AFRICA CENTRE OF EXCELLENCE IN COASTAL RESILIENCE (ACECoR)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

(Environmental and Social Management Plan)

Association of African Universities
Association des universités africaines
رابطة الجامعات الأفريقية

WORLD BANK GROUP

GHANA

UNIVERSITY OF CAPE COAST

ACECoR
AFRICA CENTRE OF EXCELLENCE IN COASTAL RESILIENCE

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ACRONYMS

AAU	Association of African Universities
ACE	Africa Centre of Excellence
ACECoR	Africa Centre of Excellence in Coastal Resilience
AER	Annual Environmental Report
BP	Bank Procedures
CBD	Convention on Biological Diversity
CCMA	Cape Coast Metropolitan Assembly
CCTV	Closed Circuit Television
CITES	Convention on International Trade of Endangered Species
CMS	Convention on Migratory Species
CO	Carbon Monoxide
CO2	Carbon Dioxide
CSO	Civil Society Organisations
EA	Environmental Assessment
ECOWAS	Economic Community of West African States
EHS	Environmental Health and Safety
EHSGs	Environmental, Health and Safety Guidelines
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EM	Environmental Manager
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ERP	Enterprise Resource Planning
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FC	Forestry Commission
FI	Financial Intermediary
GBV	Gender Based Violence
GHG	Greenhouse Gas
GMMB	Ghana Museums and Monuments Board
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GWCL	Ghana Water Company Limited
HSE	Health, Safety and Environment
ICT	Information and Communications Technology
IDA	International Development Association
IE	Inclusive Education
IEC	International Electrotechnical Commission
IUCN	International Union for Conservation of Nature
MOE	Ministry of Education
MSDS	Material Safety Data Sheet
NCC	National Commission on Culture
NCCP	National Climate Change Policy
NCR	Non-Conformance Report
NCTE	National Council for Tertiary Education
NEP	National Environmental Policy
NF	Non-forest
NGO	Non-governmental Organizations

NO2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPLD	Non-Pioneer Light Demander
O3	Ozone/Trioxygen
OHS	Occupational Health and Safety
OP	Operational Policies
PBL	Problem-Based Learning
PDS	Power Distribution Services
PEA	Preliminary Environmental Assessment
PER	Preliminary Environmental Report
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RBF	Results-Based Financing
RFU	Regional Facilitation Unit
SB	Shade Bearer
SO2	Sulphur Dioxide
SOP	Standard Operating Procedures
SSA	Sub-Saharan Africa
SSSI	Sites of Special Scientific Interest
TBD	To Be Determined
TCP	Town and Country Planning
UCC	University of Cape Coast
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VAWG	Against Women and Girls
WHO	World Health Organization
WRC	Water Resource Commission
WRC	Water Resources Commission

EXECUTIVE SUMMARY

The coastal zone of West Africa, just like any other coastal zone in the world is confronted with a myriad of problems. These problems have resulted from rapid population growth and urbanization, as well as the impact of climate change and poor land use practices in the coastal zone. Currently about 68% of sandy beaches of West Africa are being eroded at an average rate of two (2) meters per annum with low lying areas perennially inundated. This is further compounded by poor sanitation and rapid encroachment of coastal wetlands leading to the destruction of natural habitats and biodiversity. Indeed, the challenge of coastal degradation is multi-faceted and resolving it will require multi-faceted and synergistic approaches built on reliable data and human expertise. There is however a lack of scientific data on coastal degradation at national and regional levels. Currently there is limited knowledge on the extent of coastal degradation facing the West African sub-region.

The Africa Center of Excellence (ACE) projects aim to build regional capacity to deliver high quality postgraduate courses and to conduct and disseminate international caliber applied research focused on addressing development challenges in Sub-Saharan Africa (SSA). Given the limited resources available to support postgraduate training and applied research in SSA, the ACE projects are designed to increase specialization and excellence of higher education. The Project Development Objective is to improve the quality, quantity and development impact of postgraduate education in selected universities through regional specialization and collaboration.

In September 2018, the University of Cape Coast was competitively selected by the World Bank from among solicited proposals received from across universities in West and Central Africa to establish an Africa Centre of Excellence in Coastal Resilience (ACECoR) on its campus. The objective of ACECoR is to support technical capacity development of young African professionals to address issues of coastal degradation within the sub-region, as well as promote the sustainable utilization and management of marine and coastal assets in the partner countries through collaboration with academia, research institutions and industry and will secure international partnerships. As part of the ACECoR program, the University of Cape Coast will construct a multipurpose educational complex to accommodate research laboratory, offices and lecture rooms. The construction will have the following but not limited to:

- Ground Floor Layout: Ground floor: Conference room, offices for academics, researchers and administration, reception and entrance hall, lobby, entrance terrace
- First Floor Layout: Mini auditorium, syndicate meeting rooms, ICT lab, offices
- Second Floor: Library, offices, study booths, research commons, incubation centre,
- Third Floor: Library, office, laboratories
- Fourth Floor: Outdoor sitting area, restaurant, rooms,

The conduct of an Environmental and Social Impact Assessment (ESIA) for the Project is a regulatory requirement of national laws and regulations such as the Environmental Assessment Regulations, 1999 (LI 1652), the Environmental Protection Act, 1994 (Act 490) and the 1992 Constitution of Ghana. The Constitution mandates that appropriate measures be taken to protect and safeguard the national environment. Similarly, LI 1652 mandates that no undertaking which is likely to adversely impact on the environment or public health commences without

the conduct of an Environmental Impact Assessment (EIA) and prior approval of the Environmental Protection Agency (EPA).

The ESIA is also needed because the Project is financed by The World Bank, as such, the Project is required to meet or satisfy The World Bank's Environmental and Social policies and Standards. The Project has been classified as a Category B Project per The World Bank criteria for categorizing projects based on environmental significance, type, location, sensitivity, and scale. Category B Projects refer to projects that involve site specific and immediate project environment interactions and have adverse impacts that are not sensitive, diverse, unprecedented and are mostly reversible. Though they generally do not significantly alter natural systems and resources or consume much natural resources (e.g. ground water), the conduct of an ESIA is a requirement.

The proposed project was deemed to require an Environmental Impact Assessment since construction activities of such magnitude are expected to give forth both negative and positive effects to the environment and ultimately contribute to an increased waste generation both in the construction and occupational phases. Specific assessment objectives pinned to this project are:

- Identify and analyze the impacts of the proposed project on the natural environment
- Evaluate impacts of the project on the socio-cultural environment
- Assess impacts on infrastructure and social amenities
- Assess and predict any effects on any sensitive ecosystems
- Identify and predict impacts on and changes in development policy with respect to the area
- Formulate an Environmental and Social Management Plan (ESMP)

Various data collection and analyses techniques were used in the assessment: desk review, field assessment, analysis of alternatives and public and stakeholder engagements.

The significant potential adverse impacts of the proposed project, which were identified through this ESIA's methodology, were found to be:

- Loss of flora and fauna
- Generation of solid and liquid wastes
- Air pollution: gaseous, dust and particulates
- Noise generation
- Labour Influx
- Gender Based Violence
- Increased pressure on utilities/services
- Increased Traffic
- Public health and safety risks
- Differentiated impacts on gender and other vulnerable groups (i.e. persons with disabilities)

The above-mentioned impacts will be effectively managed and where possible eliminated through the following mitigation measures:

- Landscaping with indigenous species on completion of construction.
- Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens.
- Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.
- Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dust.
- Enclosing the structures under construction with dust proof nets.
- Using efficient machines with low emission technologies for the ones that burn fossil fuels.
- Controlling the speed and operation of construction vehicles.
- Regular maintenance and services of machines and engines.
- Use of clean fuels e.g. unleaded and de-sulphurized fuels.
- Educate and raise awareness of construction workers on emission reduction techniques.
- Using equipment with noise suppressing technologies.
- Placing signs around the site to notify people about the noisy conditions.
- Regular maintenance of equipment to ensure they remain efficient and effective.
- Complying with the EPA noise regulation.
- Construction works will be carried out only during the specified time which is usually from 0800 hrs to 1700 hrs.
- There should not be unnecessary horning of the involved machinery.
- Provision of bill boards at the construction site gates notifying of the construction activity and timings
- Employing water conservation techniques and only using the required amounts of water to prevent wastage.
- Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible.
- Using machines with power saving technologies i.e. high efficiency equipment.
- Providing proper sanitary facilities for construction workers.
- Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.
- Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.
- Ensuring all drivers for the project comply with speed regulations.
- Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations.
- Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.
- Following metropolitan regulations on Waste Management.
- Employing a waste management plan.
- Using waste minimization techniques such as buying in bulk.
- Allocating responsibilities for waste management and identifying all sources of

wastes, and ensuring wastes are handled by personnel licensed to do so.

- Making available suitable facilities for the collection, segregation and safe disposal of the wastes.
- Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc.
- Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected.
- Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation.
- Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities.
- Ensuring bins are protected from rain and animals.
- Employing an occupational health and Safety (OHS) plan that will outline all OHS risks and provide a strategy for their management.
- Ensuring all potential hazards such as movable machine parts are labelled.
- Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment.
- Providing the workers with adequate Personal Protective Equipment (PPE) and monitoring regularly to ensure they are replaced on time when they wear out.
- Placing visible and readable signs around where there are risks.
- Ensuring there is security in and around the site to control the movement of people.
- Providing safe and secure storage for equipment and materials at the site
- Placing visible and readable signs to control the movement of vehicles and notify motorists, pedestrians and workers around the site.
- Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.
- Labeling chemicals and material according to the risks they pose.
- Creating safe and adequate fire and emergency assembly points and making sure they are well labeled.
- Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.
- Labour influx control principles;
- Socio-cultural conflicts prevention principles;
- Gender and vulnerable groups impact mitigation principles;
- GBV prevention in accordance with the Good Practice Note for Civil works
- Stakeholder Engagement Plan including Grievance Redress Mechanism

The proposed project will also have many positive impacts due its objectives, scope, details, the site and other baseline conditions. These can be summarized by the following which are

the most significant positive impacts:

- Creation of Employment and Business Opportunities
- Generation of Income and Source for Government Revenue
- Environmental Opportunities
- Market for goods and services
- Create Market for local Communities
- Increased Economic Activities and Revenue
- Solutions to coastal degradation from researches
- Increased knowledge on coastal degradation
- Sustainable resource use due to proper management
- Increased experts in the fields of coastal management
- Resilient coastal communities created

The project will play an important role in enhancing the capacity of the University of Cape Coast to deliver high quality postgraduate courses and to conduct and disseminate international caliber applied research focused on addressing development challenges in West Africa. However, to greatly work in synchrony with the environment and stakeholders in order to ensure its sustainability University of Cape Coast should proceed with the project with the prescribed mitigation measures. Constant monitoring of the said aspects (impacts and mitigation) through close follow-up and implementation of the recommended Environmental Management and Monitoring Plans will also ensure its longevity and avoid conflicts between the project and stakeholders or between it and the natural environment. In relation to the proposed mitigation and environmental management and planning measures that will be incorporated during construction and operation phases; and the developments' input to the proponent and the general society, the proposed project is considered beneficial and important. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. On the strength of the aforesaid, it is hereby recommended that the project be granted the required approval and an EIA license as appropriate.

1.0 INTRODUCTION

1.1 Background

The coastal zone of West Africa, just like any other coastal zone in the world is confronted with a myriad of problems. These problems have resulted from rapid population growth and urbanization, as well as the impact of climate change and poor land use practices in the coastal zone. Currently about 68% of sandy beaches of West Africa are being eroded at an average rate of two (2) meters per annum with low lying areas perennially inundated. This is further compounded by poor sanitation and rapid encroachment of coastal wetlands leading to the destruction of natural habitats and biodiversity. Indeed, the challenge of coastal degradation is multi-faceted and resolving it will require multi-faceted and synergistic approaches built on reliable data and human expertise. There is however a lack of scientific data on coastal degradation at national and regional levels. Currently there is limited knowledge on the extent of coastal degradation facing the West African sub-region. What is also missing are the types of degradation and where they are occurring along the coast. Again, information is needed on the impact of the coastal degradation on human society and biodiversity. Under the influence of both climatic and anthropogenic stressors, effective management of coastal degradation is also affected by limited historical time-series data as well as expertise in technical areas to resolve the problem of coastal degradation in developing countries. The degradation is characterized among others by the erosion of shoreline, pollution of coastal and marine ecosystems and the apparent lack of technical and scientific capacity to effectively utilize and manage coastal and marine assets.

Africa Centre of Excellence (ACE)

The ACE projects aim to build regional capacity to deliver high quality postgraduate courses and to conduct and disseminate international caliber applied research focused on addressing development challenges in SSA. Given the limited resources available to support postgraduate training and applied research in SSA, the ACE projects are designed to increase specialization and excellence of higher education. Further, universities will enhance regional collaboration through university networks. This will build regional capacity essential to Africa's development. The ACE project would leverage institutional and national strengths to serve regional needs. To achieve results, the ACE projects use a regional model with the following elements: transparent and competitive selection of centers; a strong focus on regional collaboration and student recruitment; strong government and institutional ownership; results-based financing (RBF) with independent verification of results; a robust monitoring and evaluation.

Following the success of Phase I of the African Higher Education Centres of Excellence (ACE) project, The World Bank in conjunction with the Regional Facilitation Unit (RFU) of the Africa Centres of Excellence (ACE) Project (ACE I) recognized the need to scale up the success and expand the benefits accrued to the Centres and their Countries. This decision gave birth to ACE III which was announced at the ACE I & ACE II Joint Workshop held in November, 2017 at La Palm Royal Beach Hotel, Accra, Ghana.

ACE III will focus on increasing the quality and relevance of post-graduate education in selected universities through regional specialization, applied research, upfront University-Industry linkage and better Regional and International coordination. ACE III is not an absolute replacement for ACE I, but rather seeks to build on the success achieved and expand the reach of the benefits from ACE I. It further aims at upscaling performing Centers hence, only performing ACE I Centers have been upgraded to ACE III. The Regional Facilitation Unit for the ACE III is the Economic Community of West African States (ECOWAS) Secretariat. Regional services such as Monitoring, and Evaluation, Verification and Logistics will be provided by the Association of African Universities (AAU) on consultancy basis.

The Project Development Objective is to improve the quality, quantity and development impact of postgraduate education in selected universities through regional specialization and collaboration. The project has three components:

- ***Component 1***aims to build and strengthen the capacity of competitively selected ACE Impact centers based in higher education institutions across West and Central Africa.
- ***Component 2*** seeks to expand the regional scope of impact of the ACEs funded under Component 1 by providing demand-side funding for partnering institutions and regional students to buy the training and services from the ACEs.
- ***Component 3*** will fund, through a Regional International Development Association (IDA) grant of US$10 million to the Association of African Universities (AAU), the facilitation of the ACE Impact project's regional activities and support to centers under the project.

Africa Centre of Excellence in Coastal Resilience (ACECoR)

In September 2018, the University of Cape Coast was competitively selected by the World Bank from among solicited proposals received from across universities in West and Central Africa to establish the Africa Centre of Excellence in Coastal Resilience (ACECoR) on its campus. The selection brings the ACECoR into a network of 44 Centres of Excellence (ACEs) in Africa approved by the World Bank to host a Regional Centre of Excellence. The University of Cape Coast will receive a counterpart funding to the tune of US$ 6.5 from the World Bank and Government of Ghana to implement the project. The call for proposals was rolled out by the Association of African Universities (AAU) and the Regional Facilitation Unit (RFU) of the Africa Centres of Excellence (ACE) Project, with support from the World Bank, under the ACE for Development Impact Project.

The multi-year project (2019-2023) was officially launched at the continental level among the other ACEs by H.E. Mr. Ismail Omar Guelleh, the President of the Republic of Djibouti at the 10th Africa Higher Education Centres of Excellence (ACE) Workshop and Bootcamp on 20th February, 2019 in Djibouti. The objective of ACECoR is to support technical capacity development of young African professionals to address issues of coastal degradation within the sub-region, as well as promote the sustainable utilization and management of marine and coastal assets in the partner countries through collaboration with academia, research institutions and industry, locally and will secure international partnerships.

ACECoR will carry out education, research and outreach programmes. These programmes will be implemented in collaboration with other academic institutions and industries within the country, sub-region and at the global level to ensure a multi- and interdisciplinary approach to addressing coastal degradation across the sub-region.

The Centre aims at achieving excellence in training both students and professionals in selected areas as a way of enhancing coastal resilience and promoting policies through:

i. Enhancing old academic programmes and developing new programmes to train professionals in coastal issues
ii. Improve teaching and learning environment and resources for training and research
iii. Enhance human resource capacity for teaching and research in the thematic areas of the project
iv. Establish strategic academic and industry sector partnerships for outreach through students/faculty exchange, networking, conferences and workshops.

As part of the ACECoR program, the University of Cape Coast will construct a multipurpose educational complex to accommodate research laboratories, offices and lecture rooms.

1.2 Purpose of ESIA

The conduct of an ESIA for the Project is a regulatory requirement of national laws and regulations such as the Environmental Assessment Regulations, 1999 (LI 1652), the Environmental Protection Act, 1994 (Act 490) and the 1992 Constitution of Ghana. The Constitution mandates that appropriate measures be taken to protect and safeguard the national environment. Similarly, LI 1652 mandates that no undertaking which is likely to adversely impact on the environment or public health commences without the conduct of an EIA and prior approval of the Environmental Protection Agency (EPA).

The ESIA is also needed because the Project is financed by The World Bank, as such, the Project is required to meet or satisfy The World Bank's Environmental and Social policies and Standards. The Project has been classified as a Category B Project per The World Bank criteria for categorizing projects based on environmental significance, type, location, sensitivity, and scale. Category B Projects refer to projects that involve site specific and immediate project environment interactions and have adverse impacts that are not sensitive, diverse, unprecedented and are mostly reversible. Though they generally do not significantly alter natural systems and resources or consume much natural resources (e.g. ground water), the conduct of an ESIA is a requirement.

The World Bank is committed to its safeguard policies and Environmental and Social Standards (ESS) which are targeted at preventing and mitigating undue harm to people and their environment in development initiatives or projects supported by the Bank through Investment Project Financing. This ESIA therefore evaluated several issues which relate to the physical and biological environment of the Project area, as well as socio-economic, cultural, health and safety issues. The ESIA identified potential impacts (positive and negative) that may result from the Project and recommended applicable mitigation measures for negative impacts and

enhancement measures for positive impacts.

Specifically, the purpose or objective of the ESIA report is therefore to present the following:

- A comprehensive description of the Project and relevant Project alternative assessment;
- The ESIA process and a review of legislation, standards and guidelines pertinent to the Project and associated ESIA;
- Description of stakeholder engagement activities;
- A comprehensive baseline study and review of the physical, biological and socio-economic characteristics of the Project area;
- Assessment of potential impacts to the physical, biological and socio-economic environments within the Project's area of influence;
- Mitigation measures and associated management plans targeted at avoiding, reducing or managing the severity of identified impacts; and
- Assessment of potential cumulative impacts associated with other planned, existing or project- related developments in the Project area.

The ESIA report will be a significant source of information which The World Bank, the public and Government decision-makers would use in assessing the Project. This ESIA includes preliminary Environmental and Social Management Plan (ESMP) which will be used in preparing bid documents that will be used in selecting a Contracting Entity to construct the project. It is expected that based on the concept design, the Contracting Entity will prepare the detailed ESMP on the basis of the detailed design.

1.3 Methodology

The process of data collection was undertaken as follows:

- **Preliminary assessment of the site**: The experts visited the site to know the location.
- **Screening**: This is the initial phase of any ESIA process. It involves the determination of whether or not an ESIA assessment is required for a particular development activity.

Determination of the environmental impact in the proposed project depended on the following aspects but not limited to:

- The sensitivity of the area likely to be affected;
- Public health and safety;
- The possibility of uncertain, unique or unknown risks;
- The possibility of having individually insignificant but cumulatively significant impacts;
- Whether the proposed activity affects protected areas, endangered or threatened species and habitats;

From the above, the proposed project was seen to require an Environmental Impact Assessment since construction activities of such magnitude are expected to have both negative and positive effects to the environment and ultimately contribute to an increased waste generation both in the construction and occupational phases. This stage also involved activities such as:

a) Getting a comprehensive site description that includes: Location of the proposed project, the soils and geology of the proposed site, water resources available on site, drainage system evident on site, climatic conditions of the proposed location and its vicinity, vegetation on site, land use systems on site and its vicinity, population characteristics of the region holding the proposed site, infrastructure at the site and justification for selection of the site
b) Getting detailed information on: The nature of the proposed construction activities, the materials to be used in the construction activities on site and the expected project outputs including waste generation

Various data collection and analyses techniques were used in the assessment:

1.3.1 Desk Review

Deskwork provided a detailed description of the project with respect to spatial coverage, preliminary design layout, magnitude, implementation schedules and costs as well as human resources. Relevant documents were reviewed to obtain information on the baseline information in general but specifically at the project site. This documentary review provided further understanding the project design (site plan and architectural drawings), land use, local environmental conditions, development strategies and plans (local and national) as well as the policy and legal documents among others. Others included area maps, relevant legislations, regulations and guidelines and standards.

1.3.2 Observations

Detailed field observation assessment was undertaken to enable determination of the exact socio- economic activities within the proximity of the project site. Among the broad focal areas for which observation was done included settlement patterns, land use, commerce, trade and industry among others. Checklists were used along with observations to check on possible environmental impacts the project would have on the environment during both construction and operational phases. In this assessment, checklists were utilized to: facilitate identification of potential environmental impacts; provide a means of comparing the predicted environmental impacts; indicate the magnitude of both positive and negative environmental impacts; indicate possible adverse environmental impacts that are potentially significant but about which sufficient information can be obtained to make a reliable prediction; and Indicate negative potential environmental impacts in the project area which merit mitigation measures and monitoring during project implementation.

1.3.3 Field Assessment

The field survey adopted various techniques for baseline data collection on the existing environmental conditions, namely:

- Field observations and recordings including taking photos of the project site and its vicinity.
- Use of checklists for determining potential environmental impacts of the proposed project.
- Consultations and public participation within the neighbourhood of the project site.

