP implementation</li> </ul>

11.	Policy Planning and Monitoring and Evaluation Units of SIF	<ul style="list-style-type: none"> <li>• Coordination of internal and external monitoring of PECSMP implementation.</li> <li>• Periodic monitoring of the PECSMP implementation and its impact</li> </ul>
12.	External Consultants or NGOs	<ul style="list-style-type: none"> <li>• Periodic monitoring, evaluation and auditing of PECSMP implementation.</li> </ul>

**Source: Individual Consultant Data Report.**

## 14 Monitoring and Control

### 14.1 Overview

A monitoring plan will be developed to determine impacts on physical, biological/ecological and socio-economic/socio-cultural environments within the project zone of influence. The monitoring results will be expected to facilitate the predictions of potential impacts as accurate and the prescribed mitigation measures proposed for their management are adequate and appropriate. Furthermore, the monitoring program will also serve as an early warning system by revealing unforeseen impacts and allow additional corrective measures to be implemented to arrest the situation and ensure that damage caused are not irreversible. Finally, the monitoring program will also serve as useful guidance tool for future SIF/AfDB educational infrastructural facilities development. Therefore, a monitoring program has been developed for those environmental and social components/parameters under consideration during the pre-construction, construction and post-construction periods activities in the long-term.

### 14.2 Monitoring of Various Components

The environmental and social parameters will be monitored as per the details presented in **Table 29.0**

**Table 29.0 Monitoring of Environmental & Social Components during Pre-Construction, Construction and Post Construction Phases**

Phase/Period	Components/ Parameters	Locations	Duration	Frequency	Responsibility
	<ul style="list-style-type: none"> <li>• Air Quality:               <ul style="list-style-type: none"> <li>➤ TSP</li> <li>➤ SPM</li> <li>➤ RPM</li> <li>➤ NOx</li> <li>➤ SO2</li> <li>➤ CO</li> </ul> </li> </ul>	Not less than two Points. Additional Location to be Determined by Supervision Consultant and Resident Engineer	24 hours Continuous Sampling	Not less than once prior to construction as a verification and update of baseline survey data required for compliance requirement	SIF, Ghana EPA, Project Financier, Supervision Consultant

Pre-Constructi on	<ul style="list-style-type: none"> <li>• Ground and Surface Water Quality: <ul style="list-style-type: none"> <li>➤ Suspended solids (SS).</li> <li>➤ Biological Oxygen Demand (BOD)</li> <li>➤ Dissolved Oxygen (DO)</li> <li>➤ Conductivity</li> <li>➤ Fecal Coliform</li> <li>➤ Oil and Grace</li> <li>➤ Arsenic</li> </ul> </li> </ul>	Cross-culvert site and locations of major sources of potential water pollution (construction camp and other sources of significant runoff and liquid waste generation) as identified by the Resident Engineer and Supervision Consultant	Sampling	Not less than once prior to construction to verify baseline conditions.	SIF, Ghana EPA, Project Financier, Supervision Consultant
	<ul style="list-style-type: none"> <li>• Noise: <ul style="list-style-type: none"> <li>➤ L10</li> <li>➤ L90</li> <li>➤ Leq</li> </ul> </li> </ul>	In areas of sensitive reception subject to high noise and vibration levels.	24 hours continuous sampling	Once prior to construction	SIF, Ghana EPA, Project Financier, Supervision Consultant
	<ul style="list-style-type: none"> <li>• Air Quality: <ul style="list-style-type: none"> <li>➤ TSP</li> <li>➤ SPM</li> <li>➤ RPM</li> <li>➤ Nox</li> <li>➤ SO2</li> <li>➤ CO</li> </ul> </li> </ul>	At locations as determined for pre-construction monitoring and additional locations as determined necessary by resident Engineer/ Supervision Consultant.	24 hours continuous sampling	As determined necessary by Resident Engineer/ Supervision Consultant	SIF, Ghana EPA, Project Financier, Supervision Consultant

Constructi on	<ul style="list-style-type: none"> <li>• Ground and Surface Water Quality: <ul style="list-style-type: none"> <li>➤ SS</li> <li>➤ BOD</li> <li>➤ DO</li> <li>➤ Conductivity</li> <li>➤ Fecal Coliform</li> <li>➤ Oil and grease</li> <li>➤ Arsenic</li> </ul> </li> </ul>	Same location as pre-construction and additional locations as determined later.	Sampling	As determined warranted by the Resident Engineer/Supervision Consultant	SIF, Ghana EPA, Project Financier, Supervision Consultant
Constructi on	<ul style="list-style-type: none"> <li>• Soils: <ul style="list-style-type: none"> <li>➤ Lead</li> <li>➤ PH</li> <li>➤ Oil and Grease</li> <li>➤ Pesticides</li> </ul> </li> </ul>	As determined advisable by Resident Engineer/Supervision	Sampling	As determined advisable by Resident Engineer/Supervision	SIF, Ghana EPA, Project Financier, Supervision Consultant
Constructi on	<ul style="list-style-type: none"> <li>• Project users access created</li> </ul>	Sidewalks/Walkways/Crossways/Pedestrian Traffic Movement Zones/Entrance to Project sites	Continuous during construction	24 hours continuous access provision	SIF, Ghana EPA, Project Financier, Supervision Consultant
Constructi on	<ul style="list-style-type: none"> <li>• Noise: <ul style="list-style-type: none"> <li>➤ L10</li> <li>➤ L90</li> <li>➤ Leq</li> <li>➤</li> </ul> </li> </ul>	Not less than two locations in each sensitive receptor areas.	24 hours continuous sampling	Once prior to construction	SIF, Ghana EPA, Project Financier, Supervision Consultant
	<ul style="list-style-type: none"> <li>• Erosion and Sedimentation levels</li> </ul>	Construction sites water bodies	Continuous precipitation events.	After cessation of precipitation events	SIF, Ghana EPA, Project Financier, Supervision Consultant