Data collection was guided by literature review and discussion with the proponent, observation, detailed physical inspection of the proposed site and the surrounding areas to determine the present and anticipated impacts of the proposed project, assessment of the approved structural and technical drawings for the proposed project development (housing units) and development of a photo log. The baseline study focused on the flora (vascular plant species) and fauna (small mammals) at the proposed project site. The data obtained was used to assess potential impacts on health, safety, environment and the community surrounding the proposed site. From the obtained data, environmental, health, safety and social concerns were identified in relation to the proposed project location and mitigation measures proposed for the negative impacts, while enhancement measures were proposed for the positive impact. Photography was used to capture salient features and baseline conditions in the project site and its neighbourhood. The photos were used to define existing features in the project area and identify soils and floral species in the area.

Non-destructive standard field survey methodologies were used in the study. The objectives of the study were to:

- Review any existing information on flora and fauna at the project site;
- Identify and document the occurrence of flora and fauna species on the site;
- Provide a checklist of the flora and fauna species of the concession;
- Assess the conservation significance of the flora and fauna species;
- Establish if there are any factors relating to flora and fauna which may preclude implementation of the proposed project;
- Determine the potential impact of the proposed project on the flora and fauna community on the site;
- Recommend appropriate measures to mitigate the expected impact of the project on the local flora and fauna.

1.3.3.1 Flora Survey

The flora survey was carried out at the study site as well as its environs to have a complete assessment of the flora of the area. The systematic sampling method was mainly used to collect data on the flora. Both area- based and non-area-based techniques were used to sample the flora. For the area-based method, a total of 500 (1m×1m) quadrats were used along 20 line transects. The non-area-based technique involved identification of plant species at 1m interval along 200m line transects and random selection of spots to record species that have not been encountered previously. Identification of most of the species was done on the field using standard literature and field guides (Irvine, 1960; Akobundu and Agyakwa,1989; Dokosi, 1998; Hawthorne and Jongkind, 2006; Hall and Swaine, 1981 and Hawthorne and Gyakari, 2006). Voucher specimens of

species that were not identified on the field were sent to the Herbarium at the University of Cape Coast for determination of their identity.

Descriptive analysis involving simple counts and percentages were used to analyse the data using the Excel Microsoft Software (2010). The comprehensive list of species obtained was used in the determination of the proportions of taxa and life forms. The species were classified under various life forms, viz: Trees, Shrubs, Climbers, Lianes and Herbs. The relative diversity (Dallmeier, 1992), ecological guild and star rating system of the Forest of Ghana Geographic Information Exhibitor manual (Hawthorne, 1995) were also used to analyse the data.

$$\text{Relative diversity} = \frac{\text{number of species in the ith family}}{\text{Total number of species}} * 100$$

The flora was classified into ecological guild as follows;

- Pioneer (P)
- Non-Pioneer Light Demander (NPLD)
- Shade Bearer (SB)
- Swamp (SW)
- Non-forest (NF)

The plant species were star-rated according to the specific circumstance of Ghana as follows:

- Black Star – Species rare internationally and at least uncommon in Ghana; urgent attention to conservation of population needed
- Gold star – Fairly rare internationally and./or locally
- Blue star – Widespread internationally but rare in Ghana or vice-versa
- Scarlet star – Common, but under serious pressure from heavy exploitation
- Red star – Common, but under pressure from exploitation
- Pink star – Common and moderately exploited. Also, non-abundant species of high potential value
- Green star – No particular conservation concern, common in Ghana

The proportions of species in the various categories were used to comment on the ecological significance of the study site.

1.3.3.2 Fauna Survey

Three main methods were employed in the fauna survey; which were Direct/Opportunistic observation, Identification of animal spoors and Setting of traps. Direct/Opportunistic observation involved recording any animal sightings while walking along main access roads or animal trails to the areas bordering the proposed project site. Transect walks to spot animal spoors (any signs left by living animals, such as feeding sites, regular pathways, tracks, footprints, faecal pellets, nest, etc.) were carried out to complement animal sightings made during the study. Field guides, Kingdom (1997) and Roell et al. (1993) were used to verify the field observations.

1.3.3.3 Noise Levels

The fieldwork encompassed two tasks, namely, measurement of outdoor noise levels and assessment of risk perception of residents in each community. First and foremost, a Garmin Etrex hand-held Global Positioning System (GPS) was used to obtain the coordinates of locations. Precision-grade sound level meter -RION NL-22 (Higashimotomachi, Tokyo, Japan) was used to measure the noise levels generated from the location. The device conforms to the standards of International Electrotechnical Commission (IEC) 61672-1:2002. The instrument was calibrated by the internal sound level calibrator before making measurements at each site. *L*Ai (A-weighted instantaneous sound pressure level) measurements were recorded at intervals of 30 s for a period of 30 min, giving 60 readings per sampling location. This procedure was carried out for day (0600–2200 hours), and night (2200–0600) measurements. The A-weighted equivalent sound pressure level, *L*Aeq; the daytime average sound level, *L*D; the day–night average sound level, *L*DN; the noise pollution level, *L*NP; and the TNI were consequently computed. The noise produced from these sources was compared with the ambient noise level guidelines of the Ghana Environmental Protection Agency (Table 1-1) to verify compliance. For each location the noise levels were recorded for low and peak values, and the average noise level computed. This was done in cognizance of the fact that noise is transient and that noise levels within localities will be varying all the time.

Table 1-1: Ambient Noise Level Guidelines of the Ghana EPA

ZONE	DESCRIPTION OF AREA OF NOISE RECEPTION	PERMISSIBLE NOISE LEVEL dB (A)	
		DAY 0600 – 2200	NIGHT 2200 – 0600
A	Residential areas with negligible or infrequent transportation	55	48
B1	Educational (school) and health (hospital) facilities	55	50
B2	Area with some commercial or light industry	60	55
C1	Area with some light industry, place of entertainment or public assembly and place of worship such as churches and mosques	65	60
C2	Predominately commercial areas	75	65
D	Light industrial areas	70	60
E	Predominately heavy industrial areas	70	70

1.3.4 Data Analysis and Evaluation of Alternatives

Checklists and the threshold limits were used in data analysis; while the proposed site location, technologies to be employed, product mix, scale of construction, potential environmental impacts, capital and operating costs, suitability under local conditions, and institutional, training, and monitoring requirements were considered in the evaluation of

alternatives. The proposed project's impacts were identified using a developed checklist, public consultation information, literature and professional knowledge. Impacts were first distinguished as either positive or negative. The proposed project's negative impacts were analysed to denote their significance based on their characteristics and this was also impacts per project phase. Significance was judged based on their capacity to change baseline conditions beyond acceptable standards or legislative provisions. A qualitative scoring matrix was used to give a value/score of each impact on the environment

1.3.5 Public and Stakeholders Engagement

Structured and semi-structured stakeholder engagements were undertaken of the proposed project to capture the views and concerns of interested and affected parties. The engagement process entailed face to face meetings / interviews.

2.0 PROJECT DESCRIPTION

2.1 Project Overview

The University of Cape Coast (UCC) is partnering with the World Bank under the new Africa Centre of Excellence (ACE III) Impact Project. The project is known as the "*Africa Centre of Excellence in Coastal Resilience (ACECoR)*", which seeks to promote coastal resilience within the West and Central African sub-regions. The objective of ACECoR is to support the development of technical and scientific capacity of young African professionals to develop integrated solutions to address coastal degradation in the countries of intervention through short – to long-term professional and academic training programmes. Focus will be on regional participation and the inclusion of females, albeit limited in previous interventions, all geared towards the advancement of sustainable use and management of marine and coastal assets in the partner countries to be involved, achieved through collaboration with academia, research institutions and industry, locally and will secure international partnerships. Five (5) outcomes are envisaged as follows:

- Outcome 1: Highly skilled postgraduates (PhD and MPhil), post-doctoral fellows and professionals trained
- Outcome 2: Applied research on cross cutting issues on marine and coastal degradation conducted
- Outcome 3: Access to data or information for management of coastal degradation enhanced
- Outcome 4: Effective integrated coastal zone management policies developed
- Outcome 5: Marine and coastal resources are managed in a sustainable manner

ACECoR will train 120 graduates at the postgraduate (PhD and Masters) levels in addition to 570 professionals (in short courses) across Africa in the areas already described. In addition to existing programmes of Disaster Risk Management and Migration, Fisheries Science, Oceanography and Limnology and Integrated Coastal Zone Management, new programmes in Physical Oceanography, Coastal and Marine Engineering, Forestry Engineering and Marine Meteorology will be developed and mounted for the training of postgraduate students. The first batch of students are expected to be admitted in August at the beginning of the 2019/2020 academic year. All programmes will be nationally and internationally accredited. The postgraduate programmes will be taught using problem-based learning (PBL) methods and on modular basis.

In terms of role of partners, lecturers from different collaborating universities worldwide and experts from sector industries in the sub-region will constitute the core teaching team on the programmes. Sector industry collaborators apart from providing practical basis for the taught programmes, will support students and staff internships. They will also support the professional training of their staff through short courses on the project.

Among others ACECoR will:

- establish new and relevant post-graduate programs to address the challenges of coastal degradation within the sub-region;
- provide support for the development and delivery of short courses in the areas mentioned, accredited to relevant international bodies;

- develop mentoring support systems for faculty for effective administration and management, as well as course delivery;
- provide incentives for lecturers to teach, guide research and provide in-service training to professionals in delivery of short courses;
- provide Smart Classrooms with state-of the art facilities including science laboratories with ICT equipment to promote research and deliver the trainings;
- supply computer hardware and software to deliver the course to the expected standards; and
- provide placements in industry for selected students and support lecturers to attend conferences, workshops to upgrade their skills, with fees paid through scholarships and living expenses funded by this Project
- initiate a scheme for five (5) post-doctoral fellows to be selected from within the region.

In terms of academic programmes, the Centre will admit and train 120 postgraduate students made up of thirty (30) PhD and ninety (90) masters students. The Centre will ensure strong industry linkages, encourage female participation and will facilitate an estimated 40% of total student intake into the program from within the African sub-region. ACECoR will work towards developing and securing local and international accreditation for modular academic programmes in the following areas:

1. PhD/MPhil Marine and Coastal Engineering
2. PhD/MPhil Forestry Engineering
3. PhD/MPhil Marine Meteorology
4. PhD/MPhil Physical Oceanography
5. PhD/MPhil Limnology
6. PhD/MPhil Disaster Risk Management and Migration
7. PhD/MPhil Integrated Coastal Zone Management
8. PhD/MPhil Fisheries Science
9. PHD/MPhil Blue Economy, Governance and Social Resilience

These academic programs shall be grounded on five (5) thematic and applied research areas as follows:

- Coastal Geomorphology and Engineering;
- Climate Change Adaptation and Mitigation;
- Disaster Risk Management and Migration ;
- Ecosystems and Biodiversity Science; and
- Blue Economy, Governance and Social resilience

ACECoR will also introduce short courses to train 570 African Professionals and students in the following areas of emphasis:

- Integrated Coastal Zone Management
- Climate Change Adaptation and Mitigation in Coastal Areas
- Fisheries Resources Management

- Fisheries Observer Program
- Coastal Conservation Economics
- Remote Sensing for Coastal Area Monitoring & Geographic Information Systems

Expected outcomes of ACECoR's activities will include:

i. Enhanced capacity of staff the University to deliver high-quality training to increase the number of postgraduate students and supply of highly skilled graduates (30 PhDs, 90 masters, 570 short courses participants)
ii. Enhanced research capacity to publish 50 scientific articles in both international and local journals and communicate applied research at regional and international conferences and workshops during the project period.
iii. Strong collaboration with academic partners established for joint research and training,
iv. Partnership between UCC and sector industry established to enhance faculty and student internships, training of practitioners and research into industry problems to influence national and regional policies,

As part of the ACECoR program, the University of Cape Coast will construct a multipurpose educational complex to accommodate research laboratory, offices and lecture rooms.

2.2 Project Location

The project will be located within the University of Cape Coast (UCC) which is on a hill overlooking the Atlantic Ocean.

Figure 2-1: ACECoR Multi-purpose Educational Complex Proposed Project Site (Oblique Photo)

2.3 Project Building Design

2.3.1 Project Building Layout

Figure 2-2: Multi-purpose Educational Complex Block Layout

Figure 2-3: Architectural Impression of proposed project building

Ground Floor Layout

Ground floor: Conference room, offices for academic, research and administration, reception and entrance hall, lobby, entrance terrace

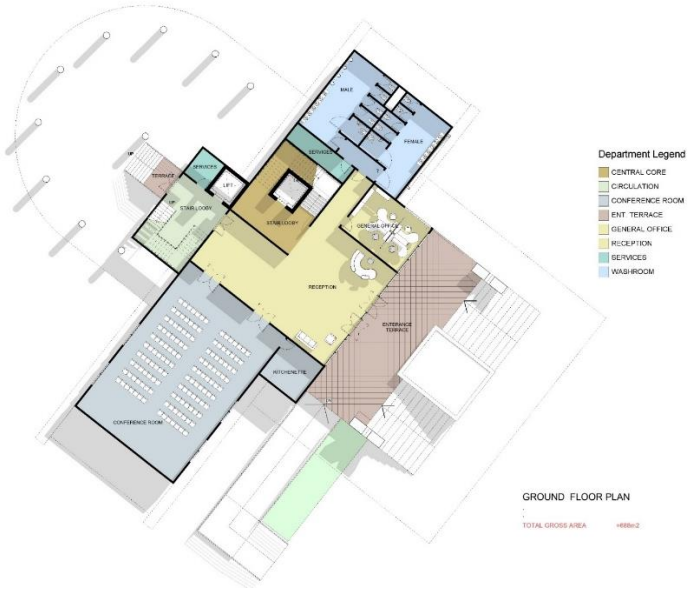

Figure 2-4: Multi-purpose Educational Complex Ground floor layout

First Floor Layout

Mini auditorium, syndicate meeting rooms, ICT lab, offices

Figure 2-5: Multi-purpose Educational Complex First floor layout

Second Floor Layout

Library, offices, study booths, research commons, incubation centre,

Figure 2-6: Multi-purpose Educational Complex Second floor layout

Third Floor Layout

Library, office, labs

Figure 2-7: Multi-purpose Educational Complex Third floor layout

Fourth Floor Layout

Outdoor sitting area, restaurant, rooms, roof below

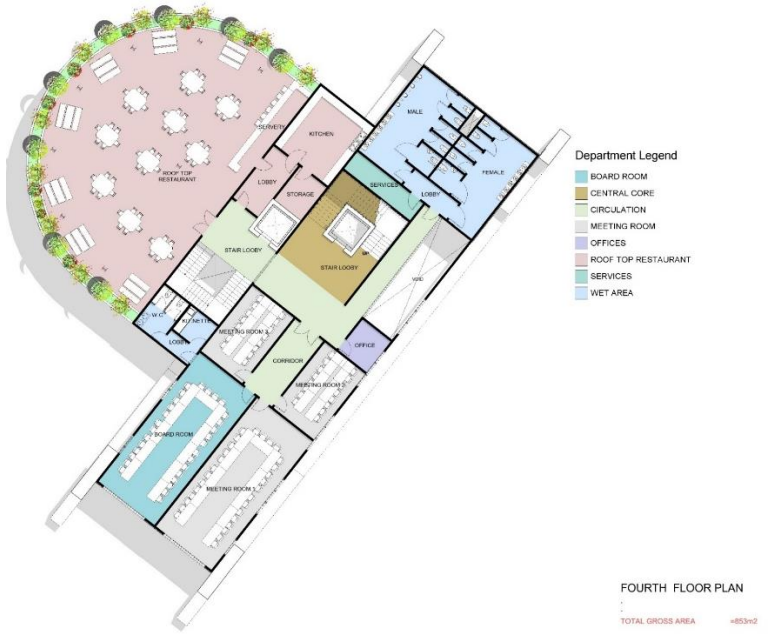

Figure 2-8: Multi-purpose Educational Complex Fourth floor layout

Fifth Floor Layout

Rooms and offices

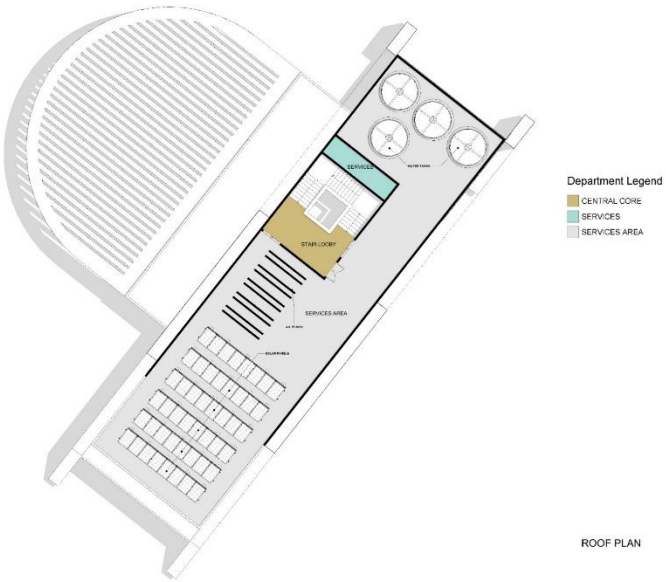

Figure 2-9: Multi-purpose Educational Complex Fifth floor layout

2.3.2 Utilities

For the project to achieve its objectives varying quantities of utilities and facilities will be necessary as ancillary and primary inputs. These utilities include: Water, Electricity, Sewerage, Water Drainage, Transport and Traffic, Fire Reticulation.

The Brimso Waterworks and the dam provides water for the Cape Coast metropolis. Historically, the supply of water to UCC has been from Ghana Water Company Limited (GWCL) operations. Cape Coast used to experience perennial water shortage with its attendant problems. Therefore, Ghana Water Company Limited (GWCL) instituted some measures including dredging of the Brimsu dam and construction of a new water treatment plant at Sekyere Hemang to improve water supply situation in the Region.

Generally, water supply utilization at the project site will fall under two (2) categories: consumptive and non-consumptive uses. The major consumptive uses are for human sustenance. But the main non-consumptive uses are fire-fighting, sanitation and hygiene and for aesthetics beautification purpose. The estimated total demand for potable water for the development will range between 50 to 100 cubic metres per day.

3.0 LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

This Chapter details the legislative and administrative framework for the ESIA and the Project as a whole. In addition to applicable national regulations, the Project is committed to align as far as practicable to the requirements of The World Bank Environmental and Social Standards and The World Bank Group Environmental, Health and Safety Guidelines (EHSGs).

3.1 Environmental Impact Assessment (EIA) in Ghana

The fundamental principle underlying Ghana's formal Environmental Impact Assessment (EIA) Procedures is the preventive approach to environmental management in which EIA is applied as a tool, especially at the project-specific level. Environmental Assessment (EA) is recognized and applied in Ghana to development projects as well as other undertakings as an environmental permitting pre-requisite and a major environmental management tool. The existing procedures have evolved over time since EA became a requirement in Ghana in 1989, to screen and evaluate all developments, undertakings, projects and programmes, which have the potential to give rise to significant environmental impacts. The procedures establish an EA process of which one principal objective is the requirement to provide enough relevant information to enable the Environmental Protection Agency (EPA) to set an appropriate level of assessment of any proposed undertaking, investment or programme for the assessment for the necessary review and to facilitate the decision-making process for EA approval. The information may be gathered through an environmental impact assessment study and published in an Environmental Impact Statement (EIS), Preliminary Environmental Report (PER), or by completing an Environmental Assessment Preliminary Registration, Form EA1 or EA2, depending on the complexity, nature, and location of the proposed undertaking.

EPA is mandated by law to ensure compliance with laid down Environmental Impact Assessment (EIA) procedures in the planning and execution of development projects, including compliance in respect of existing projects. The basic objectives of the EIA system are to:

i. integrate environmental management and economic decisions at the earliest stages of planning an undertaking or investment; and
ii. provide avenues for the involvement of the public, proponents, private and government agencies in the assessment and review of proposed undertakings, among others

3.2 Institutional and Administrative Framework

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

The Ministry of Education (MOE) - established under the Civil Service Law 1993 and the PNDC Law 327, the MOE is mandated to provide relevant education to all Ghanaians as a vehicle for human growth and national development. The goal of the MOE is to formulate and implement policies that would ensure quality and accessible education to all Ghanaians to meet the needs of the labour market; and accelerate the acquisition of requisite skills to

achieve human development, good health, poverty reduction, national integration and international recognition and to create an honest, creative and responsible citizenship. Its vision is to prepare and equip all Ghanaians with relevant education and skills to promote socio-economic development and national orientation. Its mission is to provide relevant education with emphasis on science, information, communication and technology to equip individuals for self-actualization and peaceful coexistence as well as skills for the workplace for national development

National Council for Tertiary Education (NCTE) - At the tertiary level, the NCTE which is facilitating the implementation of the ACE Impact project in Ghana is the key coordinating agency. The Tertiary Education sector is expected to produce cadres of highly qualified individuals to support economic and social development in Ghana. Ghana has ten state and at least 81 private universities according to the National Accreditation Board (2018).

Environmental Protection Agency - The principal institution established for environmental protection in Ghana is the EPA, created under the Environmental Protection Agency Act, 1994 (Act 490). The EPA's policy direction is articulated by the Environmental Assessment Regulations, 1999 (LI 1652). These two pieces of legislation mandate the EPA to manage, control and monitor compliance of environmental regulations by specific industries. The EPA has an important role in the Project implementation as the lead environmental regulator, which oversees compliance with environmental assessment requirements, facilitate public participation and disclosure, and issue environmental permits for the project. The EPA has the mandate to decide on project screening, guide the conduct of the environmental assessment studies and to grant environmental approval for the project to commence. Its mandate also covers monitoring of implementation phase of the project to confirm compliance with approval conditions, mitigation measures, and other environmental commitments and quality standards.

Town and Country Planning (TCP) - The Town and Country Planning 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. With regards to the Proposal, TCP will ensure that the architectural designs or drawings, structural designs, mechanical and electrical systems design, geotechnical designs of the buildings and facilities are in conformance with national and local regulatory requirements.

Power Distribution Services (PDS) (formerly Electricity Company of Ghana) – PDS is responsible for the provision of quality, reliable and safe electricity services to support the socio-economic growth and development of Ghana. With regards to the Proposal, PDS will ensure that the required power output could be provided from the national grid.

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. With regards to the Proposal,

GWCL will ensure that water supply to the project could be provided through dedicated pipelines to the site.

Cape Coast Metropolitan Assembly (CCMA) - The construction activities of the ACECoR Project falls under the jurisdiction of the Cape Coast Metropolitan Assembly. The CCMA is responsible for the spatial planning and zoning of the municipality. With regards to the proposed construction, CCMA will ensure that the development falls within the zonal laws and regulations of the municipality. Moreover, CCMA will be required to issue Building Permit to certify Project implementation.

Forestry Commission (FC) - The FC of Ghana is responsible for the regulation of utilization of forest and wildlife resources, the conservation and management of those resources. The Timber Validation Department of the Forestry Commission of Ghana is responsible for verifying the legal origins of timber products harvested in Ghana for local utilization and for export. With regards to the Proposal, FC will ensure that any tree which requires to be cut is done under FC Tree Felling Guidelines.

National Commission on Culture (NCC) – The NCC is in charge of implementing the cultural policy on physical cultural resources, which requires the preservation of monuments, all forts and castles, designated shrines, mosques, church buildings, old city walls and gates, cultural sites, palaces, public and private buildings of historical significance and monumental sculptures. These are required to be protected from neglect, desecration and/or destruction. Under the policy, the NCC - in collaboration with the EPA - is required to identify heritage sites of Ghana and collect, collate and store indigenous beliefs and practices associated with them.

Civil society and the media play a strong role in environmental awareness, and in influencing to the extent possible, the decision making process related to environmental issues. Ghana has Non-governmental organizations (NGOs) actively participating in the environmental arena, on issues ranging from public awareness and environmental education to waste collection and community self-help programs. NGOs have been increasingly involved in project implementation, in public debate, in hearings/consultations on EA, and also in monitoring compliance with environmental laws. The media have contributed to increased awareness and to changes in behavior.

3.3 National Environmental Legislation and Policies

The Constitution of Ghana - The 1992 Constitution[1] of Ghana sets out the first source of environmental protection requirements in Ghana. Article 36 (9) of the Constitution states that "the State shall take appropriate measures needed to protect and safeguard the national environment for posterity; and shall seek co-operation with other states and bodies for purposes

[1] [1] The 1992 Constitution of the Republic of Ghana sets out the Rights, Freedom, Duties and Obligation of every citizen of Ghana. These are these are the constitutional rights of Ghanaians. The constitution also defines specific requirements for the protection of the Environment such as provided under: Article 37(3); Article 39(6); Article 41(k); Article 268 and Article 269.

of protecting the wider international environment for mankind". In addition, Article 41 (k) requires that all citizens protect and safeguard the natural environment of the Republic of Ghana.

Article 25 (1) states that all persons shall have the right to equal educational opportunities and facilities and with a view to achieving the full realization of that right. The following sections of Article 25 (1) are referenced: (c) higher education shall be made equally accessible to all, on the basis of capacity, by every appropriate means, and in particular, by progressive introduction of free education; (d) functional literacy shall be encouraged or intensified as far as possible; (e) the development of a system of schools with adequate facilities at all levels shall be actively pursued.

Environmental Protection Act, 1994 (ACT 490) - The Environmental Protection Act, 1994 (Act 490) came into being to establish the EPA as a body for the protection, conservation and management of environmental resources for the Republic of Ghana. The Act mandates the EPA with the formulation of environmental policy, prescribing of standards and guidelines, issuing of environmental permits and pollution abatement notices. Section 2 (i) of Act 490 further mandates the EPA to enforce compliance with established EIA procedures among companies and businesses in the planning and execution of development projects, including existing projects. Section 10 (2) of the Act also promulgates the establishment of a Hazardous Chemicals Committee with functions to monitor the use of hazardous chemicals by collecting information on the importation, exportation, manufacture, distribution, sale, use and disposal of such chemicals.

Environmental Assessment Regulations, 1999 (LI 1652) - The Environmental Assessment Regulations is established to provide a framework for environmental assessment of development projects in Ghana. The LI 1652 is organised into five schedules of categorised projects which may either be subjected to a complete EIA or a Preliminary Environmental Assessment. The Schedules include:

- Schedule 1, Regulation 1 (1) outlines activities for which an Environmental Permit is needed.
- Schedule 2, Regulation (3) outlines activities for which EIA is mandatory.
- Schedule 3, Regulation 15 (2) provides requirements for disclosure of scoping notice and "notice of intent" to undertake the proposed project.
- Schedule 4, Regulation 16 (3) provides requirements for disclosure and public consultation in the EIA process.
- Schedule 5, Regulation 30 (2) outlines environmental sensitive areas known as Sites for Special Scientific Interest (SSSI).

Regulation 1 (2) of LI 1652 mandates that no person shall commence an undertaking which in the opinion of the Agency has or is likely to have adverse effects on the environment or public health unless, prior to the commencement, the undertaking has been registered by the EPA and an environmental permit has been issued by the Agency in respect of the undertaking.

The LI 1652 prescribes requirements for the following documents:

- Environmental Impact Statement (EIS).

- Preliminary Environmental Assessment (PEA).
- Environmental Management Plan (EMP).
- Annual Environmental Report (AER).
- Environmental Permits and Certificates

The National Environmental Policy (2010) - The 2010 National Environmental Policy[2] (NEP) sets out a new vision for environmental management in Ghana and is based on an integrated and holistic management system for the environment. It is aimed at sustainable development now and in the future. The policy seeks to unite Ghanaians in working toward a society where all residents of the country have access to sufficient and wholesome food, clean air and water, decent housing and other necessities of life that will further enable them to live in a fulfilling spiritual, cultural and physical harmony with their natural surroundings.

The NEP is defined under key operational principles of accountability, equity, environmental justice, inclusivity and open information, precautionary and polluter pays principles. Within the NEP are sector specific environmental protection policies. The NEP is intended to serve as the roadmap for Ghana towards protection, management and promoting sustainability of environmental objects.

Environmental Sanitation Policy (Revised, 2010) - This revised Environmental Sanitation Policy lays the basis for developing a systematic approach and framework for identifying and harnessing resources for value-for-money services to all. It is the outcome of reviews to address limitations of the old policy published in 1999 and a result of nation-wide consultation among sector stakeholders. The Policy has been revised to update its scope to meet current development objectives and address aspirations of sector actors. The revision also takes on board the changing context of national and international development priorities. Emphasis is placed on the need to ensure systematic collection of data on wastes from all sectors of the economy to support relevant research and development to meet the challenges of managing wastes associated with the growing economy and rapidly changing lifestyles.

National Climate Change Policy (2012) - The main purpose of the NCCP is to help policy makers think about the national policy actions and programmes needed to contribute to the fight against climate change and how such needs can be articulated in order to seek or leverage internal and external resources from public, private and international organisations.

3.4 National Educational Legislation and Policies

The Education 2008 (Act 778) - The objective of Act 778 enacted in 2008, is to provide for the establishment of an educational system intended to produce well-balanced individuals with

[2] [2] National Environmental Policy (Revised) 2010 comes in to replace the 1992 National Environmental Policy broad vision founded on and directed by respect for all relevant principles and themes of environment and sustainable development. The policy describes major environmental challenges in Ghana and recommends operational policies, sector strategic goals and sector environmental policies to combat them.

the requisite knowledge, skills, values, aptitudes and attitudes. Lift deleted to implementation strategies.

The Education Strategic Plan (2010-2020) - The Education Strategic Plan stipulates that, the Ministry of Education shall —provide education for those with physical and mental impairments, orphans, and those who are slow or fast learners, by including them, wherever possible, within the mainstream formal system or, only when considered necessary, within special units or schools.

National Inclusive Education Policy - The Inclusive Education Policy defines the strategic path of the government for the education. The Policy builds upon sections in the 1992 Constitution, the National Development Agenda, the Education Strategic Plan and International Commitments to achieve national as well international goals for creating an environment for addressing the diverse education needs of Ghanaians. The Inclusive Education Policy provides an opportunity for all stakeholders in the education sector to address the diverse learning needs of various categories of citizens in the Ghanaian education system under the universal design for learning and within a learner friendly environment for all. IE is based on the value system which holds that all persons who attend an educational institution are entitled to equitable access to quality teaching and learning, and which transcends the idea of physical location but incorporate the basic values that promote participation, friendship and interaction.

University of Cape Coast Law, 1992 [PNDC Law 278] - The University was established with an original mandate to train graduate professional teachers for Ghana's second cycle institutions and the Ministry of Education to meet the manpower needs of the country's accelerated education programme at the time. This original mandate was revised in the mid-1990s, and led to the University expanding and diversifying its programmes in response to changing needs.

The University of Cape Coast was established in October, 1962 as a University College affiliated to the University of Ghana, Legon. On 1st October, 1971, the University College became an autonomous institution with the authority to confer its own degrees, diplomas and certificates by an Act of Parliament - The University of Cape Coast Act, 1971 [Act 390]. The first Act was subsequently replaced with the University of Cape Coast Law, 1992 [PNDC Law 278]. The existing Law (P.N.D.C.L. 278) is under review after being in force for 25 years.

3.5 Other Legislations and Policies

Ghana National Fire Service Act, 1997 (Act 537) - This act makes provision for the management of undesired fires and as per the functions of the service provides technical advice for building plans in respect of machinery and structural layouts to facilitate escape from fire, rescue operations and fire management. Other functions of the service are:

i. Organize public fire education programmes;
ii. Inspect and offer technical advice on fire extinguishers; and
iii. Offer rescue and evacuation services to those trapped by fire or in other emergencies.

The Fire Precaution (Premises) Regulations, 2003(LI 1724) - The Ghana National Fire Service Act, 1997 (Act 537) states that a fire certificate will be required for premises used as a public place or place of work. This requirement is reinforced by the Fire Precaution (premises) Regulations, 2003 (LI 1724). It is incumbent on any project developer to ensure that adequate measures are introduced to minimise or prevent fire out breaks and a fire permit is obtained for development prior to the commencement of works.

Local Governance Act, 2016 (Act 936) - The Local Governance Act 2016 (Act 936) seeks to give a fresh expression to government's commitment to the concept of decentralization. It is a practical demonstration of a bold attempt to bring the process of governance to the doorstep of the populace at the regional and more importantly, the district level. The Act establishes metropolitan, municipal and district assemblies as the highest decision-making authority at the local level with powers to enforce zoning and building regulation as well as responsibility of waste management. The proposed multi-purpose educational complex at the university of Cape Coast in Cape Coast requires approval from the Cape Coast Municipal Assembly (Building Permit) prior to the commencement of works.

Land Use and Spatial Planning Act 2016 (Act 925) - The Act consolidates the laws on land use and spatial planning. It provides sustainable development of land and human settlements through a decentralized planning system and ensures judicious use of land to improve the quality of life, promote health and safety in respect of human settlements. This gives a clearer direction to ensure compliance and enforcement of development regulations by the Ghanaian society. It will also contribute to a more sustainable and well-functioning land administration system that is fair, efficient, cost effective and decentralized and will enhance land tenure security in the country.

The Labour Act 2003 (Act 651) - The purpose of the Labour Act, 2003 (Act 651) is to amend and consolidate existing laws relating to employers, trade unions and industrial relations. The Act provides for the rights and duties of employers and workers; legal or illegal strike; guarantees trade unions the freedom of associations and establishes Labour Commission to mediate and act in respect of all labour issues. Under Part XV (Occupational Health Safety and Environment), the Act explicitly indicates that it is the duty of an employer to ensure the worker works under satisfactory, safe and healthy conditions.

Workmen's Compensation Law 1987 (PNDC 187) - This Act seeks to address the necessary compensations needed to be awarded to workers for personal injuries arising out of and in the course of their employment.

Factories Offices and Shops (Amendment) Act (No. 275 of 1991) - Deals with registration of factories (including indication of the numbers of male and female employees and of the welfare facilities provided), notification of occupational accidents and illnesses, health and welfare standards (lighting, ventilation, dust, noise, etc.), safety measures, complaints in relation to dangerous conditions and practices, offences and legal proceedings, administration of the Act, duties of persons employed and prohibition on deductions from wages.

National Building Regulations 1996, (LI 1630) - National Building Regulations 1996, (LI 1630) is a legislative instrument mandated by the Local Government Act. The core principle of

the National Building Regulations like most National Codes is the provision of guidelines for safety, health and governance is a legislative instrument mandated by the Local Government Act. The core principle of the National Building Regulations like most National Codes is the provision of guidelines for safety, health and governance.

Public Health Act, 2012 (Act 851) - The Public Health Act, 2012, Act 851 revises and consolidates all the laws and regulations pertaining to the prevention of disease, promote, safeguard and maintain and protect the health of human and animals, and to provide for related matters. The law has merged all provisions in the criminal code, ordinances, legislative and executive instruments, acts, bye-laws of the District Assemblies etc. The Act enjoins the provision of sanitary stations and facilities, destruction of vectors including mosquitoes, protection of water receptacles and the promotion of environmental sanitation.

Ghana Disability Act, 2006 (Act 715) - Ghana's Disability Law was passed in 2006, aimed at ending the discrimination that faces people with disabilities. The Act offers a legal framework to protect the rights of physically and mentally disabled persons in all areas of life, from education, training and employment to physical access and health care. It is also intended to promote the creation of an environment that will advance the economic well-being of disabled people and enable them to function better in society.

Other relevant legislations applicable to the Project have been summarised in Table 3-1 below.

Table 3-1: Other relevant legislations applicable to the Project

Legislation	Objective	Implementing Agency	Comment	Relevance to Project
National Museum Decree 1969 (NLCD 387)	Custodian and preservation of Ghana's material cultural heritage (movable and immovable)	Ghana Museums and Monuments Board	Section 8 (1) specified that "no person shall by means of excavation or similar operation search for any antiquity unless authorised by a permit". Section 9 of the Decree provides requirements for the removal of antiquity. Section 10 (1) behoves responsibility for any person who discovers an antiquity and the owner or occupier or any land upon which an antiquity is discovered on becoming aware of the discovery to without delay notify the Board.	Identification, assessment and removal of archaeological artefacts identified during construction works where excavation occurs
Wetland Management (RAMSAR sites) Regulation, 1999	Protection and management of wetland sites of special scientific interest (SSSI)	Wildlife Division of the Forestry Commission	Protection of vital ecosystems and valuable environmental components.	Protection of mangroves and wetlands within the Project area
Wild Animals Preservation Act, 1961	Protection of wild animals, birds and fish	Wildlife Division of the Forestry Commission	Protection of critical species and habitats	Protection and management of terrestrial wildlife

Forestry Commission Act, 1999 (Act 571)	Regulation of the utilization of forest and timber resources and managing of forest reserves and protected areas	Forestry Commission (FC)	The Act promotes management practices that encourage sustainability and provides for technical assistance in matters of resource protection	Protection and management of forest resources
Rivers Act, 1903	Protection and sustainable use of rivers and related matters	Water Resources Commission (WRC)	Section 3 of the Act prohibits a person from dredging a river or extracting the water for construction purposes unless a license is obtained	Protection of water resources during the construction

3.6 International Treaties, Conventions and Protocols

Table 3-2 below summarises the international and regional treaties, conventions and protocols to which the Government of Ghana is a signatory and identifies those aspects of the Project where they may be relevant.

Table 3-2: International Treaties, Conventions and Protocols Applicable to Project

Treaty/Convention/Protocol	Objective	Relevance to the Project
Convention on Biological Diversity (CBD) (1992)	Preserving and sustaining biological diversity.	Biodiversity studies and management/preservation
Convention on Migratory Species (CMS) of Wild Animals (1983)	An international regime for the protection of migratory animals and their habitats, and the prevention, reduction and control of factors that endanger them.	Biodiversity studies and management of migratory species of wild animals.
The Basal Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1989)	The Convention directs for the control and transport of hazardous waste and their disposal. It sets in light the proximity principle for managing waste.	Plant and material selection for construction and demolition. Management of hazardous waste and health protection.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (1993)	To conserve and protect the wise use of wetlands through local, regional and national actions and international cooperation.	Construction works and operations
Vienna Convention for the Protection of the Ozone Layer	Protection of the Ozone Layer	Compliance with standards and protocols
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973)	To enforce that international trade in specimens of wild animals and plants does not threaten their survival	Biodiversity studies and management
United Nations Framework Convention on Climate Change (1992)	The reduction of negative changes to the earth's climate, with focus on greenhouse gases. Places focus on industrialised countries to reduce emissions. Developing countries like Ghana are currently exempt from the reduction requirement; however, this may change	Manage GHG emissions associated with the Project.

Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), Paris (1975)	International Convention to identify and conserve the world's cultural and natural heritage	Protection of natural heritage and zones of cultural influence within the Project area
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise, and Vibration (ILO No. 148)	The Convention encourages that employers in consultation with their workers understand project hazards related to air pollution, noise pollution, and vibrations	Project occupational health and safety
Bamako Convention on the Ban and Import to Africa and the Control of Transboundary Movement and Management of Hazardous Waste (1991)	The Convention, affirming a commitment to address the problem of hazardous wastes in Africa, bans the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa	Plant and material selection for construction and demolition. Hazardous waste management and health protection.
African Convention on the Conservation of Nature and Natural Resources	The objectives of this Convention are: to enhance environmental protection; to foster the conservation and sustainable use of natural resources; and to harmonize and coordinate policies in these fields with a view to achieving ecologically rational, economically sound and socially acceptable development policies and program	Biodiversity studies and management of wetlands
Universal Declaration on Human Rights	The law provides for the promotion of respect for rights and freedoms and for progressive national and international measures to secure the effective recognition and observance among people of signatories themselves and among the territories under their jurisdiction. Key provisions include: Article19: Everyone has the right to freedom of opinion and expression. Article 20: (1) Everyone has the right to freedom of peaceful assembly and association. (2) No one may be compelled to belong to an association. Article 24: Everyone has the right to rest and leisure, including reasonable limitation of working hours and holidays with pay	Employment or labour issues and protection of worker welfare
Arhaus Convention on Public Access to Information and Participation in Decision Making and Access to Justice in Environmental Matters (1998)	Protection of the right of present and future generations to live in an environment adequate to their health and well-being. Each party would promote the rights of	Enhance Project information disclosure, public consultation and stakeholder engagement for the Project

	access to information, public participation in decision-making and access to justice in environmental matters in accordance with the provision of this Convention.	

3.7 The World Bank Environmental and Social Policies and Standards

3.7.1 World Bank Safeguards Policies

The World Bank Environmental and Social Safeguards Guidelines and Operational Policies enable the integration of environmental and social considerations into the development, planning and execution of development projects. These policies are designed to: (i) protect the environment and society from the potential negative effects of projects, plans, programs and policies; (ii) reduce and manage the risks associated with implementation of project activities; and (iii) assist in better decision-making to ensure sustainability of activities. The Bank Environmental and Social Safeguard Policies provide guidance to the World Bank on the process, scope and extent of environmental and social assessment required for project evaluation. The World Bank's safeguard policies or operational policies (OP) have been revised into the ESS as detailed under Section 3.7.2. The Safeguard Policies are listed below:

- OP 4.01 Environmental Assessment;
- OP 4.36 Forestry
- OP 4.09 Pest Management
- OP 4.04 Natural Habitats;
- OP 4.11 Physical Cultural Resources;
- OP 4.10 Indigenous Peoples (replaces operational Directive 4.20 on Indigenous People);
- OP 4.12 Involuntary Resettlement;
- OP 4.37 Safety of Dams;
- OP 7.50 Projects in International Waterways; and
- OP 7.60 Projects in Disputed Areas.

Table 3-3: World Bank Safeguard Policies

World Bank Safeguard Policies	Summary of Core Requirements	Triggered / Applicable
OP 4.01 Environmental Assessment	Screen early for potential impacts and select appropriate instrument to assess, minimize and mitigate potentially adverse impacts.	Yes
OP 4.04 Natural Habitats	Do not finance projects that degrade or convert critical habitats. Support projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place.	No

OP 4.36 Forestry	Support sustainable and conservation-oriented forestry. Do not finance projects that involve significant conversion or degradation of critical forest areas or critical vegetation.	No
OP 4.09 Pest Management	Support integrated approaches to pest management. Identify pesticides that may be financed under the project and develop appropriate pest management plan to address risks.	No
OP 4.11 Physical Cultural Resources	Investigate and inventory cultural resources potentially affected. Include mitigation measures when there are adverse impacts on physical cultural resources.	Yes
OP 4.10 Indigenous Peoples	Screen to determine presence of indigenous peoples in project area. Policy triggered whether potential impacts are positive or negative. Design mitigation measures and benefits that reflect indigenous people's cultural preferences.	No
OP 4.12 Involuntary Resettlement	Assist displaced persons in their effort to improve or at least restore their standards of living. Avoid displacement where feasible or minimise. Displaced persons should be provided with opportunities for participation in the project. Pay compensation for affected assets at replacement cost through an approved RAP.	No
OP 4.37 Safety of Dams	For large dams, technical review and periodic safety inspections by independent dam safety professionals.	No
OP 7.50 Projects on International Waterways	Ascertain whether riparian agreements are in place, and ensure that riparian states or communities are informed of and do not object to project interventions.	No
OP 7.60 Projects in Disputed Areas	The World Bank may support a project in a disputed area if governments concerned agree that, pending the settlement of the dispute, the project proposed for one country should go forward without prejudice to the claims of the other country.	No

Every project is subject to a preliminary environmental and social review based on the type, location, degree of sensitivity, scale, nature and extent of its potential environmental and social impacts, which is class in one of the following categories:

- ***Category A:*** Project that is likely to have very negative, nerve, diverse or unprecedented impacts on the environment.
- ***Category B:*** Project whose adverse effects on the population or areas of environmental importance (land, forests, and other natural habitats, etc.) are moderate.
- ***Category C:*** Project whose likelihood of negative environmental impacts is considered minimal or zero.