	<ul style="list-style-type: none"> <li>Traffic and Public Safety (Number of traffic incidences or accidents)</li> </ul>	Construction sites; Settlement or Working Zones/Areas	24 hours continuous on working days	Daily movement of construction vehicles and machinery	SIF, Ghana EPA, Project Financier, Supervision Consultant, Traffic Police
	<ul style="list-style-type: none"> <li>Public Health and Safety Hazards (Number complaints recorded and addressed)</li> </ul>	Construction site; Settlement or Working Zones/Areas	48 hours continuous on working days	Once a year; continuous during post-construction phase. Source should be from the Grievance Registry	SIF, Ghana EPA, project Financier, Supervision Consultant, Ministry of Health
	<ul style="list-style-type: none"> <li>Waste Disposal (Volumes of hazardous/Non-hazardous, collection and disposal)</li> </ul>	Construction sites; Settlement or Working Zones/ Areas	24 hours continuous on working days	Continuous during post-construction phase	SIF, Ghana EPA, project Financier, Supervision Consultant, District Assembly.
Post – Construction	<p>Air Quality, Dust and Odor</p> <ul style="list-style-type: none"> <li>➤ TSP</li> <li>➤ SPM</li> <li>➤ RPM</li> <li>➤ NOX</li> <li>➤ SO2</li> <li>➤ CO</li> <li>➤ Methane (CH4)</li> <li>➤ H2S</li> </ul>	Working Areas/Zones	24 hours Continuous on	Every day during operational phase;	SIF, Ghana EPA Project Financier, Supervision Consultant

Post-Construction	<p>Noise/ Vibration</p> <ul style="list-style-type: none"> <li>➤ L10</li> <li>➤ L90</li> <li>➤ Leq</li> <li>➤ Cracks on facilities within construction zone.</li> </ul>	At locations of sensitive reception subject to high noise and vibration levels.	24 hours Continuous sampling.	Every 6 months	SIF, Ghana EPA, project Financier, Supervision Consultant
Post-Construction	<p>Ground/ Surface Water Quality</p> <ul style="list-style-type: none"> <li>➤ SS</li> <li>➤ BOD</li> <li>➤ DO</li> <li>➤ Conductivity</li> <li>➤ Oil and Grease</li> <li>➤ Arsenic</li> </ul>	Locations inside and outside of project sites as determined necessary.	Sampling	Every three (3) months	SIF, Ghana EPA, Project Financier, Supervision Consultant
Post-Construction	<p>Waste Generation and Disposal (in volumes)</p> <ul style="list-style-type: none"> <li>➤ Hazardous Waste</li> <li>➤ Non-Hazardous</li> <li>➤ Biomedical Waste</li> </ul>	Project Sites	24 hours continuous on working days.	Every day	SIF, Ghana EPA, Project Financier, Supervision Consultant
Post-Construction	<p>Influx Population Surge Number of people seeking employment</p>	Project Neighborhood Communities	3 months after construction activities	Ceases with stoppage of construction activities.	SIF, Ghana EPA, Project Financier, Supervision Consultant



Post-Constructi on	Environmental /Social Reporting done: ➤ Record keeping ➤ Surveys ➤ Auditing	Project Sites	1 month	Monthly/ Quarterly/ Annually.	SIF, Ghana EPA, Project Financier, Supervision Consultant
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Source: Individual Consultant Data Records

## **15 Conclusions**

### **15.1 Overview**

The nature of civil works proposed under the Proposal is not likely to cause significant and/or irreversible adverse environmental and social impacts. Most of the Project impacts will be localized due to the relatively moderate to small-scale activities. However, there are some issues of concern that cut across the range of proposed interventions.

### **15.2 Lessons from Similar Projects**

Field studies and lessons learned from similar Programs show that issues such as good infrastructure design, disability consideration, climate effect on designs, site location and layout issues, maintenance of facilities, consideration of environment and climate change factors are some of the key concerns that influence Project success and sustainability.

### **15.3 Operationalization of ECSMP**

To ensure compliance with ECSMP requirements during the construction and operation periods, an adequate monitoring and evaluation systems have been developed for implementation under the strict supervision of SIF/AfDB and Ghana EPA in liaison with local NGOs concerned. The Project will also include special programs for Covid-19/HIV/AIDS Awareness Training and Environmental and Social Protection Training.

### **15.4 Beneficial and Non-Beneficial Environmental and Social Requirements**

Admittedly, all the non-beneficial environmental and social requirements are negative, significant but controllable. They include: removal of trees/vegetation; air pollution, noise and vibration nuisance; demolition of abandoned structures, borrow pits generation; erosion and sedimentation; waste generation; water supplies; concrete batch plant and hot mix asphalt/bitumen; construction camps/site offices; biodiversity loss; traffic nuisance; public, occupational health and safety; visual impairment; history; hazardous waste stream; campus community access; fire prevention and control; influx population surge and greenhouse gas (GHG) emissions. The expectation is that, all the prescribed implementable mitigation/management measures which have been detailed enough under discussion will reduce, eliminate or reverse the negative, non-beneficial impacts. However, most of the beneficial issues of the Proposal are positive and significant. They include: human resource development; expansion of educational and residential infrastructure; peri-urban income levels enhancement; improvement in

peri-urban economy; peri-urban gender balance in education. These beneficial impacts will ensure that the Program with the accompanying PECSMP will be friendly, environmentally and socially acceptable.

### **15.5 Project Implementation**

The implementation of the Project is highly recommended. The project residents, project neighbouring populations and future generations will need the Project to boost their socio-economic development.

## **16 Recommendations**

### **16.1 Overview**

Based on results of field study findings, lessons learned from similar programs and the Environmental Consultant's professional opinion, the following recommendations are made to SIF:

- **Ensure Sustainability Plan Issues are addressed**

To embed principles of sustainability that support the SIF's goal and strategies; to foster understanding of and commitment to the principles of sustainability in teaching, learning and research; to achieve a profile of excellence in world class research relevant to sustainability; to contribute to a robust, equitable and environmentally and socially sustainable society by fostering partnerships and engagement opportunities focused on sustainability; to strive for best practice in the management of biodiversity, greenhouse gas (GHG) emissions and energy, water, recycling and waste, planning and development, procurement and transport.

- **Ensure Good Infrastructure Design**

To adopt building designs which respond to the local climate, topography and any potential hazards; materials of construction which reduce costs of construction and provide better quality buildings; disability considerations in the design; climate effect on designs.

- **Maintenance Regime of Facilities**

To engage SIF to draw-up a strict program of maintenance regime for the new facilities as is the case with all existing structures on campus, to ensure their sustainability in the long-term.

- **Covid-19/HIV/AIDS Awareness Training Program**

To conduct Covid-19/HIV/AIDS Awareness training for project neighbourhood communities, school populations and construction labour units to explain the pandemic. Similar programs could be conducted for Ebola awareness and cholera infections.

- **Environmental and Social Protection Training**

To organize Environmental and Social Protection Training for Contractor(s) and other stakeholders to instil good environmental and social management and monitoring practices during construction and operation phases.

## **16.2 Records Keeping and Documentation**

Every facility will be required to maintain records of its waste management. In addition to stores and logistics management records regarding the type of waste, where it is generated, when separated, by whom and every other subsequent action until final disposal or handing over to a waste disposal company, all these intermediates and final steps will need to be recorded and documented comprehensively. This additional information will be expedient:

- Information on waste types and handling processes should reflect these parameters: data; type and volume/weight of waste; means of transportation, type, volume transported; final disposal method and quantities.
- Records of environmental and social performance for hazardous waste management should be disclosed to Ghana EPA/AfDB.

## **16.3 Awareness Creation**

Awareness creation programs should be carried out, with these guidelines:

- Periodic general awareness creation or raising activities on health care and wellness and hazardous and non-hazardous waste management practices should be undertaken through education programs, such as seminars, workshops, lectures, etc.
- Healthcare Professional Bodies should be engaged in enhancing and understanding and promoting good healthcare practices through effective hazardous and non-hazardous waste management by recycle, reuse, reduction and redesign.

## **16.4 Training and Capacity Building**

Training and capacity building is very necessary in the safe and correct management of hazardous waste generation to all staff including Environmental Health and Safety Manager. The following strategies should be adopted:

- Pre-service and post-service training of waste handlers should include healthcare waste management.
- Review of health training curricula to incorporate waste management.
- EHS Manager should ensure that his staff undergoes in-service training in healthcare waste management.
- Training modules should include train-the-trainer and regular on-going training within the medical laboratories.

## **16.5 Information, Education and Communication**

Strategies on information, education and communication should take these dimensions:

- Education of workers on the classification of waste, the need for waste minimization and separation using Ghana EPA/Ministry of Health colour codes for different containers and bags.

Information dissemination by use of mass media to educate the campus populations and neighbourhood communities on the importance of hazardous and no-hazardous waste management, coding system, container usage type.

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# APPENDICES

**APPENDIX A – GHANA NEWS AGENCY OFFICE, ACCRA**



**Landing corridor from staircase**



**Clustered Dark Room**



**Small Library Room**



**Uncovered Electricity Panel**



**Damaged Overhead Ceiling**



**Old Storage Room**



**Old Buildings with Huge Cracks**



**Old Buildings with Defaced Walls**



**Room with Desolate Equipment**



**Exposed Electrical Wires**



**Refuse Dump**



**Hanging Electrical Cable**

Kwaku Anim Boateng (Individual Consultant)

**APPENDIX B – DEPARTMENT OF MEDICAL MICROBIOLOGY, UNIVERSITY OF GHANA, KORLE BU, ACCRA (ANIMAL HOUSE UNIT – PROJECT SITE)**



MSSI Building Front View



Partial Demolition (Animal Hse Bldg)



Microbiology Building



Relocation Generator Set 1



Effected Pavement Blocks



Relocation Generator Set 2



Animal House Unit Exterior



Animal House Unit Interior (1)



Animal House Unit Interior Features (2)



Effected Animal Cages in Animal House Unit

Kwaku Anim Boateng (Individual Consultant)



**APPENDIX C – SCHOOL OF NURSING AND MIDWIFERY, UNIVERSITY OF GHANA, LEGON, EXTENSION PROJECT SITE**



**Dean and Architect in Discussion**



**Relocation of Metal Container**



**Vegetated Landscape (1)**



**Vegetated Landscape (2)**



**Relocation of Transformers**



**Sewage Line Chamber Presence**



**Fallow Landscape**



**Old Concrete Mixer Machine**



**Water Storage Tank**



**Fallow Landform**



**Electricity Transformer**

Kwaku Anim Boateng (Individual Consultant)

**APPENDIX D – BIOTECHNOLOGY CENTRE, UNIVERSITY OF GHANA, LEGON – PROJECT SITE**



**Vegetated Landscape**



**Isolated Trees on Site**



**Undulating Project Site**



**Effectuated Trees on Site**



**Open Landscape Site**



**Dry Vegetated Landform**



**Back of the Existing Biotechnology Centre Building**



**Demarcation of the Eastern Boundary of the Project Site**



**APPENDIX E – GHANA NEWS AGENCY OFFICE, TEMA**



Reception Area



Entrance Gate



Frontage of GNA Office Building



Back Section of GNA Office



Access Alley to the Back



Parking Lot at the Back



Back Garden with Pawpaw Tree



Back Section of Building



Damaged Drainage System



Interior Corridor Features



Damaged Interior Ceiling (1)



Damaged Interior Ceiling (2)

**APPENDIX F – MASLOC , ACCRA – STAKEHOLDERS ENGAGEMENT OF EBANK CAPITAL OFFICIALS IN FOCUS GROUP DISCUSSION OF LIVELIHOOD RESTORATION PLAN (LRP)**



**EBAN Capital Officials After Focus Group Discussion**



**EBAN Capital Officials with Independent Consultant**

Kwaku Anim Boateng (Individual Consultant)

# POST COVID-19 RECOVERY PROGRAM

## STAKEHOLDERS CONSULTATION AND ENGAGEMENT PROGRAM

### SCOPING EXERCISE SUMMARY SHEET

Stakeholder Name(s):.....

Affiliation / Occupation:.....

Title:.....

Location:.....

Date:.....