The ACE Impact Project is classified as "category B", because its adverse effects on the population or areas of environmental importance are ***limited, site-specific, and likely reversible***, and mitigation measures can be more ***easily designed/implemented***.

Among all the World Bank environmental and social safeguard policies, ***two Operational Policies (OPs) and Bank Procedures (BPs) are triggered under the ACE Impact Project***, namely:

- ***OP 4.01 Environmental Assessment***, which covers impacts on the environment (air, water and land), human health and safety, physical cultural resources, and global transboundary and environmental issues. OP 4.01 is triggered because the Project is likely to have environmental risks and impacts on its area of influence. This policy requires that environmental and social consequences be identified early in the project cycle and considered in the selection, location, planning, and design of the project to minimize, prevent, reduce, or compensate for adverse impacts and thereby maximize positive impacts and include processes for mitigation and management of environmental and social impacts during the project cycle.

- ***OP 4.11 Cultural Physical Resources***, which provides cultural heritage guidelines to avoid or mitigate adverse impacts of development projects. This policy applies to the following projects: (i) any project involving major excavation, demolition, earthworks, flooding or other environmental modifications; (ii) any project located on or near a site recognized as cultural property; (iii) any project designed to support the management or conservation of physical cultural property. As part of the ACE Impact project, this will also concern buildings of historical value and which would be the subject of rehabilitation works. The construction companies will follow key procedures of the *Cultural Heritage in Environmental Assessment. Environmental Assessment Sourcebook* (1994), prepared by the World Bank.

However, under the ACECoR Project the following will also be used:

- The World Bank Group's Environmental, Health and Safety Guidelines.
- The 2010 Access to Information Policy for wide dissemination of all information concerning the nature and objectives of a project.
- The World Bank Group Guidelines on Labor Influx.

3.7.2 Environmental and Social Standards (ESS)

The World Bank has ten (10) ESS that are used to examine the potential environmental and social risks and benefits associated with Projects sponsored or financed by the Bank. The Project is committed to meeting the World Bank's Environmental and Social Standards (ESS). These are listed below:

- ESS 1: Assessment and Management of Environmental and Social Risks and Impacts;
- ESS 2: Labour and Working Conditions;
- ESS 3: Resource Efficiency and Pollution Prevention and Management;
- ESS 4: Community Health and Safety;
- ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities;
- ESS 8: Cultural Heritage;
- ESS 9: Financial Intermediaries; and
- ESS 10: Stakeholder Engagement and Information Disclosure.

Only ESS 1, 2, 3, 4, 6, 8 and 10 are relevant and applicable to this project. However, the Project will be guided by the recommendations stipulated in ESS 5, 7 and 9. The ESS are summarised below.

ESS 1: Assessment and Management of Environmental and Social Risks and Impacts: This standard evaluates the potential environmental and social risks and impacts associated with each stage of a project (the project life cycle) in its area of influence. It examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, reducing, mitigating, or compensating for adverse environmental and social impacts and enhancing positive impacts. It includes the process of mitigating and managing adverse impacts throughout the project implementation so that the project is environmentally and socially sound and sustainable. ESS 1 considers the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous people, and physical cultural resources); and trans-boundary and global environmental aspects.

Applicability to the Project: The standard provides guidance on assessing the Project's potential environmental risks and impacts, evaluate alternatives and addressing potential impacts through planning and mitigation hierarchy approach.

ESS 2: Labor and Working Conditions: The World Bank through the ESS 2 promotes the fair treatment, non-discrimination and provision of equal opportunities for workers engaged on projects it supports. It strongly encourages protection of all project workers, including vulnerable groups such as women, persons with disabilities, children (of working age) and migrant workers, contracted workers and primary supply workers, as appropriate. It provides certain requirements that the project must meet in terms of working conditions, protection of the work force (especially the prevention of all forms of forced and child labour), and provision of a grievance mechanism that addresses concerns on the project promptly and uses a transparent process that provides timely feedback to those concerned.

Applicability to the Project: The standard provides guidance on promoting the safety and health of the project workers and recognises the need of the project to create employment and income generation opportunities that will lead to poverty alleviation and economic growth of project stakeholder communities.

ESS 3: Resource Efficiency and Pollution Prevention and Management: The ESS 3 provides requirements for projects to achieve the sustainable use of resources, including energy, water and raw materials, as well as implement measures that avoids or reduces pollution resulting from project activities. The standard places specific consideration on hazardous wastes or materials and air emissions (climate pollutants) given that the current and projected atmospheric concentration of greenhouse gases threatens the welfare of present and future lives.

Applicability to the Project: The project is expected to through this standard, avoid or limit all sources of pollution to air, water and land as a result of the project. The project will adopt efficient and effective resource use, pollution prevention and mitigation or management technologies and practices.

ESS 4: Community Health and Safety: This standard recognizes that project activities, project equipment and infrastructure often increase the exposure of project stakeholder communities to various health, safety and security risks and impacts and thus recommends that projects implement measures that avoids or limits the occurrence of such risks. It provides further requirements or guidelines on managing safety, including the need for projects to undertake safety assessment for each phase of the project, monitor incidents and accidents and preparing regular reports on such monitoring. ESS 4 also provides guidance on emergency preparedness and response.

Applicability to the Project: The project will therefore be guided by this standard in managing and/or addressing issues relating to the health and safety of the project stakeholder, with particular attention to people who, because of their particular circumstances, may be vulnerable.

ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement: It is recognized that project-related land acquisition causes physical displacement and economic displacement or both which often leaves adverse impacts on communities and affected persons. Involuntary resettlement is triggered in situations involving involuntary taking of land or involuntary restrictions of access to the use of land, including cases where people or communities may have traditional or customary tenure or recognizable usage rights. ESS 5 aims at avoiding involuntary resettlement to the extent feasible, or to reduce its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The standard prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

Applicability to the Project: The project will not involve land acquisition, since the project will be undertaken on the university campus and the land is owned by the university. However, the Project will be guided by the recommendations stipulated in this standard in the event of project-related land acquisition and restrictions on land.

ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: ESS 6 promotes the conservation of biodiversity or natural habitats. The World Bank supports the protection and maintenance of the core ecological functions of natural habitats and the biodiversity they support. The World Bank encourages projects to incorporate into their development, environmental and social strategies that addresses any major natural habitat issues, including identification of important natural habitat sites, the ecological functions they perform, the degree of threat to the sites, and priorities for conservation.

Applicability to the Project: The project will be guided by this standard and will consider the views, roles, and rights of groups, including local non-governmental organizations (NGOs) and local stakeholder communities, and involve such in planning, designing, implementing, monitoring, and evaluating the project. Involvement may include identifying appropriate conservation measures, managing protected areas and other natural habitats, and monitoring and evaluating specific actions.

ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities: ESS 7 addresses distinct social and cultural groupings such as "indigenous ethnic minorities" or "vulnerable and marginalized groups" and encourages that development projects provide benefits for all, irrespective of unique cultural identities and aspirations that are distinct from mainstream groups in a given society. The standard discourages the marginalization of men, women and children in indigenous cultures often different from mainstream groups and advocates for their inclusion in consultation processes about the design and implementation of projects, as well as respect for their human rights, dignity, identity and culture.

Applicability to the Project: There are no indigenous people or underserved traditional local communities within the project area. However, the project will be guided by this standard in achieving that objective.

ESS 8: Cultural Heritage: This standard sets out general provisions on cultural heritage preservation and recommends protecting cultural heritage from the adverse impacts of project activities. It addresses physical or tangible cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be in urban or rural settings, and may be above or below ground, or under water. It also addresses intangible cultural heritage such as practices, representations, expressions, instruments, objects and cultural spaces that communities recognize as part of their cultural heritage. Projects involving significant excavations, demolition,

movement of earth, flooding, or other environmental changes are to take cognizance of this standard in the ESIA.

Applicability to the Project: Although the Project will take place in an existing university campus that has been disturbed in the past, the Project will need to still take cognizance of tangible and intangible cultural heritage sites and items, including potential archaeological heritage within the project's area of influence. The Project will adopt measures such as undertaking meaningful consultations with stakeholders regarding cultural heritage and implementing basic mitigation measures at the construction phase, such as a chance find procedure.

ESS9: Financial Intermediaries (FIs): This standard recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. FIs are required to monitor and manage the environmental and social risks and impacts of their portfolio and FI subprojects, and monitor portfolio risk, as appropriate to the nature of intermediated financing. The way in which the FI will manage its portfolio will take various forms, depending on a number of considerations, including the capacity of the FI and the nature and scope of the funding to be provided by the FI.

Applicability to the Project: There are no FIs involved in this project. However, the project will be guided by this standard when applicable.

ESS 10: Stakeholder Engagement and Information Disclosure: The World Bank through the ESS 10 seeks to encourage open and transparent engagement between the Borrower and the project stakeholders (project-affected parties) throughout the project life cycle. The standard establishes a systematic approach to stakeholder engagement that potentially helps the Borrower to identify stakeholders and build and maintain a constructive relationship with them, as well as disclose information on the environmental and social risks and impacts to stakeholders in a timely, understandable, accessible and appropriate manner and format. It recommends that stakeholder engagements are commenced as early as possible in the project development process and continued throughout the lifecycle of the Project. This allows for stakeholders' views to be considered in the project design and environmental and social performance. The Borrower is also expected to implement a grievance mechanism to receive and facilitate resolution of concerns and grievances.

Applicability to the Project: The Project will engage with various stakeholders at the project design, planning and project implementation stages. The Project will be guided by this standard in undertaking all project-related consultations and engagements given that this enhances the environmental and social sustainability of the Project.

CHAPTER 1

4.0 Environmental and Socioeconomic Baseline

The project will be located within the University of Cape Coast (UCC) which is in the Cape Coast Metropolitan Assembly (CCMA) in the Central Region of Ghana. CCMA is bordered by the Gulf of Guinea to the south, Komenda- Edina- Eguafo- Abirem Municipal Assembly to the west, Abura- Asebu- Kwamankese District to the east and Twifo-Heman- Lower Denkyira District to the north. The Municipality covers a total land area of approximately 122 sq. km and lies within latitude 5°. 07^{l} to 5°.17^{l} (check) north of the Equator and between longitudes 1°. 11^{l} to 1°.41^{l}west of the Greenwich Meridian.

4.1 Natural Environmental Conditions

4.1.1 Topography

The land in the Metropolis is generally hilly with valleys in between the hills. The site is flat and 43 feet above sea level.

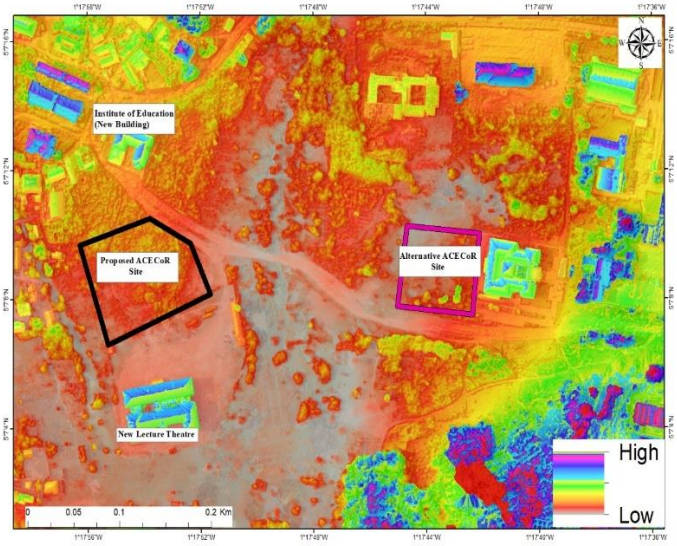

Figure 4-1: Surface model of the proposed site of ACECoR Building

4.1.2 Soils and Geology

The rock type of the metropolis is of the Birimian formation and consists of schist and introduced granites and pegmatite. The types of soil series found in the Municipality include Chichiwere-Kakum, Ayensu- Chichiwere and Achenfu- Kuntu- Suprudu. The soil on the site is laterite.

4.1.3 Climate

Temperature: The temperature in the metropolis varies between 24°c and 32°c. The hottest months are February and March, just before the main rainy season, while the coolest months are June, July and August.

Humidity: The relative humidity is between 60% and 80%.

Precipitation: There are two seasons of rainfall with peaks in May- June and October with annual rainfall total volume ranging between 750mm and 1,000mm. The variability in climate in the metropolis is influenced more by rainfall than temperature.

4.1.4 Ambient Air

Ambient air quality is satisfactory at the site. There are no activities within the UCC and immediate environs that generate excessive dust and emissions. The only source of emission is from moving vehicles. During the hamattan/dry season dust levels may be elevated due to the influence of the north east trade winds.

4.1.5 Noise Levels

The range of ambient noise level measurements recorded inside the University of Cape Coast are within the guidelines of the Ghana EPA (Table 4-1).

Table 4-1: Ambient Noise Level Guidelines of the Ghana EPA

DESCRIPTION OF AREA OF NOISE RECEPTION	**MAXIMUM RECORDED NOISE LEVEL dB (A)**		**PERMISSIBLE NOISE LEVEL dB (A)**	
	DAY 0600 – 2200	NIGHT 2200 – 0600	DAY 0600 – 2200	NIGHT 2200 – 0600
Faculty areas	40	10	55	50
Area with some commercial activities	50	30	60	55
Areas with entertainment or public assembly and place of worship such as churches and mosques	60	78	65	60
Areas of residence - Halls at the University of Cape Coast	30	45	55	48

4.1.6 Hydrology

The major stream and river in the Metropolis are Siwere and Kakum respectively. Lagoons include the Fosu. Rivers and streams end up in wetlands and finally drain into the Fosu Lagoon at Bakaano and the sea at Abakam. Figure 4-2 shows the map of Cape Coast, Fosu lagoon, and some of its settlements.

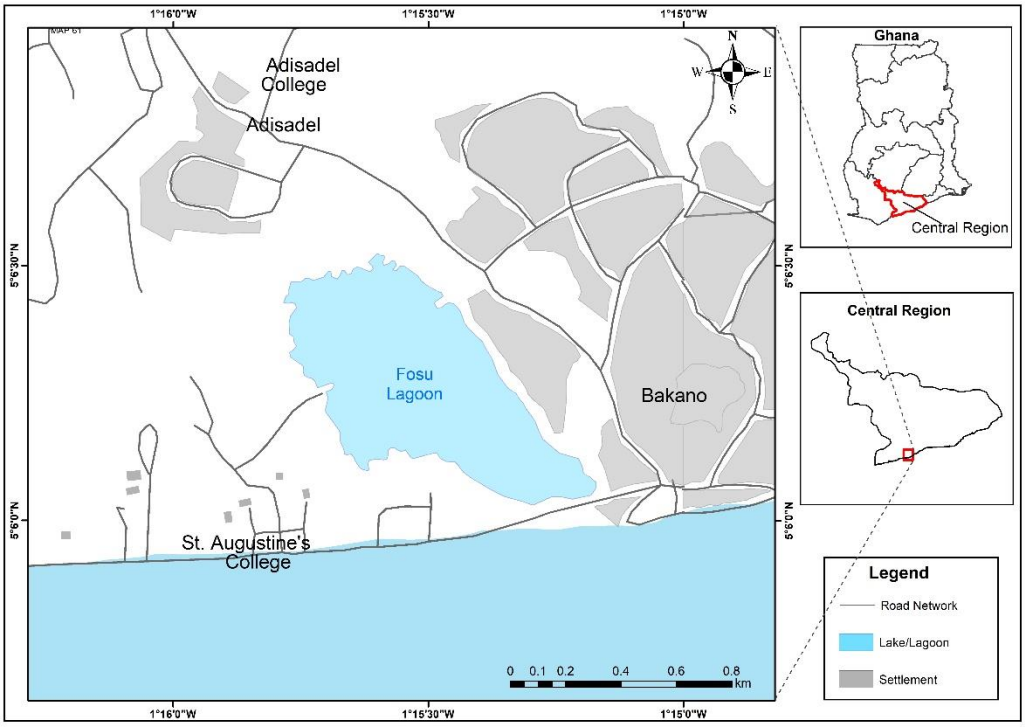

Figure 4-2: Map of Cape Coast showing the Fosu Lagoon and some settlements (Source: Nature Today, 2019)

4.1.7 Vegetation and Flora Survey

The coastal area falls under two main vegetation zones, forest and savanna. The vegetation of the Metropolis is mainly secondary forest with thickets and shrubs growing to a mean height of 4.5 m.

The original vegetation of the project site within the University of Cape Coast has been degraded primarily due to the previous clearance of the vegetation on site for the establishment of various infrastructure found in the surroundings of the proposed project site. Most of the plant families contain very low numbers (table 4-2). The physiognomy of the original vegetation has been destroyed leading to the preponderance of early stages secondary succession species. The star rating of the flora revealed that most of the species are of low conservation status or have not been star rated. It is recommended that conscious effort should be made to plant trees in unused spaces after the construction of the proposed project.

Table 4-2: Plant species of the study area

Species name	**Family**	**Life form**	**Star rating**	**Ecological guild**
Acacia mangium Willd.	Mimosaceae	Tree sapling	NA	NA
Ageratum conyzoides L.	Asteraceae	Herb	NA	Pioneer
Alchornea cordifolia (Schum. & Thonn) Muell.Arg	Euphorbiaceae	Shrub	Green	Pioneer
Andropogon gayanus Kunth.	Poaceae	Herb	NA	NA
Aspilia africana (Pers.) C.D.Adams	Asteraceae	Climber	NA	Pioneer
Azadirachta indica A.Juss.	Meliaceae	Tree	NA	Non forest

Baphia nitida Lodd.	Papilionaceae	Tree sapling	Green	SB
Bidens pilosa L.	Asteraceae	Herb	NA	Pioneer
Boerhavia diffusa L.	Nyctaginaceae	Herb	NA	Pioneer
Bracharia deflexa (Schum.) C.E.Hubbard ex Robyns	Poaceae	Herb	NA	Pioneer
Bryophylum pinnatum (Lam) Kuntz.	Crassulaceae	Herb	NA	NA
Caesalpina pulcherrima (Linn.) SW.	Caesalpinaceae	Shrub	NA	NA
Calopogonium mucunoides Desv.	Papilionaceae	Herb	NA	Pioneer
Capsicum frutescens L.	Solanaceae	Herb	NA	Pioneer
Cassia occidentalis L.	Caesalpiniaceae	Shrub	NA	Pioneer
Ceiba pentandra Gaertn.	Bombaceae	Tree	Green	Pioneer
Centrosema pubescens Benth.	Papilionaceae	Climber	Green	Pioneer
Chromolaena odorata (L.) King & Robinson	Asteraceae	Shrub	Green	Pioneer
Coix lacryma-jobi L	Poaceae	Herb	NA	Pioneer
Combretum racemosum P. Beauv.	Combretaceae	Climber	Green	Pioneer
Commelina benghalensis L.	Commelinaceae	Herb	Green	Pioneer
Crotalaria retusa L.	Papilionaceae	Herb	NA	Pioneer
Cynodon dactylon (L.) Pers.	Poaceae	Herb	NA	NA
Cyperus rotundus L.	Cyperaceae	Herb	NA	Pioneer
Dactyloctenium aegyptium (L.) P.Beauv.	Poaceae	Herb	NA	NA
Desmodium adscendens (Sw.) DC.	Papilionaceae	Herb	NA	Pioneer
Digitaria horizontalis Willd.	Poaceae	Herb	NA	Pioneer
Dissotis rotundifolia (Sm.) Triana	Melastomataceae	Herb	Green	Pioneer
Echinochloa cruspavonis (Kunth) Schult.	Poaceae	Herb	NA	Pioneer
Elaeis guineensis Jacq.	Palmaceae	Tree	Pink	Pioneer
Eleusine indica (L.) Gaertn.	Poaceae	Herb	NA	Pioneer
Emilia coccinea (Sims) G.Don.	Asteraceae	Herb	NA	Pioneer
Euphorbia heterophylla L.	Euphorbiaceae	Herb	NA	Pioneer
Euphorbia hirta L.	Euphorbiaceae	Herb	Green	Pioneer
Euphorbia prostrata L.	Euphorbiaceae	Herb	NA	Pioneer
Fluerya aestuans (L.) ex Miq.	Urticaceae	Herb	NA	NA
Hewittia sublobata L	Convolvulaceae	Climber	NA	Pioneer
Hibiscus esculentus L.	Malvaceae	Herb	NA	NA
Hilleria latifolia (Lam) H. Walt	Phytolaccaceae	Herb	NA	NA
Hyptis suaveolens Poir	Lamiaceae	Herb	NA	NA
Ipomoea involucrata L.	Convolvulaceae	Climber	NA	Pioneer
Ischaemum rugosum Salisb.	Poaceae	Herb	NA	Pioneer
Leptochloa caerulescens Steud.	Poaceae	Herb	NA	Pioneer
Lycopersicum esculentum Mill.	Solanaceae	Herb	NA	NA
Mallotus oppositifolius (Geisel.) Muell.Arg.	Euphorbiaceae	Tree	Green	SB
Mangifera indica L	Anacardiaceae	Tree seedling	NA	Non forest
Manihot esculenta Crantz.	Euphorbiaceae	Shrub	NA	NA
Maniophyton fulvrum Mull. Arg.	Euphorbiaceae	Liana	Green	NPLD
Melanthera scandens (Schum. & Thonn.) Roberty	Asteraceae	Climber	NA	Pioneer
Melochia corchorifolia L.	Sterculiaceae	Herb	NA	Pioneer
Mimosa nigra L.	Mimosaceae	Herb	NA	Pioneer
Mimosa pudica L.	Mimosaceae	Herb	NA	Pioneer
Mollugo verticillata L.	Molluginaceae	Herb	NA	Pioneer