**Please tick more than one response for the underlisted items**

#### **PROJECT APPRECIATION / BENEFICIAL IMPACTS**

- Human Resource Development
- Expansion of Infrastructure
- Space Enhancement
- Space Utilization
- Development Plan Phasing (in order of priority)
- Employment Generation and Job Creation
- Economic Enhancement for Locality



**PROJECT CONCERNS / NEGATIVE IMPACTS**

- **Water and Energy Consumption Increment**
- **Erosion and Siltation Incidence**
- **Air Pollution ( Dust , Exhaust Fumes and Odour)**
- **Noise and Vibration Effects**
- **Construction Waste Disposal**
- **Construction Material Hazards**
- **Visual Impairment and Intrusion**
- **Traffic Flow Obstruction / Nuisance**
- **Public /Occupational Health And Safety**
- **Biodiversity Loss**
- **Pedestrian Traffic Obstruction / Severance Effect**

**STAKEHOLDER’S MAIN ISSUES OF CONCERN**

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**STAKEHOLDERS' RECOMMENDATIONS FOR MAIN ISSUES OF CONCERN ADDRESSAL**

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**Stakeholder's signature:.....**

***NB: Signing this form confirms that you were consulted during the scoping exercise program.***

# POST COVID-19 RECOVERY PROGRAM

## ENVIRONMENTAL FEATURES CHECKLIST FOR SITE SELECTION

### PHYSICAL ASPECTS

#### 1. PROJECT LOCATION

- Region .....
- District / Municipality .....
- Project Type/Name .....

#### 2. TYPE OF INFRASTRUCTURE:

- Department of Medical Microbiology, University of Ghana, Korle Bu, Accra.....
- School of Nursing and Midwifery, University of Ghana, Legon, Accra.....
- Biotechnology Centre, University of Ghana, Legon, Accra.....
- Ghana News Agency Office, Accra.....
- Ghana News Agency Office, Tema .....

#### 3. TYPE OF ACCESS TO EDUCATIONAL INFRASTRUCTURE

- Footpaths.....
- Unmotorable Feeder Road.....
- Motorable Feeder Road.....
- Motorable Paved Road.....

**4. PROJECT SITE CONDITIONS**

- Wet Period: Accessible..... Inaccessible.....
- Dry Period: Accessible..... Inaccessible.....

**5. DEMOLITION OF STRUCTURE(S) TO MAKE WAY FOR PROJECT:**

- Structure type..... Structure condition.....

**6. Topography of project site landform**

- Gentle rolling landscape
- Undulating holly landscape
- Evidence of potential landslide

**7. Hydrology and drainage pattern**

- Stream: Name..... Distance from site.....
- River: Name..... Distance from site.....
- Wetland: Distance from site.....
- Floodplain: Distance from site.....
- Potential flooding Area / Site. Yes  No

**Biological / ecological aspects**

- 8. Type of flora content / plant species.....
- 9. Flora content / plant species:
  - Threatened..... Not threatened.....

10. Type of Fauna species.....

11. Fauna species:

➤ Threatened..... Not threatened.....

➤ Presence of Cattle route.....

12. Presence of protected areas:

➤ Forest Reserve.....

➤ Keta Lagoon.....

➤ Biodiversity Preserve.....

13. Presence of sensitive developments:

➤ Shrine..... ➤ Cemetery.....

➤ Grove..... ➤ Mausoleum.....

➤ Borehole..... ➤ Hand-dug well.....

➤ Pipe borne water.....

➤ Market..... ➤ Lorry park.....

➤ Taxi Rank..... ➤ Clinic.....

➤ Health Center..... ➤ Hospital.....

➤ CHIPS..... ➤ Maternity home.....

➤ Traditional Healing Center.....

14. Presence of electricity network (National Grid)

➤ Yes..... How far from project.....

➤ No..... How far from project.....

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✓ Name of Inventory Taker.....

✓ Date.....

✓ Time..... Signature.....

✓ Describe any significant feature that can impact on the project, either Positively or  
Negatively.....  
.....

✓ Group Number:            1             2

# Chemicals/Herbicides Safety Protocols

## Chemical/Herbicides Stores and Maintenance Personnel

- Chemical Stores and Maintenance personnel will be certified by either Ghana EPA, MoH or MoFA and trained in chemicals/herbicide application.
- Chemicals/Herbicides to be used will be manufactured under license, registered, and approved by an appropriate authority such as Ghana EPA, MoH, MoFA, FAO and WHO.
- Only Chemicals/herbicides that are labelled in accordance with national and international standards and norms will be used.
- Chemical/Maintenance personnel will review manufacturers Materials Safety Data Sheet (MSDS) for directions on maximum recommended dosage or treatment, reduced rates of chemicals/herbicide application without loss of effect and application for the minimum effective dose.
- Chemicals/Herbicide application will be based on criteria (e.g. field observation, weather data, time of treatment, and dosage) with use of a pesticide logbook to record data.
- Training programs in application demonstrations will be designed to reduce unintentional drift or runoff.
- Chemicals/Herbicide application equipment will be maintained and calibrated in accordance with manufacturers recommendations.
- Untreated buffer zones, strips or corridors will be established along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources.
- Contamination of soils, groundwater, or surface water resources due to accidental spills during transfer, mixing, and storage of chemicals/herbicides will be prevented by following recommended AfDB EHS Guidelines.

## Chemicals/Herbicides Handling Measures:

- Safety is the most important factor in chemicals/herbicides use.
- It is important to protect both maintenance workers and the environment.
- All chemicals/herbicides have a warning label that contains one of the signal words DANGER, WARNING or CAUTION, that denotes the toxicity level of the product.
- Materials with the word DANGER on their label are at least 10 times more toxic than those with the word WARNING and 100 times more toxic than those with the word CAUTION.
- The hazard potential of chemical/herbicide depends on two (2) primary variables: toxicity and exposure.
- Toxicity of the chemical/herbicide is the capacity of the substance to produce injury or death.
- Exposure of the chemical/herbicide refers to the contact with untargeted species.



- Chemical/Herbicide may be extremely toxic but present little hazard to the maintenance workers or others when used as follows: (i) in a very diluted formulation (ii) in a formulation not readily absorbed through the skin or readily inhaled (iii) only occasionally and under conditions to which humans are not exposed (iv) only by experienced maintenance workers who are properly equipped to handle the material safely.
- Chemical/Herbicide may have relatively low toxicity but present a hazard if used in concentrated form, which is readily absorbed or inhaled.

**Chemical/Herbicide Application and Storage to Reduce Human Hazards:**

- Read, study, and follow the labelling instructions and precautions.
- Avoid spilling the material on human skin and clothing and wear adequate protective clothing (PPE) as indicated on the label or MSDS.
- If a spill occurs, wash immediately with soap and water.
- DO NOT SMOKE while mixing or using the chemical/herbicide.
- Wash thoroughly and change clothes after spraying.
- Store chemical/herbicides in original containers only.
- Prevent drift by slowing down, reducing pressure, or adding adjuvants.
- Be alert and keep your mind on the job.
- Get medical attention quickly if you or co-worker experience any unusual or unexplained symptoms while applying chemical/herbicides.
- An Incident Response Plan will always be ready and available where chemical, herbicides and pesticides are stored and handled.

**Chemicals/Herbicides Spills Prevention and Response Plan:**

To prevent possible spills:

- Prevent bags and cardboard containers from getting wet.
- Prevent or correct leaks in herbicide containers and application equipment.
- Keep drift to a minimum by the proper use of spray adjuvants, nozzle selection, pressure, and sprayer speed.
- Avoid volatilization by using only amine formulations.
- Ester formulations will be used with caution for dormant stem treatment.
- Properly dispose of all empty containers as required by Ghana EPA, MoH, MoFA, WHO and AfDB EHS Guidelines.
- When transporting chemicals/herbicides, tie down or secure the containers to prevent them from falling off the vehicle.
- Follow all regulatory compliance requirements for transporting herbicides.

If a spill occurs:

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- Rinse all skin that has been exposed to the material and remove all contaminated clothing.
- Contain the spill as well as possible
- Do not spread the spill by washing it down.
- Prevent the spill from contaminating any water source.
- Contact Ghana EPA, MoH, MoFA Chemicals Inspectorate Division by phone on Emergency Number 193.
- Clean the spill by removing the contaminated soil or by neutralizing the chemical with an application of activated charcoal, or both.
- Wash spills off sprayer and dispose of the contaminated rinse water in accordance with Ghana EPA, MoH, MoFA regulations.

### **Chemical/Herbicide Usage Data Records**

- Maintenance personnel must maintain a record of chemical/herbicide used on each site for a minimum of five (5) years.
- Application date number of units treated.
- Name/address of treated location and completion time.
- Brand name used and name of maintenance worker.
- License number of maintenance worker.
- Dosage and registration (serial) number of herbicide product used or applied.
- Temperature of the environment.
- Wind speed and direction in the environment.
- Size of area treated per acre or meters.
- Start and completion dates.
- Name and signature of maintenance worker.
- Name and address of maintenance division or department.

# Implementation of Code of Conduct

## **Contractor's and Sub-Contractor's Code of Conduct:**

The SIF should require that Contractor's and Sub-Contractor's follow this Code of Conduct, including the International Best Industrial Management Standards in compliance with the EHSS provisions on contract.

## **Objectives:**

Basically, objective of the Contractor's and Sub-Contractor's Code of Conduct is to avoid or minimize as much as possible, any negative impact that could be produced as a consequence of inter-relations between the Workers inside the local areas of influence and the outskirts of the Project Area.

## **Sanctions:**

The Project Manager should require that the all employees of the project comply with the following measures:

- Each of the employees should receive a written copy of this Code of Conduct as a part of the induction process.
- A copy of this Code of Conduct will be available in a visible place in each Area of the Project.
- As a requirement to be hired, all employees must sign a copy of this Code, where they acknowledge it and certify they have read it and accepted its terms, promising to comply with its terms thoroughly and at always.
- Any question related to this Code of Conduct or any regulation within it must be addressed by a representative designated by the Project Manager.
- The employees are obliged to comply with the rules and procedures indicated in this Code of Conduct, to maintain good relations with the local communities in the direct area of influence of the Project.
- Any employee may be subject to disciplinary actions and/or may be fired if their behaviour while he/she was employed on the project program went against the rules stated in this Code of Conduct.
- This Code of Conduct can be modified at any moment by Project Manager, in which case it will immediately deliver a written copy of said change to each employee, in accordance with the assent procedure explained before.

## **Rules Regarding the Project Population:**

- The project population is defined as all people that live within the direct area of influence of the Project, or in the areas used for the transportation of equipment and materials required for the construction or operation stages of the Project.
- All employees are expected to behave adequately and appropriately always and must avoid improper relations with the project population.
- Any public release about the Project must be approved by the Management of the Contractor or the person he appoints.

- All employees shall avoid any discriminatory conduct based on gender, age, disability, race, language, culture, political affiliations, philosophy, religion, or any other illegal basis.
- All employees must comply always with all applicable environmental, social, health and safety rules and regulations, including complying with the social, environmental, health and safety responsibilities which have been implemented.
- Should any employee fail to comply with the Code of Conduct, or behave in such a way that he/she creates a problem with the project population, the corresponding action must be communicated to the Project Community Relations Manager, detailing what happened, so that the Project Manager can carry out an investigation.

#### **Rules Regarding the Operations Stage:**

- All employees are required to show always a transparent and honest behaviour, and a high level of personal responsibility and professionalism, either in or out of the Project Area.
- All employees shall comply with all applicable laws, rules and regulations.
- The Project Manager shall require all employees to take the medical exams necessary to work and enjoy good health.
- Employees shall immediately inform medical staff in the Project Area about any kind of sickness or symptom that may affect their ability to carry out their work-related obligations properly.
- Employees shall use adequate personal protection equipment (PPE) when undertaking any task assignment in any Project Area or operational zone, including Project Vehicles.
- Employees are not allowed to smoke or make an open fire within or in the surroundings of the Project Area or near any Project Property, including Project Vehicles.
- The medical staff in charge of the project shall authorize possession and use of drugs within the area of influence of the project.
- Employees are forbidden to possess, use or carry any kind of illegal drugs, medical paraphernalia, narcotics or alcoholic beverages within the Project Area or any Project property, including Project Vehicles.
- Employees are not allowed to possess or carry weapons, such as firearms, explosives, ammunitions, knives, clubs, etc., within the Project Area or any Project Property, including Project Vehicles.
- All employees shall report any conflicts of interest in writing to their supervisor.
- Employees shall not receive or hand over money, goods or other objects of value in order to obtain benefits, receive favours or influence decisions benefiting the project implementation program, third parties, or themselves.
- Employees shall not use project funds or plant, equipment and machinery or other articles provided by the project program for their personal benefit or any other unauthorized use.
- Employees shall keep all information related to the project in the strictest confidence.
- Employees shall carry an easily detectable ID card at always whenever they are inside any Project Area.
- Employees shall show their ID card to go in or out of any Project Area, or to use transportation provided to the Workers.