Momordica charantia L.	Cucurbitaceae	Climber	NA	Pioneer
Morinda lucida Benth.	Rubiaceae	Tree sapling	Green	Pioneer
Musa paradisiaca L.	Musaceae	Herb	NA	NA
Mussaenda elegans Schum. & Thonn.	Rubiaceae	Climber	Green	Pioneer
Panicum laxum Jacq.Sw. PR.Br.	Poaceae	Herb	NA	Pioneer
Panicum maximum Jacq.	Poaceae	Herb	Green	Pioneer
Paspalum conjugatum Berg.	Poaceae	Herb	NA	Pioneer
Paspalum scrobiculatum L.	Poaceae	Herb	NA	Pioneer
Pauzolzia guineensis Benth	Urticaceae	Herb	NA	NA
Pennisetum polystachion (L.) Schult.	Poaceae	Herb	NA	Pioneer
Phyllantus amarus Schum. et. Thonn.	Solanaceae	Herb	NA	Pioneer
Physalis angulata L.	Solanaceae	Herb	NA	NA
Physalis micrantha Link	Solanaceae	Herb	NA	NA
Rottboellia cochinchinensis (Lour.) W.Clayton	Poaceae	Herb	NA	Pioneer
Schrankia leptocarpus DC.	Mimosaceae	Herb	NA	Pioneer
Schwenckia americana L.	Solanaceae	Herb	NA	Pioneer
Setaria barbata (Lam) Kunth.	Poaceae	Herb	NA	Pioneer
Sida acuta Burn. F.	Malvaceae	Herb	NA	Pioneer
Sida cordifolia L.	Malvaceae	Shrub	NA	NA
Sida rhombifolia L.	Malvaceae	Shrub	NA	Pioneer
Solanum nigrum L.	Solanaceae	Herb	NA	Pioneer
Solanum torvum Sw.	Solanaceae	Herb	NA	Pioneer
Spigelia anthelmia l.	Loganiaceae	Shrub	NA	Pioneer
Starchytarpheta indica (L.) Vahl.	Verbenaceae	Shrub	NA	Pioneer
Talinum triangulare (Jacq.) Willd.	Portulacaceae	Herb	NA	Pioneer
Tridax procumbens L.	Asteraceae	Herb	NA	Pioneer
Urena lobata L.	Malvaceae	Herb	NA	Pioneer
Vernonia cinerrea (L.) Less.	Asteraceae	Herb	NA	Pioneer
Xanthosoma sagittifolium (L.) Schoott	Araceae	Herb	NA	NA
Zea mays L.	Poaceae	Herb	NA	NA

Table 4-3: Family, number of plant species and relative diversity

Family	**Number of species**	**Relative diversity**
Poaceae	18	21.69
Asteraceae	8	9.64
Solanaceae	8	9.64
Euphorbiaceae	7	8.43
Malvaceae	5	6.02
Papilionaceae	5	6.02
Mimosaceae	4	4.82
Caesalpinaceae	2	2.41
Convolvulaceae	2	2.41
Rubiaceae	2	2.41
Urticaceae	2	2.41
Araceae	1	1.21
Bombaceae	1	1.21
Combretaceae	1	1.21
Commelinaceae	1	1.21
Crassulaceae	1	1.21

Cucurbitaceae	1	1.21
Cyperaceae	1	1.21
Lamiaceae	1	1.21
Loganiaceae	1	1.21
Meliaceae	1	1.21
Molluginaceae	1	1.21
Musaceae	1	1.21
Nyctaginaceae	1	1.21
Palmaceae	1	1.21
Phytolaccaceae	1	1.21
Portulacaceae	1	1.21
Sterculiaceae	1	1.21
Verbenaceae	1	1.21
Anacardiaceae	1	1.21
Melastomataceae	1	1.21

Table 4-4: Distribution of the plant species among various life forms

Life form	**Number of species**	**Proportion of species (%)**
Herbs	57	68.68
Shrubs	9	10.84
Trees	8	9.64
Climbers	8	9.64
Liane	1	1.20
Total	**83**	**100**

Table 4-5: Star rating of plant species of the study area

Star rating	**Number of species**	**Proportion of species (%)**
Green	14	16.87
Pink	1	1.20
Not Available	68	81.93
Total	**83**	**100**

Table 4-6: Ecological guild of plant species of the study area

Guild	**Number of species**	**Proportion of species**
Pioneer	59	71.08
SB	2	2.41
NPLD	1	1.21
Non Forest	2	2.41
Not Available	21	22.89
Total	**83**	**100**

4.1.8 Fauna Survey

Four species of small mammals distributed in four different families were recorded in this study. The species were *Arvicanthis niloticus*, *Cricetomys gambianus*, *Euxerus erythropus* and *Thyronomys swinderianus* of the Muridae, Nesomyidae, Sciuridae and Thryonomyidae families respectively

(Table 4-7). The IUCN classification of the mammalian species in this study shows that all the species are of least concern. The lack of vegetation on the site and the activities of the nearby community members have contributed to the near absence of fauna in the proposed project site. The study has revealed that the mammalian species obtained in this study are of no threat globally and nationally.

Table 4-7: Mammals of the study area and their conservation status

Family	Species Name	IUCN Conservation Status
Muridae	*Arvicanthis niloticus* (African grass rat) – sighting	Least concern
Nesomyidae	*Cricetomys gambians* (Giant gambian rat) – hole, sighting, trapped	Least concern
Sciuridae	*Euxerus erythropus* (Squirrel) sighting	Least concern
Thyronomyidae	*Thyronomys swinderianus* (Grass cutter) – trapped, faeces	Least concern

Thryonomys swinderianus trapped in a thicket near the site

Gambian rat trapped by a farmer in nearby cassava farm.

Faeces of *Thyronomis swinderianus*

Hole of entrance of *Cricetomys gambianus*

Figure 4-3: Photos of some animal species identified on the proposed project site

4.2 Socio-Economic Characteristics

4.2.1 Population

The population of the Central Region is 2,521,118. Out of this, 1,202,371 (47.7%) are males and 1,318,747 (52.3%) are females. The population of the Metropolis according to 2010 population and housing census stands at 169,894 with 82,810 male and 87,084 females. The metropolis is resident to a large floating student's population because of the existence of many educational institutions and a seasonal influx of tourists. The number of regular students at the University of cape Coast is estimated at 21,864.

4.2.2 The Local Economy

About 54.7% of the population aged 15 years and older in the central region are economically active while 45.3% are economically not active. Of the economically active population, 90.7% are employed while 9.3% are unemployed. Of the employed population, about 32.5% are into sales and services. Apart from this, there are artisans (23.6%), professionals (13.2%) and those in agriculture and related employment (6.8%).

4.2.2.1 Agriculture and Fisheries in the Cape Coast Metropolis

Farmers and fishermen as well as those into agricultural-related activities form about 60% of the population (Statistical Services, 2000 population census).

Active agricultural population is approximately 28,000. Commercial farmers are approximately 0.3% and peasants (majority) approximately 99.7%. The available land for agriculture is about 8,000 Ha. This implies that higher levels of production could be achieved for crops to meet both domestic and export market. About 3,500 Ha is currently under cultivation, with more available for expansion or development. Land holding, however, is less than 1ha for most farmers. Major tree crops in the Metropolis are oil palm, citrus and coconut (Table 4-8) and the major staple crops are cassava, plantain and maize (Table 4-9). Poultry is the major livestock production in the Metropolis (Table 4-10)

Marine fishing is another major activity along the coast. Mainly canoes and few motorized vessels do this. The commonest marine fish catch is the Anchovy, followed by Round sardinella (Table 4-11). The commonest fish catch in the lagoon is the blackchin tilapia constituting about 90% of total fish catch in terms of weight (Baffour-Awuah, 2012).

Table 4-8: Major Tree Crops in the Cape Coast Metropolis

CROP	AREA (HA) UNDER PRODUCTION	AVERAGE YIELD MT/HA	ANNUAL PRODUCTION (MT)
Oil Palm	90	7.5	675
Citrus	738.64	11.47	8,474.65
Coconut	22	5	110

Source: Ministry of Food and Agriculture (http://mofa.gov.gh/site/?page_id=1453)

Table 4-9: Major Staple Crops in the Cape Coast Metropolis

CROP	AREA (HA)	AVERAGE YIELD MT/HA	ANNUAL PRODUCTION MT/HA
Maize	678	1.83	1,240.7
Cassava	736	14.12	10,392.32
Sweet potato	55	10.2	561
Plantain	134	8.95	868.15
Groundnut	10	0.60	6.0
Tomato	45	0.16	7
Pepper	91	0.088	8
Egg Plants	52	0.09	5
Cabbage	10	0.60	6
Lettuce	5	0.17	0.85
Carrot	4	0.57	2.3

Source: Ministry of Food and Agriculture (http://mofa.gov.gh/site/?page_id=1453)

Table 4-10: Livestock Production in the Cape Coast Metropolis

TYPE OF LIVESTOCK	NUMBERS
Cattle	110
Sheep	18,000
Goat	24,000
Pig	400
Poultry (improved)	45,000
Grasscutter	54
Local birds	63,000
Ducks	115
Rabbit	50

Source: Ministry of Food and Agriculture (http://mofa.gov.gh/site/?page_id=1453)

Table 4-11: Marine Fishcatch in the Cape Coast Metropolis

TYPE OF FISH	ANNUAL TOTAL (kg)
Anchovy	7,582.56
Barracuda	6.07
Bumper	453.10
Burrito	44.00
Burro	233.93
Cassava/ croaker	74.97
Decapterus (pamplo)	694.67
Frigate mackerel	736.28
Horse mackerel	493.45
King fish	9.44
Long- finned herring	135.54
Meagre	176.12
Moonfish	280.68
Pampano	324.40
Ribbon fish	504.38
Rancador	23.64
Round sardinella	1,836.14
Scald mackerel	67.31

Chub mackerel	74.51
Sharks	2.23
Shrimps	189.12
Threadfin	24.78
Miscellaneous	178.13

Source: Ministry of Food and Agriculture (http://mofa.gov.gh/site/?page_id=1453)

4.2.3 Social Amenities

The Metropolis is home to nine senior high schools, one technical university, one college of education, two nursing training colleges and two universities. Also, there are two large castles that mirror the historical development of this country and which are classified by UNESCO as world heritage monuments.

The University of Cape Coast is home to several infrastructure which serve as social facilities to enhance teaching and learning. These include hospitals, clinics, churches, mosques, schools, police station and fire service station (See Figure 4-4).

Our Lady Seat of Wisdom Catholic Church
This church seats 500 people and is located about 874.3 metres away from the proposed site for ACECoR.

University Interdenominational Church
The University Interdenominational Church (UIC) is adjacent the Catholic Church which has a seating capacity of about 500 people. UIC is distanced about 858.6 m from the proposed site.

Mosque. The Mosque on UCC campus is located about 1.09 km from the proposed site. This is the only place of worship for Muslim student and faculty on campus.

Students' Clinic located about 861.2 m from the proposed ACECoR site.

UCC Hospital. It is located about 2.35 km from the proposed location.

UCC Primary School. The primary school is located at 2.56 km from the proposed site.

Community School at Kwaprow. This is about 648.3 m from the site.

UCC stadium. The Stadium is located behind the University Hospital and lies adjacent the UCC primary School. It is distanced about 2.5km from the proposed site.

Students Residence. University Alumni Hall approximately 1.08 km from the site

Figure 4-4: Social Amenities within the University of Cape Coa

5.0 PROJECT ALTERNATIVES

The consideration of alternatives to a proposal is a requirement of the national Environmental Impact Assessment process and methodology. During the scoping process, alternatives to a proposal can be generated or refined, either directly or by reference to the key issues identified. A comparison of alternatives will help to determine the best method of achieving project objectives while minimizing environmental impacts or, more creatively, indicate the most environmentally friendly or best practicable environmental option. In order to enable the proposed project to seek different ways of minimizing its impacts on the environment and at the same time achieve its objectives several alternatives were assessed through its architectural and engineering designs and environmental planning through this EIA. The alternatives considered as part of the conception of this project are:

i. No action scenario;
ii. Project implementation scenario - Alternative Sites 1&2
iii. Project implementation scenario – Alternative site 3
iv. Refurbishment of the existing Fort St. Jago, Elmina in the Central Region
v. Alternative Schedule
vi. Alternative Design

5.1 No Action Scenario

The "No Action Scenario" assumes that the proposed project will not be implemented. This implies that there will be no construction of the ACECoR multi-purpose educational complex. This implies that the ACECoR will have to make do with the small office space allocated to them within the College of Education Studies Lecture Theatre Building University of Cape Coast. Obviously, this will not lead the project to achieve its overall developmental objective. If the status quo prevails, there will be no adverse environmental and social impacts such as noise and waste generation as well as accidents and occupational health and safety risks associated with the construction phase.

From an environmental perspective, not carrying out this development may be the best option. Without the development, the area would remain a relatively undisturbed area providing a habitat for the varied flora and fauna presently observed. This area will continue to be impacted, although minimally, by anthropogenic and natural factors. From the educational and socio-economic perspective, the "no action" alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realised and the educational and capacity within the university of Cape Coast resources will be underutilized.

5.2 Refurbishment of the existing Fort St. Jago, Elmina

The University of Cape Coast is desirous of establishing a cooperative agreement with the Ghana Museums and Monuments Board (GMMB) to create and expand opportunities for outstanding educational and outreach programmes in coastal conservation in Ghana. This proposal is made by the University of Cape Coast to partner the Ghana Museums and Monuments Board for the joint use and maintenance of Fort St. Jago to pursue common goals. The partnership will reinforce the commitment of both institutions to serve the government and people of Ghana by developing

sustainable coastal environmental programmes, promote tourism, encourage fisheries management, conserve biodiversity and work with stakeholders towards alleviating poverty in coastal areas. Given the strategic locations of the University and the Fort (Figure 5-1), the University invited the Ghana Museums and Monuments Board for partnership to promote these goals for mutual gains.

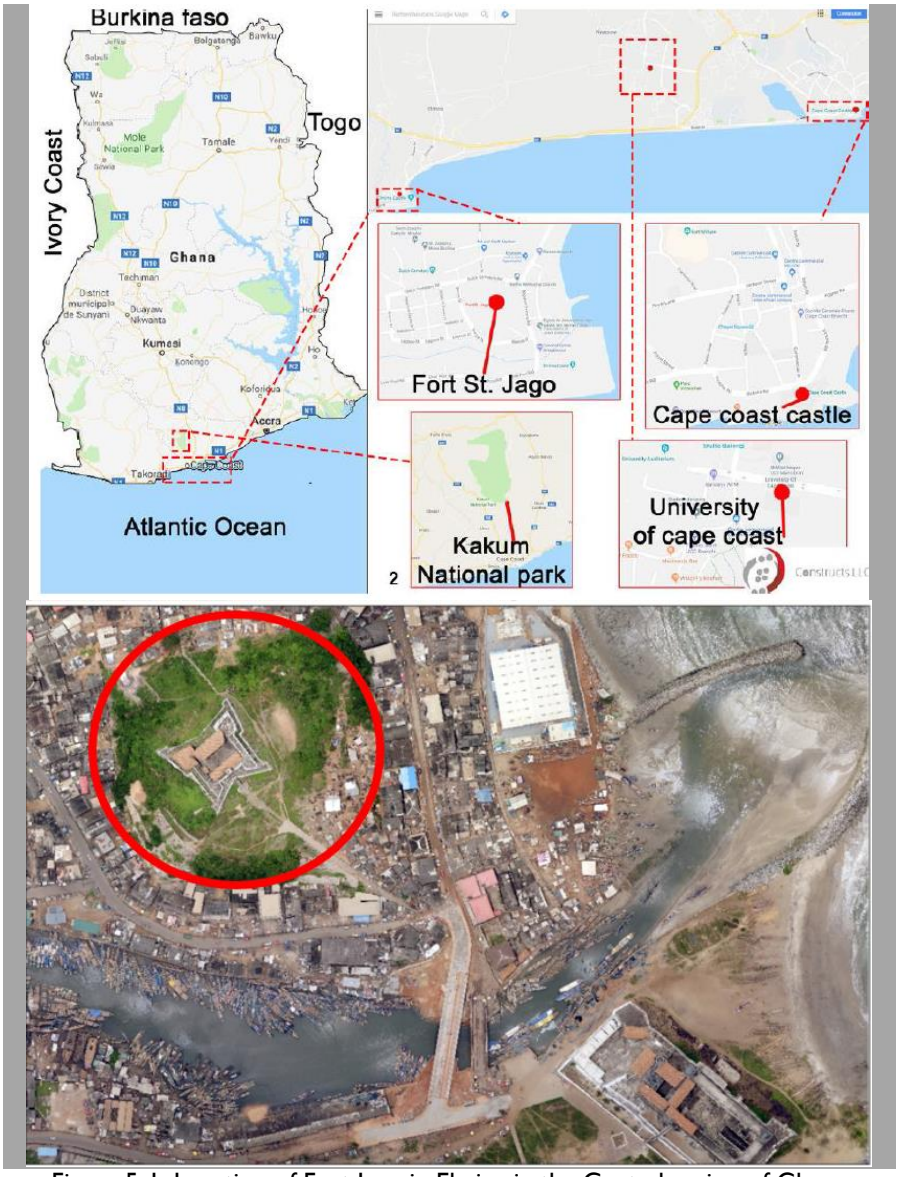

Figure 5-1: Location of Fort Jago in Elmina in the Central region of Ghana

Over the years, the Fort has been put to various uses such as a prison, hospital, and rest house. It is currently in fairly poor condition and not being put to any formal use. Its utility as Ghana's cultural heritage and its symbolism in human history is gradually being lost, dwindling its potential for tourism and income generation. There is therefore the urgent need to salvage the situation. To do so will require rehabilitation and redefinition of the use of the facility within the context

of history, culture, socio-economic activities and environmental needs of the local people as described in this proposal.

Unfortunately, after several months of perusing this option GMMB has not shown interest in the project and the Ministry of Tourisms, Culture and Creative Arts is not committed to the process and is unwilling to support this proposal. This means that this alternative cannot be further considered since availability of the Fort cannot be guaranteed.

5.3 Alternative Sites

Alternative Sites 1&2: This option involves pursuing the proposal but on different proposed sites. During this assessment three (3) alternative sites were identified. Two of the alternative sites identified were near the selected site. This means that the environmental and social impacts of the two alternative sites will not be significantly different from the selected site.

Figure 5-2: Aerial Photograph of the proposed and alternate sites for ACECoR

Alternative Site 3: The third alternative site which was proposed by the university had less disturbed natural environment, vegetation and soil. This implies that it will be more disruptive and has the potential to lead to significant loss of flora and fauna. This alternative is not seen as a sustainable option.

5.4 Alternative Schedule

This option entails carrying out the proposal at a later time thereby offsetting its impacts to that time. The benefit will be that, there may be improvements in baseline conditions and technologies that may be involved with the proposal. However, these are not guaranteed, and it may only lead to delays in development, therefore carrying out the proposed project with mitigation would be a preferred option due to this uncertainty. In addition, carrying out the proposed project at later time may lead to more operational and logistic costs due to increasing inflation and standards of living.

5.5 Alternative Designs

This option entails undertaking the project but with different infrastructural designs that encompass: buildings materials, and utilities.

Option 1: The architectural and engineering designs of this alternative design option makes the project prohibitively expensive and will require more space and will lead to loss of flora and fauna. This would mean the project would use more energy and resources as compared to the preferred project option. The positive environmental impact of this option is that it offers balance with nature that will create ambience.

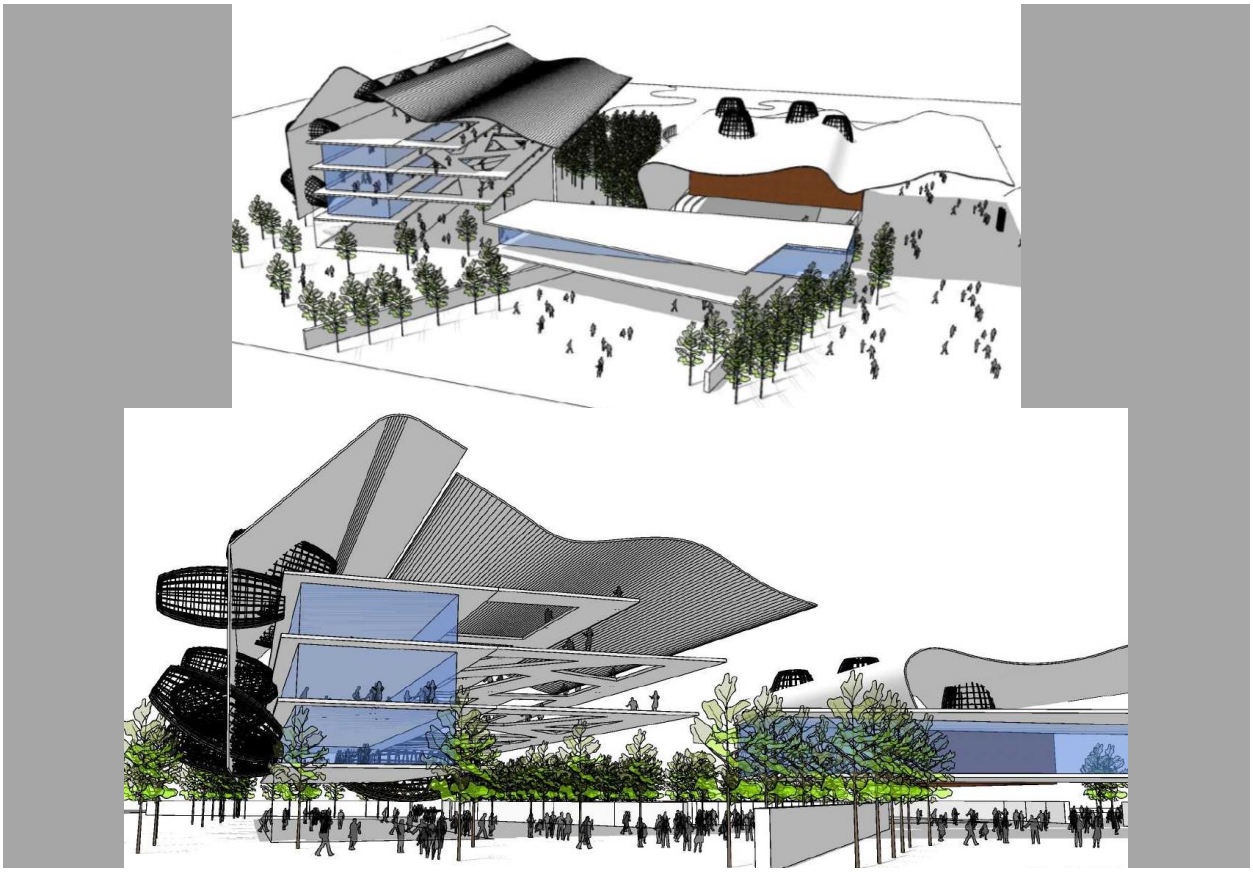

Figure 5-3: Alternative Design for the ACECoR multi-purpose educational building

Option 2: This project design and site option, which was achieved by considering the options available that would ensure cost-effectiveness and avoid or reduce environmental and social impacts as much as possible.

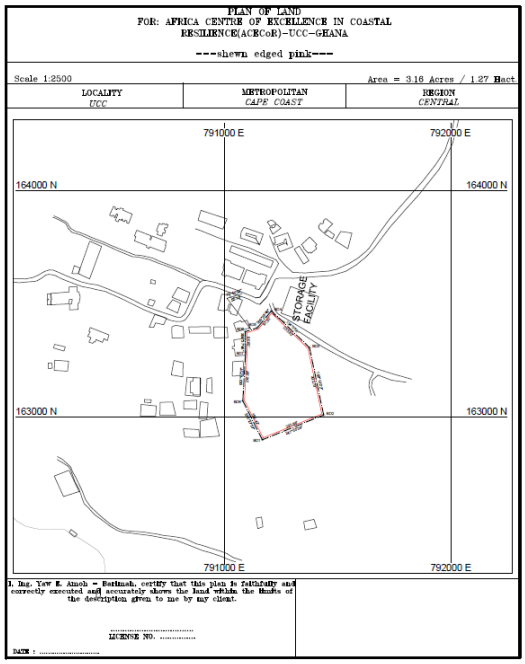

Figure 5-4: Preferred Alternative Design for the ACECoR multi-purpose educational building

Table 5-1: Qualitative scoring matrix of project alternative

Project Alternatives	**Severity of Negative Environmental Impact**
No action scenario	No impact
Project implementation scenario - Alternative Sites 1&2	Moderate
Project implementation scenario – Alternative site 3	Very High
Refurbishment of the existing Fort St. Jago, Elmina In the Central Region	Minor
Alternative Schedule	Moderate
Alternative Design – Option 1	High
Alternative Design – Option 2 (preferred)	Moderate

On the basis of the above qualitative scoring the Alternative design option 2 is the preferred option for this project. The Refurbishment of the existing Fort St. Jago, Elmina in the Central Region is not the preferred option because it can have significant impact on the cultural asset and the availability of the Fort cannot be guaranteed.

6.0 IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

This option is the preferred option for the construction of the multi-purpose building and it entails carrying out the proposal with mitigation measures to prevent, offset or avoid its negative impacts thereby maximizing it gains. This option would therefore lead to achieving the project's objectives sustainably. As compared to the other options this option uses the strengths of the other options thereby creating synergy and increasing the project's cost-effectiveness. This option also involves using the best available building materials and process to minimize risks to environmental and social systems in the area.

6.1 Impact Identification and Analysis

To assess the significance of the proposed project's impacts, the impacts were first identified from their source which are the project's activities/equipment/processes/materials and then the impact receptor which are the baseline environmental and social conditions. This was carried out through the use of the Impact Checklist (Table 6-1). This was also informed by the public participation exercise. The impacts were then classified as either positive or negative for each construction project phase. The impacts were lastly analysed in terms of their characteristics on the aforementioned baselines to define their significance by using a matrix and this was also informed by the public participation exercise to identify the acceptable risks. Lastly through literature reviews, professional knowledge, engagements with the proponent and engagements with stakeholders, mitigation measures were developed commensurate to the significance of impacts. This facilitated the development of the Environmental and Social Management Plan in this report. This entire process is illustrated through Figure 6-1.

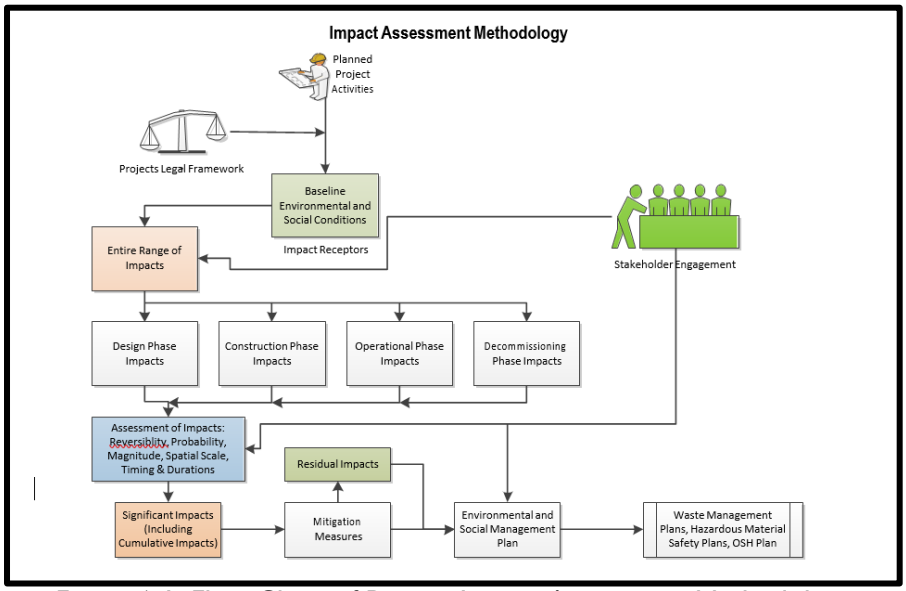

Figure 6-1: Flow Chart of Project Impact Assessment Methodology

Table 6-1: Checklist of Project's Likely Impacts

Environmental aspect	Design Phase	Construction Phase	Operational Phase	Decommissioning Phase
Water				
Pollution		✓	✓	✓
Surface flow		✓	✓	✓
Water Balance		✓		✓
Air				
Pollution		✓	✓	✓
Noise		✓	✓	✓
Soil				
Soil loss		✓		✓
Contamination		✓	✓	✓
Compaction		✓		
Bio-Diversity				
Loss of Flora		✓		
Loss of Fauna		✓		
Extinction of				
Habitat Alteration		✓		✓
Population and Social Dynamics				
Population size		✓	✓	
Diseases		✓	✓	✓
Quality of Life		✓	✓	
Employment		✓	✓	✓
Utilities		✓	✓	✓
Land uses		✓	✓	✓
Others				
Environmental	✓	✓	✓	✓
Economy	✓	✓	✓	✓
Landscape Design		✓		✓

KEY	✓	**Denotes an Impact**

6.1.1 Positive Impacts

The development of this project will have several significant positive impacts both locally and nationally. The many positive impacts would be sustained over the long term. In general, it will help fight poverty and boost shared prosperity, as well as encourage investment in knowledge and skills in all sub-sectors of education. The project will produce highly qualified human resources for priority growth sectors. More specifically, the project will promote awareness among all national stakeholders about the environmental and social issues of Project activities and respect for the environment and will promote key principles of sustainable development.

Build Capacity: The project will build and strengthen capacity in higher education. It will enhance skills development and knowledge generation (through applied research) to address development challenges. ACECoR will train 120 graduates at the postgraduate (PhD and Masters) levels in addition to 260 professionals (in short courses) across Africa in the areas already described. In addition to existing programmes of Disaster Risk Management and Migration, Fisheries Science, Oceanography and Limnology and Integrated Coastal Zone Management, new programmes in Physical Oceanography, Coastal and Marine Engineering, Forestry Engineering and Marine Meteorology will be developed and mounted for the training of postgraduate students.

Strengthening and Regionalizing Higher Education: ACECoR will recruit a high-quality regional student body and work towards a highly trained workforce with skills tailored to the needs of the sector; partnering with industry and sector stakeholders to identify regional needs; and disseminating research results both in internationally recognized publications and through appropriate regional channels.

Specifically, the following positive impacts will be achieved under the construction of the multi-purpose educational complex:

6.1.1.1 Design Phase

Creation of Employment and Business Opportunities: The design phase of the project will create employment and business opportunities for various professionals/consultants who will be involved in the planning stages of the project. They will include: project managers, engineers, architects, building economists, land surveyors, environmentalists, economists, urban planners among others. These professionals may be employed directly in the project or be consultants whose services will be procured.

Generation of Income and Source for Government Revenue: Income generated from the consultancies and services undertaken will provide income which will be taxed and generate revenue for the state. In addition, fees levied for the submission of plans to the local authorities and state agencies for approval and application for services will generate revenue that is used to meet the various governmental goals and objectives.

Environmental Opportunities: The design phase of the project will also present opportunities for green/sustainable designing of the project, which support the minimization of environmental impacts whilst fortifying the project to achieve its intended objectives. It is at this stage that the opportunities which will enable the project to achieve a sustainable development are discovered, explored and integrated into the project.

6.1.1.2 Construction Phase

Short-term employment opportunities will be generated for unskilled, semi-skilled and skilled labour in the construction sector, ranging from masons, carpenters to building technicians to architects during the construction phase of the project. This will lead to improved income profile for workers on the project. In addition, local food and other vendors and itinerant traders will

provide food and other services for the site workers. Although both direct and indirect employment opportunities created by the project will generate income for beneficiaries, employment generated during the construction phase will be significant but short term.

Creation of Employment: The construction activities will generate employment i.e. employees involved in the production, sale and transportation of the building materials, construction of the building, maintenance of the building and management. Security services, cleaning and waste collection are also some of the services that will benefit indirectly. Other employment opportunities that will be created will include for workers involved in the civil and interior works of construction such as engineers, masons, foremen, bricklayers, machine operators, interior designers, electricians, masons etc.

Market for Goods and Services: To facilitate the construction activities goods and services including raw materials, plumbing services, electrical fittings, transport landscaping and finishing would be needed. It therefore offers a market for these goods and services promoting the primary and secondary sectors involved in their procurement such as: quarrying and brick production; furniture and carpentry; glass production; plant and gardening; tarmac, asphalt and bitumen; chemicals; building contractors; electric fittings; plumbing fittings and water infrastructure etc.

Create Market for local Communities: The influx of labour into the area and subsequent people/workers to service them or provide them with goods such as food will be another positive impact of the proposed project. This is taken as positive since the population increase if sustainable will create additional market for goods and services offered in the area, increase the amount of mobilized capital and also increase the social capital in the area.

Increased Economic Activities and Revenue: The construction phase of the project will also increase the economic activities in the region, and revenue for the central government through taxes, through businesses that will be formed to service the increased population. These services include health, food and nutrition, transport and recreation that the workers taking part in the construction will require from time to time.

6.1.1.3 Operational Phase

Improved Infrastructure for Research and Learning: Buildings, classrooms, laboratories, and equipment- education infrastructure - are crucial elements of learning environments in universities. There is strong evidence that high-quality infrastructure facilitates better instruction, improves student outcomes, and reduces dropout rates, among other benefits. The quality of university facilities is linked to education outcomes for students and teachers. Infrastructure helps deliver positive outcomes for both students and teachers. So, the quality of training facilities plays a significant role.

Improved Workers Well-being and Working Efficiency: The project will provide well planned, good value infrastructure that meets the needs of users and contribute to better workers well-being and comfort. It will reduce or remove overcrowding in office spaces due to

inadequate provision of highly spacious and very comfortable infrastructure; improve the total number of worker spaces availability and space including adequate seating and waiting places. The provision of additional working space will enhance the efficiency delivery of services.

Creation of Employment Opportunities: The proposed project will create employment in three tiers, with the first being the staff that will be primarily involved in its implementation, supervision and maintenance. The second tier will be lecturers and researchers that the university may employ to provide services. The third tier of employment creation will be for the people who will take the opportunities presented to service the increased population and the population's amenities.

6.1.1.4 Decommissioning Phase

Creation of Employment and Business Opportunities: The decommissioning phase and its activities will create business for the contracting company that will be charged with pulling down the structure and transporting the resultant materials/debris. All these income streams will be taxed and generate income for the central government. Additionally, the decommissioning activities will create employment and job opportunities for the different professionals involved in them. These include: engineers, demolition experts, landscaper and garners, foremen, supervisors, masons and truck drivers amongst others.

Income Generation: Decommissioning the project will create recyclable materials and equipment such as: stones, bricks, metals, furniture, switchboards, pumps etc. may be sold for income albeit cheaper than new ones they will generate taxable income for the proponent.

Provision of Cheaper Building Materials: The decommission phase of the project will create recyclable building materials such as bricks, stones, metals, glass, wiring, furniture, electronics and water pumps, plumbing etc. which at present market trends will be cheaper than new materials. This will thus provide cheaper building material for future projects strategically increasing the productivity of the purposes the establishments in which they are used. It is also possible that the materials may be donated and used for development projects (schools, hospitals etc.) in much needed areas. This will assist in promoting development where it I smostly needed and generally improve the quality of life in those areas and cumulatively in the country.

Environmental Conservation and Restoration: The recycling of the waste to be used as raw materials in other construction process reduces the demand for raw materials. This in turn reduces the potential impact to the environment that would have been felt if the demand of the raw materials hadn't reduced.

6.1.2 Negative Impacts

6.1.2.1 Construction Phase

Loss of Flora and Faunal Habitats: The project site doesn't lie in any protected areas or ecologically sensitive areas and it is not a habitat or spawning ground for any threatened, rare

or endangered species. The selected site is currently an open area with grass and shrub vegetation. The site is for the most part previously disturbed, however, plants and animals still utilise these habitats and depend on them for survival. The clearing of vegetation during construction activities is a high possibility. The possible clearing of vegetation, topsoil and the digging of trenches will disturb the habitat of fauna and flora living within or near the corridor of influence. Vegetation has a great effect on the general and localized environment and normally can modify microclimate. The de-vegetation will lead to loss or reduction of floral and faunal diversity. The vegetation is important as food and habitat for various animals. It also assists in maintaining the structure of the soil by holding the particles together. This enables the soil microorganisms to flourish as their habitat; the soil is stable. This in turn allows the organisms easily convert the dead leaves and plants to humus which helps enrich the soil as well as preventing soil erosion. Converting the land area into a mostly built environment will minimize the natural process of the existing vegetation.

Deterioration of source of building materials: The opening of sand and burrow areas to extract construction materials like sand and gravel for the civil works would lead to the creation of pits. Rainwater will collect in the burrow pits and depressions, creating pools of stagnant water, if they are not re-instated. Stagnant water provides a suitable habitat for breeding mosquitoes and snails that are vectors for disease causing organisms. The excavated trenches and pits could serve as death traps for animals and human beings in the vicinity of the sand and burrow pits.

Changes in Surface and Sub-Surface Hydrology: Together with the loss of flora, changing the characteristics of the project site from its present state to a more built state and changing the soil's characteristics, the proposed project will lead to a change in the water regime at the project site. Vegetation clearing and grading activities, coupled with poor drainage will contribute to an increase in surface runoff and erosion of the soil. Movement of heavy construction machinery (e.g. bulldozer, excavator, etc.) can affect the soils ability to support plant growth, as such increasing erosion potential. Erosion due to rainfall could be exacerbated in the area from topsoil (and vegetation) removal.

Changes in Soil Characteristics: Several changes in the characteristics of the soil may result due to the excavation and compaction of soil for the foundation. The excavation may lead to losses in the accumulated soil carbon and this is known source of Green House Gases (GHGs) i.e. CO_2. Removal of more than several inches of soil during clearing can lead to reduction in the overall fertility of the soil. Additively this excavation can also alter the soil's structural stability and reducing its structural integrity. Compacting the soil to lay the foundation, erecting temporary structures, and also from the heavy vehicles (trucks, tractors etc.) can reduce the soil's percolative ability and thereby increasing run-off either on the specific routes or large area. Together with the laying of foundation and erecting of ancillary structures, this will further lead to changes in surface and sub-surface hydrology by changing the flow and recharge rates at the project site.

Emission of Air pollutants: The works involved in this phase of this project will also emit various air pollutants which can have both negative effects on both human and environmental health. Exposure to cement dust, emission from paints, thinners and chemicals for treating wood

and the solvents as well as delivery vehicles can reduce ambient air quality and put site workers at the risk of respiratory tract diseases. Dusts from the soil excavation, carving of bricks and movement of trucks on loose top soil after the land has been cleared can pollute the air. Excavations and the use of cement and sand among other like- materials are bound to increase the dust and particle levels in the air around the development area. Such effects should be avoided through the use of dust screens. Workers at the site should also be provided with protective clothing to avoid negative health effects. Also, engines burning fossil fuels (vehicular and generators) will emit oxides of Carbon, Sulphur and Nitrogen, and these also pose risks to human and environmental health on top some of them being GHGs such as (CO_2). Welding operations will also emit gases and fumes such as ozone, chromium particularly in its hexavalent state (Cr^{6+}), nickel (potential carcinogens), cadmium and lead, whilst others include: NOx, NO2, CO, CO2, O3 from mild and stainless-steel welding. The health effects of exposure to these fumes can include irritation of the upper respiratory tract (nose and throat), tightness in the chest, wheezing, metal fume fever, lung damage, bronchitis, pneumonia or emphysema. While particulate welding fume is usually fairly easy to see, gaseous fumes are invisible.

Table 6-2 below delineates some of the air pollutants expected from the project and the environmental and social aspects that they present a risk on.

Table 6-2: Operational Phase Air Pollutants, their Sources and Risks

Pollutant	**Sources**	**Risks**
CO_2	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities e.g. welding.	GHG and micro-climate modification Acid run-off Suffocation – Poisonous in large quantities
CO	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities e.g. welding.	Acid run-off Suffocation – Poisonous gas
SO_2	Fossil fuel engines (vehicles, generators, water pumps etc.) Welding	Acidified run-off GHG Poisonous gas Respiratory diseases and complications
NOx, NX(g)	Fossil fuel engines (vehicles, generators, water pumps etc.) Welding	Some forms are poisonous GHG – NO2 Smog Respiratory illnesses and complications
Dusts and Particulates (PM-10) Heavy metals (Pb)	Fossil fuel engines (vehicles, generators, water pumps etc.) Construction activities undertaken for O&M	Heavy metals are poisonous when ingested Respiratory diseases Pollute rivers and underground water Environmental Haze

Generation of Noise: The construction activities and processes will also generate noise above

the ambient levels of the area. Increased noise levels are expected from clearing equipment and construction machinery. The primary noise source associated with site preparation and construction works will be noise from operation of construction machinery such as excavators, compactors, haulage trucks etc., as well as noise from construction activities and workers. Increased noise levels have the potential of causing auditory fatigue, temporary and permanent loss of hearing ability, sleep disorders, and can even contribute to learning problems in children. One of the risks of the noise would be to the surrounding areas where they may create a nuisance or disturbance to students and staff of the university. Per EPA guidelines, the permissible ambient noise levels in residential areas are 55 decibels (dBA) during the day and 48 dBA at night. Those at and around educational and health facilities are 55 dBA during the day and 50 dBA at night, while the noise level for areas with light commercial or light industrial activities are 60 dBA and 55 dBA during the day and night respectively. At the site, loud noises will pose a risk to the workers and site personnel since loud noises increase the risk of ear damage and deafness. There may be an increase in the levels of noise in the construction site owing to the nature of machinery in use and the activities such as drilling and excavation. The normal levels of 55 decibels recommended by EPA and World Health Organization (WHO) may be surpassed in the duration of the construction process. Table 6-3 below shows some of the levels of noise that can emitted from the project's activities during this phase.

Table 6-3: Noise Levels of Some Construction Equipment[3]

Equipment	**Noise Levels**
Back Hoe	85-95 dB
Chain Saw	110 dB
Front-end Loader	90-95 dB
Jackhammer	112 dB
Lawn Mower	90 dB
Tractor	95-105 dB

Increased Pressure on Utilities: The processes and activities involved in the construction of the project would place added pressure on infrastructure services and utilities such as roads, water, drainage and energy. This may contribute to service disruptions since the utility and service requirements of this stage are intensive.

Increased Heavy Traffic: In this phase, the main roads leading to the site area will serve the additional vehicles used for the transportation of materials, equipment and staff to the site. The project will contribute to increasing the amount of heavy traffic plying the roads around it. Heavy trucks have the risk of causing accidents due to their limited manoeuvrability and also place added pressure on the roads and can lead to failure (cracks and potholes).

[3] Matczak W. & Gromiec J. (2000). *Occupational exposure to gases emitted in mild and stainless steel welding*. US National Library of Medicine National Institutes of Health. Med Pr. 2001;52(6):423-36. [7] Washington State Department of Labor and Industries. (n.d). Noise Basics. Retrieved January 20, 2012 from http://www.lni.wa.gov/wisha/noisebank/noisebasics.pdf

Population Influx: During the construction phase there will be an influx of people mainly working in the development. There will also be an increase in population due to the opportunities presented in providing goods and services during project implementation. This secondary increase will mainly entail retailers of foodstuffs and other commodities. Waste from such commodities might pollute the area if a designated dumping place is not allocated. The population will increase since the opportunities will be open to both local and people from other areas and thereby increasing the population. This increase in population will create pressure on utilities as well as present social risks through the interaction with the students. Also, it may present a security risk since people with ill intentions may see an opportunity in the belongings of those attracted by the project for economic reasons.