- It is not necessary for any employee to carry the ID card when outside of the Project Area, unless the employee is carrying out a business-related task.
- Pets are not allowed in any Project Area.
- Fishing, hunting and deforestation is also forbidden inside the project area and its immediate surroundings.
- For industrial security reasons, employee may not abandon any Project Area without permission.
- Local employees should be transported to their residence point of pick-up or drop-off in transport units provided by the Project. Project Transport Units may not make unauthorized stops.

# Code of Conduct for Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)

## Introduction:

Poverty, conflict and displacement inevitably erode and weaken many of the social and political structures that are designed to respect and protect members of the community where these conditions have occurred or exist. The resources available to communities and crisis-affected populations, and to the project development agencies that is there to assist them, are frequently insufficient to meet basic needs. All too often, mechanisms for protection are not given adequate priority. Against this background, women, men, girls and boys find themselves in situations where they can be exploited or abused. Such an environment can provide opportunities for abuse of power and corruption by development and humanitarian aid workers.

The Contractor will have a zero tolerance to Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) and must make every effort to create an environment where such practices are not tolerated. This is especially necessary given the following features of poverty-ridden project communities:

- The lack of economic opportunities for poor populations may result in commercial and exploitative sex being one of the few options for income generation to meet basic needs.
- In cases where communities come from an environment of gender-based violence, proper safeguards need to be put in place, as similar patterns can continue or even be exacerbated in pro-poor project community situations.
- The usual social protections are not in place or are no longer functioning. Levels of protection and security are generally poor; justice and policing frequently do not exist in the displaced environment.

## Contractor's commitment:

The Contractor's mission statement will affirm the following:

- positive and sustainable change in the lives of people affected by poverty and injustice through coordinated and effective humanitarian, development and advocacy work.
- commitment to guarding against the abuse of power by those responsible for protection and assistance to vulnerable project communities.

The Contractor will commit workers and staff to "adhere to the Code of Good Practice and Code of Conduct for the Prevention of Gender-Based Violence (GBV) and Sexual Exploitation and Abuse) and other codes which may be adopted by the Contractor Management Project Team. The Contractor will commit to having complaints handling mechanisms in place so that all project stakeholders could have a grievance handled fairly, consistently and resolved in a timely and confidential manner.

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Contractor recognizes that GBV/SEA can occur in many different environments internal and external to project implementation process. However, during compensation payment for project-affected persons (PAPs), the dependency of the affected populations on project implementation agencies for their basic needs creates ethical responsibility and duty of care on the part of the Contractor and SIF staff. Therefore, all project managers have a responsibility to ensure that all staff are aware of this code of conduct, sign it, and understand what it means in concrete behavioural terms. They must also ensure that there are proper mechanisms in place to prevent and respond to GBV/SEA.

Contractor staff and workers must cooperate, when requested, with any Contractor investigation into allegations of GBV/SEA. Failure to disclose, or withholding, information about GBV/SEA constitute grounds for disciplinary measures.

### **Scope and Purpose:**

The main purpose of this Code of Conduct is to promote greater accountability towards Project-Affected Populations (PAPs) and all those involved in the project implementation process. It is intended to serve as a guide for Contractor staff and workers to make ethical decisions in their professional lives and at times in their private lives. It is designed to assist Contractor staff and workers to better understand the obligations placed upon their conduct, and to protect the reputation of the Contractor's firm.

The spirit in which this code has been developed is intended to strengthen, complement and enhance already existing "Codes of Conduct of Contractor Staff and Workers", rather than to detract from them. Contractor workers and staff have responsibility to uphold the standards expressed in the following Code of Conduct, to set a good example and to create a working environment that supports and empowers project community residents. The Code is complemented by the Contractor Gender Policy Principles.

### **Code of Conduct:**

Contractor employees and staff will adopt to the following strategies:

- Respect and promote fundamental human rights without discrimination and irrespective of social status, race, ethnicity, colour, religion, gender, sexual orientation, age, marital status, national origin, political affiliation or disability.
- Treat all project communities with whom they work, fairly and with respect, courtesy, dignity and according to the respective Ghana's Constitution, International Law and Local Customs.
- Create and maintain an environment that prevents GBV/SEA, abuse of power and corruption, and promotes the implementation of the code of conduct. Managers at all levels have responsibilities to support and develop systems that maintain this environment.
- Uphold the highest standards of accountability, efficiency, competence, integrity and transparency in the provision of goods and services in the execution of their job.

- Never commit any act or form of harassment that could result in physical, sexual or psychological harm or suffering to individuals, especially women and children.
- Never exploit the vulnerability of any target group, especially women and children, or allow any person/s to be put into compromising situations.
- Never engage in any sexual activity with children (persons under the age of 18) regardless of the age of majority or age of consent locally. Sexual activity with children is prohibited. Mistaken belief in the age of a child is not a defence.
- Never engage in sexual exploitation or abuse of any man, woman, girl or boy. This constitutes acts of gross misconduct and is therefore grounds for termination of employment.
- Never exchange money, employment, goods, or services for sex, including sexual favours. All forms of humiliating, degrading or exploitative behaviour are prohibited. This includes exchange of assistance that is due to beneficiaries.
- Never abuse their position to withhold humanitarian assistance, nor give preferential treatment; in order to solicit sexual favours, gifts, payments of any kind, or advantage. The employee should be conscious of not taking advantage of his/her position and may not accept gifts (except for small tokens of appreciation) or bribes.
- Not engage in sexual relationships with communities and affected populations with whom we work. Such relationships are strongly discouraged since they are based on inherently unequal power dynamics. Such relationships undermine the credibility and integrity of project implementation process. This rule applies to both during and after working hours.
- Employees may not accept, solicit or engage in the "buying" of or profiting from sexual services. This is applicable both within and outside of working hours.
- Ensure that all confidential information, including reports of breaches of these standards by colleagues, obtained from communities and affected populations or colleagues is channelled correctly & handled with utmost confidentiality.
- Ensure that reports, concerns or suspicions of breaches of these standards are immediately reported to senior management or the human resources manager (or established agency reporting mechanisms), who is expected to take prompt investigative action.
- Any breach of the Code of Conduct will result in disciplinary action in accordance with the respective terms, conditions and guidelines of the individual agencies.
- Any staff member purposely making false accusations on any action by another staff member, which is in breach of the code of conduct will be subject to disciplinary action at the discretion of the employer.