Generation of Construction Waste: The construction phase will lead to generation of construction wastes from the civil works and operations on the materials involved in the processes. These wastes include: plastics, metal shavings, wood shavings, food wastes, plants, gases (Carbon, Nitrous and Sulphurous Oxides), fumes (from glues and other hydrocarbons), stone shavings, ceramics, bricks, glass, cardboard, soil, cement, asphalt, sand, concrete, paper, paints, sealants, adhesives, fasteners, construction effluent (grey water). This phase will also lead to generation of waste heat through its run-off (water used for cooling) and the electric and diesel machines used in the construction activities. This type of waste poses risks to both human and environmental health and thus the proposed project would require an adequate waste management strategy, occupational health and safety strategy, and hazardous material safety plan. Some environmental impacts would include soil contamination, water and air pollution, whereas health risks include: breathing complications and respiratory diseases, cancer, skin disorders, poisoning etc.

Occupational Health and Safety (OHS) Risks: Exposure to dust/emission during site clearing as well as mixing of concrete and elevated noise level within the work environment could also have negative implications on the health of the site workers during the construction phase of the project. Work related accidents such as burns, falls and cuts may also occur due to human errors, workers not wearing appropriate PPEs required for their assignments and mechanical faults on equipment. Accidents may also result from improper storage of equipment, paints and other solvents and construction materials as well as poor management of construction waste. Another source of accidents during the construction phase of the project is human-vehicular conflicts as equipment and supplies are transported to the site and waste is hauled from the construction site to designated disposal site. Accidents of this nature can result in spills, destruction of property, injuries and fatalities on site. Several OHS risks may occur from the activities, processes, materials and equipment involved in the construction phase of the project. These risks are listed in Table 6-4 alongside their source.

Table 6-4: Construction Phase OHS Risks

OHS Risk	Source
Injuries or Injurious substances, materials and equipment	o Moving parts of equipment e.g. saws, tractors, grinders etc. o Moving heavy materials o Open foundation pits o Raised building materials and equipment e.g. bricks, saws, hammers, steel pipes & fittings etc. o Sharp edges of nails, knives, saws, glass o Open flames, heat generating or using processes. o Working at heights o Emission of radiation i.e. EMFs from electrical equipment and bright lights from welding operations o Corrosive chemicals
Fire	o Flammable liquids & gases, chemicals, electricity, welding, open flames, heated materials and heat producing processes such as grinding, burning fuels etc.
Intoxication	o Toxic substances, corrosive chemicals, adhesives, waste gases, smoke, dusts and emitted particulate matter.

Fire Risks: Construction 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 and carpentry shops. 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.

Community Health and Safety Risks: During the construction phase, there will be excavation of trenches on site. If the site is not hoarded, safety signs are not provided, and trenches are not covered quickly and/or well protected, then the general public will be at risk of accidental falls, being hit by falling objects or cuts. These accidents can cause injuries and fatalities. Trucks supplying materials to the site may also be involved in accidents which may involve residents of the communities along the haulage routes. Such accidents can cause injuries, fatalities, loss of property and/or traffic disruptions along the haulage routes.

Incidence of Crime and Conflicts: Civils works can be associated with theft and pilfering of construction materials normally from the general public and site workers. Site workers can also steal from the offices within the immediate project environs. Other crimes include sexual harassment, illicit sexual affairs and rape as well as defilement, which are criminal under the laws of Ghana. There may also be conflicts arising out of accidents and destruction of property by the contractors' work force, equipment on vehicles.

6.1.2.2 Operational Phase

Generation of Waste: Waste streams that will be generated by workers, students and clients who visit the office during the post construction phase of the project includes paper, plastics and

food residue. The generation of waste will have significant impacts on workers at the office in terms of public health as well as reducing the amenity value of the facilities, if not well managed. Generation of solid and liquid waste during the construction and operational phase of the project is a significant impact because of its association with sanitary related diseases like malaria and cholera.

Water and Energy Consumption: The water and energy consumption will be expected to increase, because of the expected increase in staff and student population. Demands for energy in lighting, air conditioning, escalator/elevator machinery running, refrigeration, communication devices and other facilities running will increase. Similarly, water consumption at the operational phase will increase, because of increased population expectancy in staff and student populations. In all cases, the potential impacts will be significant, minor and controllable with mitigation measures.

Increased Air Pollution: Cumulatively with other projects and activities carried out in the area the proposed project will emit pollutants to the air that present risks to human and ecosystem health. Table 6-5 below delineates some of the air pollutants expected from the project during the operational phase and the environmental and social aspects that they present a risk on.

Table 6-5: Operational Phase Air Pollutants, their Sources and Risks (table repeated)

Pollutant	Sources	Risks
CO_2	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities	GHG and micro-climate modification Acid run-off Suffocation – Poisonous in large quantities
CO	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities e.g. welding.	Acid run-off Suffocation – Poisonous gas
SO_2	Fossil fuel engines (vehicles, generators, water pumps etc.)	Acidified run-off GHG Poisonous gas Respiratory diseases and complications
NOx, NX(g)	Fossil fuel engines (vehicles, generators, water pumps etc.)	Some forms are poisonous GHG – NO2 Smog Respiratory illnesses and complications
Dusts and Particulates (PM-10) Heavy metals (Pb)	Fossil fuel engines (vehicles, generators, water pumps etc.) Construction activities undertaken for O&M	Heavy metals are poisonous when ingested Respiratory diseases Pollute rivers and underground water Environmental Haze

Generation of Noise: The activities of this phase of the project will also generate noise and these will be from various point sources such as if diesel generators without silencers are used and also any repair works that may be carried as necessitated by the project's operations. Mobile sources of noise will mainly include cars and the trucks that will be ferrying goods to the project. Although the noise levels emitted during this stage will be less than during the construction the impact will have more receptors since there will be more people in the area as a direct result of the project being operational.

Generation of waste: Several waste streams will be generated from the operational phase of the project and these have been delineated in Table 6-6 below alongside their sources and risks they present if not properly managed.

Table 6-6: Operational Phase Wastes

Waste	Source	Risks
Municipal Waste | Solid Waste Garbage, Kitchen & Office Wastes	Kitchen, restaurants, shops, supermarkets, residential area, offices, repair works, plants, plastics (tubes, binders, wrappings, metals (from clips, pins, lids), paper, cloth etc.	Water pollution, nuisances, air pollution on decomposition, soil contamination, water borne diseases, respiratory illnesses
Municipal Waste | Liquid Waste Grey water, Sewerage	Kitchen, shops, offices, recreational areas, residential area, washings, cooking oils, adhesives, fuel, chemicals, toilets, soaps and detergents	Water pollution (surface & subsurface), air pollution, soil contamination, water borne diseases
Chemical and hazardous wastes	laboratory	Water pollution (surface & subsurface), air pollution, soil pollution
Waste Heat	Electronics, Vehicles, Air Conditioning, Power Generators, Water Pumps, Cooking and Heating activities (in house), Cooling water for machines	Thermal Pollution of Rivers from run- off Microclimate modification

6.1.2.3 Decommissioning Phase

Decommissioning of the proposed project is an unlikely option. However, it is important to note that decommissioning may become necessary in view of different layout and land use needs of the university which may change and will require the building to be pulled down. In the unlikely event decommissioning is necessary, a decommissioning plan will, need to be fashioned out should it become necessary at any point in time.

This ESIA emphases decommissioning activities such as dismantling of work camps and site office facilities and removal of machinery and equipment from the project site. These activities can lead to potential environmental and occupational health and safety risks and impacts.

Generation of Noise: There will be a considerable increase in noise owing to the demolition process. This will be a short-term impact and will be felt throughout the demolition process. The main sources of noise will include: cars and trucks; the civil works of pulling down the project's-built structures (especially of explosives are used), and mechanized equipment that will be used in the processes involved in this project phase.

Generation of Demolition Waste: The decommissioning phase of the project will create demolition wastes which share similar characteristic with construction wastes and therefore similar risks. The only two main differences are that: (1) demolition waste can easily be accounted for before the empty building shell is pulled down, and (2) if explosives are used they will form part of the waste. Waste in form of debris and pieces of metal and wood will arise. Thus, creating a need of disposing off of the waste and all the disadvantages associated with waste mismanagement will arise such as spread of diseases. It is hoped that this phase will be implemented only under unavoidable circumstances for instance aging of the building and/or pertinent rights arising.

Increased Heavy Traffic: Materials from the buildings and equipment will have to be transported to and from the site through the use of trucks and tractors/bulldozers and these will increase the amount of heavy traffic in the area. Although it is expected that at the time when the project will be decommissioned there will be substantial developments in infrastructure (transport), the trucks with limited manoeuvrability will pose a risk to the general public and other vehicles/drivers on top of placing extra pressure on the roads.

OHS Risks: The decommissioning phase will have several OHS risks from the civil works involved, equipment, materials and processes. This may be added to if explosives are used and although their use is not known for now, an assessment has been made assuming or incorporating their use since they present a cost-effective way of demolition, which is safe when controlled.

6.1.3 Social Consideration

Gender Inclusion: The project will identify the gender specific barriers and design specific actions aimed at contributing to closing these gaps. The project will also assess gender specific challenges for female and male lecturers, researchers and students and ensure any response considers gender needs.

Disability Inclusion: Disabled persons constitute one of the largest vulnerable groups at risk of exclusion in the educational sector of developing countries, including Ghana. Without consideration for disability-related needs and support, the project may exacerbate this inequality and limit access to quality learning for persons with disabilities. The project will ensure these activities reflect disability issues.

Risk of Gender Based Violence (GBV): Based on the Violence Against Women and Girls (VAWG) Education brief, common GBV in the education sector include: (i) risk of sexual harassment; (ii) risk of sexual assault if schools do not have safety infrastructure such as separate latrines, proper lighting, supervision in isolated areas; and (iii) abuse through physical punishment (in areas where it is prevalent). The practice of sex for grades also warrants some attention. The project will assess the risk of GBV in detail, identifying ongoing interventions and actors involved in addressing GBV in schools and explore entry points under the project to support such efforts. The project will apply the University of Cape Coast's sexual harassment policy and related addendum developed for ACECoR.

Stakeholder Engagement: The project will ensure early, continuous and inclusive (including vulnerable/disadvantaged groups) stakeholder engagement. Beyond consultations, the project will expect to conduct Citizens Engagement Feedback surveys and potentially use some civil society organizations CSO to validate project results.

Grievance Redress Mechanism (GRM): The project design will incorporate a comprehensive project-wide GRM which will enable a broad range of stakeholders to channel concerns, questions, and complaints to the various implementation agencies.

6.2 Risk Assessment

6.2.1 Risk Duration and Reversibility for Construction and Operational Phase

REVERSIBILITY	DURATION OF IMPACT				
	Temporary 1	**Short term 2**	**Medium term 3**	**Long term 4**	**Permanent 5**
Reversible 1	**Construction Phase** Incidence of Crime and Conflicts •Increased Heavy Traffic	**Construction Phase** Waste disposal issues	**Construction Phase** Generation of Construction Waste		
Recoverable 2		**Construction Phase** •Emission of Air pollutants •Generation of Noise •Dust pollution/ air quality deterioration, Deterioration of source of building materials •Occupational safety and Health problems •Occupational Health and Safety (OHS) Risks Population Influx	**Construction Phase** Changes in surface and sub-Surface Hydrology •Changes in Soil Characteristics •Increased Pressure on Utilities Fire Risks Community Health and Safety Risks **Demolition Phase** Generation of Noise Generation of Demolition Waste Increased Heavy Traffic OHS Risks	**Operational Phase** Generation of Waste. Water and Energy Consumption. Increased Air Pollution Generation of Noise Generation of Waste	
Irreversible 3				**Construction and Operational Phase** Gender Based Violence	**Construction Phase** Loss of Flora and Faunal Habitats

6.2.2 Risk Severity and Probability for Construction and Operational Phase

PROBABILITY	SEVERITY OF IMPACT				
	Negligible 1	**Minor 2**	**Moderate 3**	**High 4**	**Very High 5**
Rare 1					
Unlikely 2					
Reasonably possible 3		• Deterioration of source of building materials	• Population Influx • Changes in surface and sub-Surface Hydrology • Occupational safety and Health problems • Waste disposal issues	Fire Risks Community Health and Safety Risks	
Likely 4			• Changes in Soil Characteristics • Incidence of Crime and Conflicts		Gender Based Violence
Almost certain 5			• Loss of Flora and Faunal Habitats • Emission of Air pollutants • Generation of Noise • Dust pollution/ air quality deterioration • Increased Pressure on Utilities • Increased Heavy Traffic • Generation of Construction Waste • Occupational Health and Safety (OHS) Risks		

Key

Low	Impact either too small to be measured or, even if quantifiable, not causing any material change in the environment.
Modest	Impact capable of causing change in the environment but not fundamentally affecting the status, potential productivity, or usage of the environment.
High	Impact capable of causing sufficient change in the environment to affect the status, potential productivity, or usage of the environment.

6.3 Mitigation Measures

The project's significant impacts are analysed, reviewed further and mitigation measures are proposed in Table 6-7 below, that will enable the impacts to be managed, reduced or avoided where possible. The impacts are rated HIGH, MODERATE or LOW.

Table 6-7: Proposed Mitigation Measures

Likely Impact & Reference	Proposed Mitigation Measures	Impact
Construction Phase		
Loss o f flora and Faunal Habitats	Landscaping with indigenous species on completion of construction. Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.	Low
Changes in surface and sub-surface hydrology	During construction, the design (of the drainage system) should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site. Drainage channels should be installed in all areas that generate or receive surface water such as car parking, driveways and along the building block-edges of the roofs. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off. The channels should be designed with regards to the peak volumes such as periods or seasons when there is high intensity of rainfall which is also not common in the project area but just in case such an event occurs. They should never at any time be full due to the resulting heavy downpours. The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which means it should have a suitable gradient. Storm water generated from roof catchments should be harvested, stored and made use in various household activities such as general cleaning. This will reduce run-off reaching the drainage channels. Paving of the side walkways, driveways and other open areas should be done using pervious materials to encourage water recharge and reduce run-off volume.	Low
Changes in soil characteristics	Sprinkling water on the soil to prevent dust from rising. Creating specific paths for the trucks**.** Ensuring there is enough space for normal percolation of water. Preventing pollution from construction wastes by having specific sites for collection, sorting and transport of wastes. Proper installation and configuration of drainage structures to ensure their efficiency. Installing cascades to break the impact of water flowing into the drains. Controlling the earthworks and ensuring the management of excavation activities. Compacting areas with loose soil. Landscaping**:** Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season.	Low

Emissions of Air pollutants	Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dusts. Enclosing the structures under construction with dust proof nets. Using efficient machines with low emission technologies for the ones that burn fossil fuels. Controlling the speed and operation of construction vehicles. Regular maintenance and services of machines and engines. Use of clean fuels e.g. unleaded and de-sulphurized fuels. Educate and raise awareness of construction workers on emission reduction techniques.	Low
Generation of Noise	Using equipment with noise suppressing technologies. Providing workers with PPEs against noise e.g. ear plugs. Placing signs around the site to notify people about the noisy conditions. Regular maintenance of equipment to ensure they remain efficient and effective. Complying with the EPA noise regulation. Construction works should be carried out only during the specified time which is usually as from 0800 hrs to 1700 hrs. There should not be unnecessary horning of the involved machinery. Provision of bill boards at the construction site gates notifying of the construction activity and timings.	Low
Increased Pressure on Utilities	Employing water conservation techniques and only using the required amounts of water to prevent wastage. Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible. Using machines with power saving technologies i.e. high efficiency equipment. Providing proper sanitary facilities for construction workers. Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.	Low
Increased Heavy Traffic	Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	Low
Labour Influx	Workers to be issued with jobs cards to monitor their movements in the site area Only authorised personnel should be allowed entrance to the site Presence of a work registry book where workers sign in and out Educating the workers on proper sanitation methods. Sensitizing the worker on HIV/AIDS. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all waste is dumped in their designated areas and legally acceptable methods.	Low

Waste	Employing a waste management plan. Using waste minimization techniques such as buying in bulk. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain and animals.	
OHS Risks	Employing an OHS plan that will outline all OHS risks and provide a strategy for their management. Ensuring all potential hazards such as movable machine parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks. Ensuring there is security in and around the site to control the movement of people. Providing safe and secure storage for equipment and materials in the site. Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. Labelling chemicals and material according to the risks they possess. Creating safe and adequate fire and emergency assembly points and making sure they are well labelled. Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.	Low
Impacts on cultural heritage/ archaeological interest /existing marine infrastructure and services	Identify cultural heritage resources and existing ecologically sensitive areas. Pre-construction surveys Implement chance finds procedure Have Cultural/ archaeological resources/ existing infrastructure encounter incidence register	Moderate

Operational Phase		
Increased Pressure on available utilities	Implementing water conservation techniques such as having faucets with dead man tap openers. Using only the required amounts of water during normal operations. Creating awareness through signs of conservation of water and electricity. Using natural light during the day for lighting purposes. Using machines and equipment with a high level of power efficiency in the offices and residential houses and servicing them as often as required to maintain their efficiency. Using gas in the kitchens/restaurants for cooking purposes.	Low
Increase Land Values and Land Use Changes	Complying to local bylaws. Collaborating with public and planning officials on the development and future developments Aligning the project's objectives with those of national, county and district development policies	Low
Micro-climate modification	Advocating for the use of other renewable sources of energy such as wind and solar energy Use of clean fuels e.g. unleaded and de-sulphurized fuels in vehicles. Paving should only be carried out where necessary to reduce the reflection of the solar radiations. Landscaping the site with indigenous species of plants. Using sustainable drainage systems that mimic the natural percolation of water into the soil, and green roofs where possible. Using efficient equipment that emit little or no waste heat.	Low
Security Threats	Employing of security guards/competent security firm at the site and searching all vehicles and people entering the project Use of CCTV cameras to monitor security within the site Collaborating with the national police on security matters. Placing alarms around the project and establishing emergency preparedness and response procedures.	Low
Sociocultural Impacts	Integrating and implementing Equal Opportunity Principles in Procurement and human resource policies. Promoting social cohesion and integration among people in the area. Creating awareness towards the diversity of cultures and different economic background of the people in the project staff and residents through sensitization. Allowing the residents and businesses to form social groups and networks that build social capital.Targeting social investment programs towards the local communities and region.	Low
Increased Air pollution	Install scrubbers in the exhausts of motor vehicles to filter the toxic fumes**.** Use of clean fuels such as solar and wind energy sources Use of de -sulphurized and unleaded fuels in vehicles Banning the burning of wastes and other materials at the site. Using efficient equipment, machines and engines that emit less pollutants	Low

Increased surface runoff	Using materials that mimic natural percolation of water. Landscaping to ensure there are areas where water will percolate underground. Constructing proper drains and monitoring them to ensure there are no blockages. This also includes ensuring the size of the drains can accommodate storm flows during the rainy season.	Low
Increased traffic	Erecting visible and clear signs to control the movement of vehicles in and out of the site. Having alternative entrances and exits for emergency operations. Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to traffic regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	Low
Generation of waste	Using waste minimization techniques such as buying in bulk, buying pre-processed foods in the restaurants etc. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, paper, electrical equipment etc. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain and animals.	Low
OHS Risks	Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear. Placing readable signs alerting people of hazardous such as for slippery floors. Servicing equipment and machine to ensure efficiency. Providing firefighting equipment and maintaining them to ensure they are fully functional. Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them. Providing adequate storage for hazardous and flammable substances and controlling access to them. Monitoring the movement, handling and management of wastes to ensure they safely managed and don't present any environmental, health and safety risks. Working state agencies in the management of emergencies and disasters to ensure multilateral and inter-sectoral approaches to this management. Performing emergency drills on a frequent basis, setting benchmarks for response and evaluating performance to ensure continuous improvement of response and preparedness.	Low

Generation of Noise	Erecting signs and notifying other users of noisy activities. Conducting all noisy activities during the day when permissible levels are higher. Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. Using equipment with low noise ratings or noise reduction technologies such as for the generators	Low
Decommissioning Phase		
Generation of Noise	Carrying out the decommissioning works only during the specified time from 0800hrs to 1700hrs where permissible levels of noise are high and acceptable. Machineries should be maintained regularly to reduce noise resulting from friction. Providing workers with Personal Protective Equipment such as earmuffs when operating noisy machinery and when in a noisy environment. Provision of bill boards at the construction site gates notifying people of the activities and timings. Shielding the area to reduce noise propagation.	Low
Generation of demolition waste	Employing a waste management plan, which will involve assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Removing reusable and recyclable material from the building before demolition to minimize the amount of waste. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods	Low
Increased Heavy Traffic	Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations	Low

OHS Risks	Ensuring all hazards such as movable parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks and undertaking the riskier demolition activities first and in isolation. Ensuring there is security in and around the site to control the movement of people. Providing safe and secure storage for the waste and materials in the site. Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. Labelling chemicals and materials according to the risks they possess. Creating safe and adequate fire and emergency assembly points and making sure they are well labelled. Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.	Low
Emission of Air Pollutants	Using efficient equipment and machines with efficient engines meaning low emission. Using clean fuels such de-sulphurized diesel and unleaded fuels. Using Dust screens. Removing components with potential of emitting hazardous gases or particulates separately and under caution to prevent emissions.	Low

6.4 Chance Find Procedures

In the event of finding previously unknown sites or feature of cultural value during project implementation, the following standard procedures for identification, protection from theft, treatment and recording should be followed.

Specifically,

(a) Stop the activities in the area of the chance find.
(b) Delineate the discovered site or area.
(c) Secure the site to prevent any damage or loss of removable objects.
(d) Notify the Supervising Engineer who in turn will notify the responsible authorities.
(e) The Ministry of Tourism, in collaboration with responsible local authorities (where applicable), would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures.
(f) The Ministry of Tourism and National Museums and Monument Board will make decisions on how to handle the findings. This could include changes in the layout (such as when finding irremovable remains of cultural or archaeological importance), conservation, restoration, and salvage.
(g) The Ministry of Tourism shall communicate implementation of the authority decision concerning the management of the finding in writing.
(h) Construction work could resume only after permission is given from Ministry of Tourism or other responsible authorities concerned with safeguarding the cultural heritage.