#### **Guidelines for Implementation:**

It is essential for Contractor Team to demonstrate ways in which they are complying with the Code of Conduct on GBV/SEA (beyond the mandatory individual signing of the Code). Workers must do everything possible to reduce the power disparity between affected project populations to ensure that there is an organizational culture that prioritizes this issue, and to establish and implement responsible compliance and complaints systems. The following Mechanisms for Compliance are listed for consideration by workers, to be used or adapted as appropriate, recognizing that SIF may already have similar mechanisms in place.

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**Establish minimum standards for compliance and complaints mechanism as part of member commitment to the Code of Conduct:**

The Contractor GBV/SEA Code of Conduct is a comprehensive and broad standard, which must not be compromised. Key indicators, however, will have to be developed and adapted to the environment in which project is being implemented. It is essential that the issue is addressed in workers strategic plans and annual work plans, and that minimum organizational and procedural requirements are met. As the least common denominator, Contractor will put systems in place which ensure that minimum compliance mechanisms and complaint procedures are established, in line with the Contractor Complaints Policy and accompanying guidelines. This section suggests actions and procedures to support compliance.

**Develop and implement compliance and complaints mechanisms as part of overall managerial and staff responsibility and accountability:**

The Contractor Code of Conduct on GBV/SEA sets behavioural standards with zero tolerance for GBV/SEA. This will be elaborated as part of an overall Contractor Accountability Framework by each worker. Managerial and individual staff accountability for ensuring compliance is a crucial component of the success of the Code. Accountability to project communities and project affected populations is fundamental, in program design and implementation, and in partnerships and communication. Whatever procedures are established (e.g., information sessions, complaint boxes, focal points among affected persons, referral to focal point of the member, clear complaints channels) will be disseminated as widely as possible and should increase chances of reporting and receiving complaints.

**Prioritize adherence to the Code of Conduct on GBV/SEA (and other codes of conduct) as part of worker capacity development:**

The Contractor Capacity Development Initiative includes workers self-assessment as a fundamental component. Among other things, the self-assessment will provide indicators on a worker's conformity to the Code of Conduct on GBV/SEA (awareness and implementation thereof), and adherence to the Code of Conduct for SIF, AfDB, Others. Identified shortcomings can be addressed, as prioritized, by follow-up measures.

**Strengthen emergency and operational procedures relating to the Code of Conduct on GBV/SEA:**

All Appeal documents should include reference to worker's commitment to the Code of Conduct on GBV/SEA. This commitment should be carried through the Appeal cycle – proposal, implementation, reporting, and evaluation. As a rule, evaluations to be launched for Contractor appeals should include an assessment of how the implementing agencies have complied both with ethical and professional standards, and how GBV/SEA has been addressed.

It is noted that the use of gender-sensitive programming tools for needs assessments, planning, implementation and evaluation, and adherence to the Code of Conduct on GBV/SEA, are two of the fundamental Gender Policy Principles for gender mainstreaming in Contractor's workers.

**Embed the Contractor Code of Conduct on GBV/SEA in all employment policy, procedures and contracts:**

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- The Contractor Code of Conduct on GBV/SEA should be embedded in the workers and staffing and hiring policy.
- Contractor members should ensure that the essentials of the Code of Conduct (staff behaviour standards and possible disciplinary measures in case of misconduct) become part of the employment contract.
- All staff should have written job descriptions, which mention compliance with Contractor Codes and policies and with clear reporting lines.
- At a minimum, new staff will be required to sign that they have read, understood and in agreement with the content of the Code of Conduct, and accept the consequences of any violation of any of its provisions.

### **Appoint Committee on GBV/SEA:**

As a minimum requirement, Contractor should ensure that at least two trusted senior staff (one male and one female), preferably with experience and training in the field, are appointed who can act as Focal Points. In cases where “Employee Representation” or “Employee Representative Committees” are already in place, these should be supplemented by Focal Points. The Focal Points should be equipped with a clear Terms of Reference. Where appropriate, the member should ensure that respective training and guidance is provided to the Focal Points, and that he/she in turn will be able to train other staff. The Focal Points are the persons to whom staff can make complaints and/or to alert the member to allegations. Selection of the right persons to be the Focal Points is essential. Agreed upon criteria for the selection should be established. Every effort must be made by the Senior Management of the member agency to provide the Focal Points with the requisite tools and authority to perform this role effectively, and to protect him/her from any potential disruptions or outside influence.

### **Organize Orientation and Training Programs:**

Contractor workers cannot assume that staff members are any more aware of GBV/SEA issues than other members of the project community. Therefore, all staff should be familiarized with the topic. This may well include internal training, induction and refresher sessions. Awareness raising and familiarization should include mandatory reporting requirements, as these may help to overcome fears of sharing concerns about colleagues. One of the characteristics of GBV/SEA, is under-reporting. Victims generally do not speak of the incident for many reasons, including self-blame, fear of reprisals, mistrust of authorities, and fear of re-victimization. Contractor GBV/SEA often evokes shaming, blaming, social stigma, and often rejection by the victim’s family and/or community.

It is essential to raise awareness both for the potential victims (regarding their rights and ways of reporting) and the potential perpetrators (regarding their wrongs). At a minimum, people with whom we work need to know:

- That they have a right to be free of sexual exploitation and abuse.
- How they can complain and to whom they can complain.
- What steps they can take to ensure confidentiality and what steps the member will take to ensure safety and confidentiality.

### **Develop a Roster of Experts on GBV/SEA:**

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Country and regional mapping of senior staff experienced in gender-based violence issues, both within and outside the Contractor field of operations, should take place. Such experts could, whenever the need arises, be engaged for internal staff training, monitoring compliance, assessments, evaluations and/or random spot checking.

**Coordinate Contractor GBV/SEA Preparedness Activities:**

It is suggested that the Contractor Focal Point liaise with focal points of other members, particularly in the context of Contractors Forum. Joint training, joint orientation, joint preparation of compliance and complaints mechanisms, agreement on a roster of local GBV/SEA experts, and joint learning are among the activities which could be carried out. A forum should promote the Code of Conduct on GBV/SEA and its concrete implementation through activities such as described in this document.

**Prepare a GBV/SEA Brochure for Dissemination to Workers and Project Populations/Communities:**

Contractor staff and workers, communities and affected populations need to be aware of what mechanisms exist to prepare for and respond to cases of sexual exploitation and abuse. A simple brochure can serve that purpose. For example, the established “channel of complaints” should be communicated clearly and publicized to all staff and populations with which the Contractor is working, in succinctly worded written form. The information should include information on the following:

- the protection of the rights and confidentiality of both alleged victims and the accused.
- where to find Focal Points for inquiry, complaints and protection.
- on how to make a complaint.

The brochure, and familiarization sessions form part of an overall “information strategy”. Here it must be kept in mind that provision of too much information can sometimes be counter-productive and may undermine trust.

**Organize Appropriate Activities to help Minimize Opportunities for GBV/SEA:**

This may include the following:

- setting up responsible distribution systems.
- identifying proper locations for latrines, and common areas; and
- choosing specific locations for single women residences.

**Have Investigations and Sanctions Mechanisms in Place:**

In some instances, complaints will justifiably lead to the need for a more detailed investigation, which is generally carried out by the Contractor according to its own investigation policies and procedures. If the Contractor does not have the capacity to undertake an investigation, the SIF may be called upon to facilitate an investigation.

**Have a Safe Referral Process in Place:**

The Contractor should have the capacity to receive and handle complaints effectively. If it does not have the capacity to undertake specialized investigations into allegations of sexual exploitation and abuse, it should have a safe referral system within the Contractor Alliance Team or know where to access expert investigators.

## Chance Find Procedures

### **Purpose of the Chance Find Procedure:**

The chance find procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation. A Chance Find Procedure, as described in IFC Performance Standard 8, is a process that prevents chance finds from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements are implemented.

### **Scope of the Chance Find Procedure:**

This procedure is applicable to all activities conducted by the personnel, including contractors, that have the potential to uncover a heritage item/site. The procedure details the actions to be taken when a previously unidentified and potential heritage item/site is found during construction activities. Procedure outlines the roles and responsibilities and the response times required from both project staff, and any relevant heritage authority.

### **Induction/Training:**

All personnel, especially those working on earth movements and excavations, are to be inducted on the identification of potential heritage items/sites and the relevant actions for them with regards to this procedure during the Project induction and regular toolbox talks.

### **Chance Find Procedure:**

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken:

- Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained.
- Immediately notify a foreman. The foreman will then notify the Construction Manager and the Environment Officer (EO)/Environmental Manager (EM).
- Record details in Incident Report and take photos of the find.
- Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over.

- Preliminary evaluation of the findings by archaeologists. The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find.
- Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum disruption to the work schedule of the Contractor. The results of all archaeological work must be reported to the Ministry/Agency, once completed.
- In case of significant find the Agency/Ministry (Agency for Protection of National Heritage or Archaeological Research Centre, hereinafter referred to as Heritage team) should be informed immediately and in writing within 7 days from the find (ref. law on heritage protection).
- The onsite archaeologist provides the Heritage team with photos, other information as relevant for identification and assessment of the significance of heritage items.
- The Ministry must investigate the fact within 2 weeks from the date of notification and provide response in writing.
- Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration, and salvage.
- Construction works could resume only after permission is granted from the responsible authorities.
- In case no response received within the 2 weeks period mentioned above, this is considered as authorization to proceed with suspended construction works.
- One of the main requirements of the procedure is record keeping. All finds must be registered. Photolog, copies of communication with decision making authorities, conclusions and recommendations/guidance, implementation reports kept.

### **Management Options for Archaeological Sites:**

**Site avoidance:** If the boundaries of the site have been delineated attempt must be made to redesign the proposed development to avoid the site. (The fastest and most cost-effective management option)

**Mitigation:** If it is not feasible to avoid the site through redesign, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation. (The most expensive and time-consuming management option.)

**Site Protection:** It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include the erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site- specific.

**Management of Replicable and Non-Replicable Heritage:** Different approaches for the finds apply to replicable and non-replicable heritage.

**Replicable Heritage:** Where tangible cultural heritage that is replicable and not critical is encountered, mitigation measures will be applied. The mitigation hierarchy is as follows:

- Avoidance.
- Minimization of adverse impacts and implementation of restoration measures, in situ.
- Restoration of the functionality of the cultural heritage, in a different location.

**Permanent Removal of Historical and Archaeological Artefacts and Structures:**

- Compensation of loss - where minimization of adverse impacts and restoration not feasible.
- Non-replicable heritage Most cultural heritage is best protected by in situ preservation since removal is likely to result in irreparable damage or even destruction of the cultural heritage.

**Non-replicable cultural heritage must not be removed unless the following conditions are met:**

- There is absence of technically or financially feasible alternatives to removal.
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- Any removal of cultural heritage must be conducted using the best available technique advised by relevant authority and supervised by archaeologist.

**Human Remains Management Options:**

The handling of human remains believed to be archaeological in nature requires communication according to the same procedure described above. There are two possible courses of action:

- **Avoid:** The development project is redesigned to completely avoid the found remains. An assessment should be made as to whether the remains may be affected by residual or accumulative impacts associated with the development, and properly addressed by a comprehensive management plan.

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- **Ex-humate:** Exhumation of the remains in a manner considered appropriate by decision makers. This will involve the predetermination of a site suitable for the reburial of the remains. Certain ceremonies or procedures may need to be followed before development activities can recommence in the location of the discovery.