These procedures must be referred to as standard provisions in construction contracts, Safeguards Procedures for Inclusion in the Technical Specifications for Contracts. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed. Relevant findings will be recorded in the Monitoring Reports and the World Bank Implementation Supervision Reports (ISRs), and Implementation Completion Reports (ICRs) will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

6.5 Labour Management Plan

The project recognises the need to protect the fundamental rights of workers since the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of the project. Through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, the project will create tangible benefits, such as enhancement of the efficiency and productivity of their operations. The objectives of the labour management procedure are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.

- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as women.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced and child labour.

The project will engage the following categories of workers:

- *Direct Workers*: people employed or engaged directly by the project to work specifically in relation to the project.
- *Contracted workers:* people employed or engaged through third parties to perform work related to the project.

6.5.1 Working Conditions and Management of Worker Relationship

The project will adopt and implement human resources policies and procedures appropriate to its size and workforce that set out its approach to managing workers consistent with the requirements and national laws.

The project will provide workers with documented information that is clear and understandable, regarding their rights under national labour and employment law and any applicable collective agreements, including their rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.

Project workers will be provided with information and documentation that is clear and understandable regarding their terms and conditions of employment. The information and documentation will set out their rights under national labour and employment law (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits. This information and documentation will be provided at the beginning of the working relationship and when any material changes to the terms or conditions of employment occur.

The project will not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements. The project will base the employment relationship on the principle of equal opportunity and fair treatment and will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices. The project will take measures to prevent and address harassment, intimidation, and/or exploitation, especially in regard to women.

The project will provide a grievance mechanism for workers to raise workplace concerns. The project will inform the workers of the grievance mechanism at the time of recruitment and make it easily accessible to them. The mechanism will involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely

feedback to those concerned, without any retribution. The mechanism will also allow for anonymous complaints to be raised and addressed. The mechanism will not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

6.5.2 Protecting the Work Force

Child Labour: The project will not employ children in any manner that is economically exploitative or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Under the Ghana Children Act 1998, the minimum age for admission of children into employment is fifteen (15). However, children may be employed at the age of thirteen (13) to do light work. The minimum age for engagement of persons in hazardous work is eighteen (18). The minimum age for employment or engagement set out in the World Bank's Environmental and Social Standard 2 is age 14. The project will comply with the World Bank's minimum age and children under the age of 14 will not be employed under this project. The project will also ensure that children under the age of 18 are not be employed in hazardous work. All work of persons under the age of 18 will be subject to an appropriate risk assessment and regular monitoring of health, working conditions, and hours of work.

Forced Labour: The project will not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labour, such as indentured labour, bonded labour, or similar labour-contracting arrangements. The project will not employ trafficked persons.

6.5.3 Occupational Health and Safety

The project will provide a safe and healthy work environment, taking into account inherent risks in its particular sector and specific classes of hazards in the client's work areas, including physical, chemical, biological, and radiological hazards, and specific threats to women. The project will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, as far as reasonably practicable, the causes of hazards. The project will address areas that include the:

(i) identification of potential hazards to workers, particularly those that may be life-threatening;
(ii) provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances;
(iii) training of workers;
(iv) documentation and reporting of occupational accidents, diseases, and incidents; and

(v) emergency prevention, preparedness, and response arrangements.

6.5.4 Workers Engaged by Third Parties

With respect to contracted workers the project will make reasonable efforts to ascertain that the third parties who engage contracted workers are reputable and legitimate organisations and have an appropriate labour management procedure. The project will establish policies and procedures for managing and monitoring the performance of such third-party employers. In addition, the project will incorporate these requirements in contractual agreements with such third-party. Contracted workers will have access to a grievance mechanism. In cases where the third party employing or engaging the workers is not able to provide a grievance mechanism to such workers, the project's grievance mechanism will be available to the contracted workers.

7.0 STAKEHOLDER ENGAGEMENTS

7.1 Overview

The importance of promoting public participation is to make the Environmental and Social Assessment Processes open, transparent and robust. Communication between the assessment team and the public (project users) is the key to public participation.

Stakeholder consultations are crucial component in the preparation and implementation of ESIA. Specifically, it aims to achieve the following objectives:

- To provide information about the project and its potential impacts to those interested in or beneficiaries or those affected by the project, and solicit their opinion in that regard
- To educate and solicit views from all stakeholders to enhance the implementation mechanisms and processes
- To manage expectations and streamline misconceptions regarding the project
- To ensure participation and acceptance of the project by all relevant stakeholders

Stakeholder Engagement under ACECoR began early from the project identification to allow stakeholders' views and concerns to be considered in the project design, and to provide inputs to the project environmental and social assessment and mitigation plan. The engagement also sought to disseminate and disclose project related information and to plan project implementation, monitoring and evaluation arrangements. Engagements included both formal and several informal methods. Stakeholders span government institutions, Development Partners, private sector, CSO/ NGOs, academia and across the geographic spread of the country.

7.2 University Community Engagement

The project has consulted and engaged different stakeholders within the university community in designing the project. The project has engaged with the leadership of the university (office of the Vice Chancellor), different colleges and departments, the Directorate of Research Innovation and Consultancy (DRIC-UCC) faculty members and students.

7.3 External Stakeholders

The project has also engaged with external stakeholders such as the private sector, the World Bank, the Ministry of Education, National Council for Tertiary Education, Environmental Protection Agency, Other universities and ACE Centres in Ghana, universities in the United States of America, USAID, DANIDA, the US National Oceanic and Atmospheric Administration and the World Bank.

During the consultation and engagement, the following suggestions were made on potential environmental and social impacts that could be associated with the ACECoR:

- Provision of appropriate PPEs for workers and ensuring that all standards relating the work on site are complies with by contractors and artisans
- The need to put measures in place to allow students authorities expresses their views on work the project without victimization
- Acquisition of building permits and other regulatory permits
- Increase women's participation
- Avoiding GBV (sexual harassment against students)
- Include construction strategies for green building

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This ESMP is developed with an aim to outline actions necessary to prevent, mitigate and control possible negative impacts or disadvantages during the different phases of the project onto the environment and to analyse steps that could be taken in respect to this.

8.1 Environmental Framework

8.1.1 Environmental Policy

The implementation of the activities of the proposed by ACECoR must be consistent with all applicable policies, laws, regulations, and notifications. It is the responsibility of the Vice Chancellor, Sectoral, ACE Centre Director, and the Environmental and Social Safeguard Officer (and the contracting entity) to ensure that project activities are consistent with the applicable regulatory and legal frameworks. Additionally, it is also to be ensured that activities are consistent with World Bank policies, Performance Standards and guidelines.

The management policy of the proposed development is ensuring a clean and safe environment within the site and support of environmental health and safety both within and outside the project through proactive and responsible activities. The measures that are to be enforced would be implemented under the following framework:

Land

- Ensuring the presence of floral cover on unpaved surfaces so as to maintain the soil's structure within the project area and where flora has been lost. Landscaping should be undertaken
- Ensuring proper waste management of both solid and liquid wastes is implemented to prevent soil contamination and creation of an unsightly environment

Biodiversity

- Maintain where possible trees and larger flora by planting more trees at or near the site during and after construction phase of the development
- Buffer creation and maintenance between the project and other land uses to mitigate micro climate changes

Air

- Maintenance of low levels of dust generation during construction through either surfacing the bare areas of any roads as well as by watering areas that are not paved.
- Installation of scrubbers on all the machinery used during construction that has a certain level of emission
- Setting up screens and buffer fences to reduce the amount of fugitive dust and noise generated during construction

- Use of noise absorbent padding in fixed installations
- Use of silencers in heavy earth moving machines and pumps
- Use of ear-muffs by staff to reduce any exposure to increased noise
- Retention and consistent planting of green-belts barriers between source and receiver,
- although a long-term strategy trees are effective noise barriers and flower bushes or shrubs can be grown around noise emitting utilities

Water

- Ensure conservation of water in the construction phase through wise and only necessary use and recycling where possible
- Maintenance of floral cover within the non-paved areas in order to reduce direct evaporation and maintain the micro-climate or the area
- Management of any liquid and solid wastes to ensure that they don't lead to pollution of surface and sub-surface waters
- Using water catchment techniques such as roof catchment where water harvested can used for cleaning or lawn maintenance purposes
- Employing sustainable drainage measures that mimic the normal drainage of water to prevent increasing run-off to high levels as result of the development. These methods include using materials that allow water percolation in making paved surfaces such as the parking lot; using green roofs where possible or water catchment.

Hazards

- Hazards especially from moving vehicles and trucks in and out of the site could be handled properly
- Erecting hazards warning signs
- Using smaller trucks that make narrow turnings
- Construct storm water drains to channel flood waters
- Keep the percentage of the area of impervious surface as low as possible to reduce runoff during storm periods and in respect to the slope of the project area.

8.1.2 Health, Safety and Environmental (HSE) Risk

Some of the HSE risks from the project will come from the following aspects:

Construction Phase HSE Aspects

- Air emissions
- Water emissions
- Moving parts
- Heavy equipment and trucks
- Inflammable materials
- Hazardous/Poisonous chemicals and substances

- Storage areas
- Ladders
- Working at heights
- Electricity
- Open pits
- Heated surfaces, solids and fluids
- Wastes
- Raised materials and equipment, etc.

Operational Phase HSE Aspects

Slippery floors

- Moving parts and barriers
- Storage areas
- Heated surfaces, solids and fluids
- Cold surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Inflammable materials
- Electricity
- Wastes
- Air emissions
- Water emissions
- Vehicles and service trucks, etc.

Decommissioning Phase HSE Aspects

- Falling debris
- Air emissions
- Water emissions
- Heated surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Moving vehicles and trucks
- Heavy equipment and materials, etc.

8.1.2.1 Environmental Policy Statement

ACECoR shall undertake the development and operation of the Project in an environmentally responsible way by complying with the national and World Bank environmental policies

As a means of achieving this, ACECoR will include this ESMP with project contract documents that it issues to any third party who carries out all or part of the Contracting Entity's obligations in terms of the contract. ACECoR should procure the construction in an environmentally responsible way by imposing adherence to the provisions of the ESMP as a contractual obligation in respect of every project contract document for the construction activities.

8.2 Objectives of the ESMP

The objectives of this ESMP are as follows:

- To state standards and guidelines for compliance to environmental/social management
- To communicate the aims and goals of the ESMP and incorporate environmental management into the project planning, construction and operational phases;
- To guide Contracting Entities, sub-contractors and the various other workers involved in the Project in meeting the legislative and best practice commitments set out in the ESIA;
- To set out cost effective mitigation measures in order to minimize the extent of negative environmental/social impacts, to enhance positive environmental impacts,
- To provide guidance regarding method statements which are required to be implemented to achieve the environmental specifications; and
- To define corrective actions to be taken in the event of non-compliance with the specifications of this ESMP in order to prevent long-term environmental degradation.

8.3 Applicability to Other Documentation

This ESMP applies to work to be undertaken with regards to the construction of the multi-purpose educational complex. The ESMP should be read in conjunction with all documents that comprise the suite of documents for this Contract. This may include various applicable standard specification and environmental legislation. Third parties appointed by the Contracting Entity in terms of the contract should validate compliance with the conditions of this ESMP.

The ESMP is a dynamic document subject to similar influences and changes as are wrought by variations to the provisions of the project specification. Information contained in this current version will be reviewed and updated annually. The findings and recommendations of periodic assessments (annually or more frequently) by internal/external auditors will be used to update the current version at that time, if required. Substantial changes to the ESMP should be submitted to the relevant state authorities, including the Environmental Protection Agency (EPA) for approval before construction continues.

8.4 Management Framework

8.4.1 ACECoR Responsibilities

The ultimate responsibilities for the implementation of the above described safeguards instruments and processes are with the Vice-Chancellor, Sectoral Advisory Board (SAB), ACE Centre Director, and the Environmental and Social Safeguard Officer. The Project Environmental

and Social Safeguard Officers will work with the Centre Director and will be responsible for compliance with national environmental regulations, as well as the Banks E&S safeguards policies. The Vice-Chancellor, SAB, ACE Centre Director, and the Environmental and Social Safeguard Officer will ensure that no contracts for works that have a physical impact are signed, or re-construction or rehabilitation of proposed activities initiated without the required safeguards instruments in place and approved by the World Bank. No activity with physical environmental and social impact should be implemented without the approved safeguards instruments.

ACECoR will perform the following roles:

- See that all contracting companies tendering for work in the project affected area receive a copy of the ESIA, ESMP and any other relevant project documents and are assisted in understanding their responsibility to operate within the framework of the measures defined in the ESMP. When adjudicating tenders, ACECoR should confirm that Contracting Entities have made appropriate allowance for management of environmental and social matters and develop their own ESMPs (where necessary) which shall be approved;
- See that on appointment, contracting companies shall sign the ESMP component of this ESIA so the ESMP will then become part of the contract and be legally binding on the Contracting Entity. Contracting companies will also receive the required training or be guided to understand their responsibility to operate within the framework of the measures defined in the ESMP;
- Ensure that the responsibility for implementing and complying with the conditions of the ESMP forms part of the conditions of appointment of all Contracting Entities throughout the life of the project;
- See that independent environmental experts are appointed to audit the implementation of, and compliance with, the ESMP and monitoring plan on an annual basis; and the independent environmental audits, together with other relevant monitoring information, are made available to the public, throughout the life of the project.
- See that a formal senior management review of environmental management performance is undertaken on a quarterly basis for the first one-year, then on monthly basis throughout the lifespan of the project. Senior management responsibility will include the review and approval of any proposed measures to improve environmental performance.
- See that training and awareness creation is provided to all Contracting Entities in environmental and social management and the mitigation of impacts, to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner. ACECoR should not tolerate transgressions of the provisions of the ESMP.
- Make sure there is availability of human and financial resources needed to conduct all environmental management, mitigation and monitoring activities throughout the project phases.

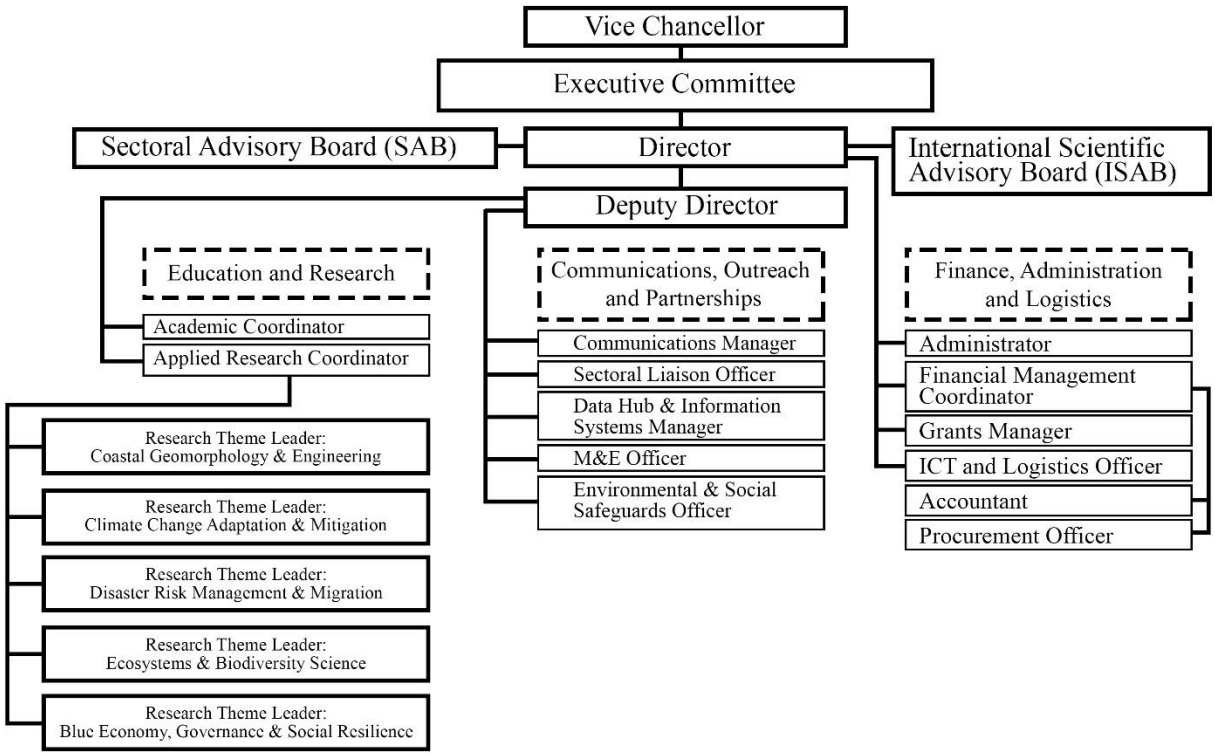

Figure 8-1: Organogram of the Africa Centre of Excellence in Coastal Resilience (ACECoR)

8.4.2 World Bank Responsibilities

- The World Bank Task Team will be responsible for ensuring the timely commencement of the preparation of safeguard instruments as needed.
- The Task Team will review Terms of Reference for the preparation of safeguard instruments and contracts if needed, to ensure that their scope and quality are satisfactory to the Bank.
- The Task Team will review tender documents and construction contracts regarding due consideration of the safeguard instruments, and the inclusion of effective and enforceable contractual clauses.
- The task team will ensure that no contracts for works that have a physical impact are signed, or re-construction or rehabilitation of proposed activities initiated without the required safeguards instruments in place.
- The task team will also monitor the implementation of the different prepared instruments through regular supervision missions (which will include an environmental and/or social specialist) during which document reviews, site visits and spot-checks will be conducted. Depending on the circumstances, Third Party Monitoring may also be used for supervision and monitoring and would thus complement the efforts of the task team.

8.4.3 Responsibilities of the Consulting Engineer (Supervision Consultant)

The engineer or supervision consultant is responsible for:

- Enforcing the environmental specifications of the project.
- Monitoring compliance with the requirements of the specification.
- Documenting, in conjunction with the Contracting Entity, the state of the site prior to construction activities commencing. This documentation may be in the form of photographs, video recording or other appropriate formats.
- Maintaining high standard of site supervision and operation to reduce risk of damage to environmental components.

8.4.4 Responsibilities of the Contracting Entity

The Contracting Entity is required to:

- Be responsible for the overall implementation of the ESMP.
- Be conversant with the requirements of this ESMP and ensure sub-contractors or third parties who carry out all or part of the Contracting Entity's obligation under the Contract comply with the requirements of this ESMP.
- Be responsible for the procurement of relevant environmental permits that are required for the construction and operation of the Project.
- Supply method statements for activities requiring special attention as specified and/or requested by the Project Developer for the duration of the Contract.
- Bear the costs of damages/compensation resulting from non-compliance with the ESMP.
- Be responsible for informing the Project Developer or Supervision Consultant of foreseeable activities that will require their input in a timely manner.
- Appoint a suitably experienced and qualified person to fulfil the role of theEnvironmental Manager (EM) as detailed in this ESMP.
- Conduct activities in a manner that minimizes/avoids impacts to the environment, affected residents and the public in general.

8.4.5 Responsibilities of the Environmental Manager (EM)

The Contracting Entity should procure the appointment of the EM, at their cost, for the duration of the Project, and the EM would be responsible for the overall implementation of the EMP in accordance with the requirements of the Contract. There should be an approved EM on the site at all times, and it is proposed that the EM is made part of the construction project management team. The EM should make sure that outlined environmental issues are communicated to the Contracting Entity and personnel involved in the Project before construction commences. The ESMP should be kept on-site and made accessible to all personnel.

The EM is to understand the environmental responsibilities as stated in the ESMP and is to enforce that all members of the project operate on site in an environmentally considerate manner, as prescribed by the ESMP. The EM is to be fully versed in the contents of the ESMP and is to ensure that the activities of the contracting team remain in compliance with the code of conduct and site-specific protection measures identified by the ESMP. The EM will be responsible for all monitoring and reporting activities such as noise, water and dust/air quality monitoring. The EM is to ensure that all monitoring records are available for review by the

competent authority when needed. The EM is to coordinate all specialists that are required on site, if and when required.

Specific roles/activities to be performed by the EM are outlined below:

- Enforce site protection measures on-site;
- Ensure that all the environmental authorizations and permits required in terms of the applicable legislation have been obtained;
- Monitor and verify compliance with the ESMP and contract and keep records of compliance/non-compliance, and make them available to the external auditor;
- Monitor and verify that environmental impacts are kept to a minimum;
- Review and approve construction method statements with input from the Contracting Entity, where needed, in order that the environmental specifications contained within the ESMP are adhered to;
- Keep accurate and detailed records of all activities on-site;
- Monitor the undertaking by the Contracting Entity of environmental awareness training for all new personnel on-site;
- Assess the Contracting Entity's environmental performance from which a brief monthly statement of environmental performance is drawn up for record purposes;
- Ensure that third parties who carry out all or part of the Contracting Entity's obligations under the Contract are conversant with the requirements of the ESMP and the site protection measures;
- Ensure that the Contracting Entity complies with every applicable legislation;
- Maintain a register of complaints and queries by members of the public at the site office and the actions taken in response to these complaints;
- Recommend that the Contracting Entity suspend any or all works on-site if the third parties who carry out all or part of the Contracting Entity's obligations under the Contract fail to comply with the said specifications;
- Conduct environmental audits for compliance with the ESMP and Contract, and report on the findings to the Supervision Consultant; and
- Undertake a continual internal review of the ESMP and submitting any changes to the Contracting Entity and Supervision Consultant, as well as the Client for review and approval.

The EM is expected to have the following qualifications, as a minimum:

- A good working knowledge of relevant environmental policies, legislation, guidelines and standards.
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports.
- The ability to manage public communication and complaints.
- The ability to think holistically about the structure, functioning and performance of environmental systems.
- Proven competence in the application of the following integrated environmental

management tools:

- ✓ Environmental and Social Impact Assessment.
- ✓ Environmental management plans/programs.
- ✓ Environmental auditing.
- ✓ Mitigation and optimisation of impacts.
- ✓ Monitoring and evaluation of impacts.
- ✓ Environmental Management Systems.

The UCC and/or Supervision Consultant will have the authority to instruct the Contracting Entity to replace the EM if, in their opinion, the appointed person is not fulfilling his/her duties in terms of the requirements of the ESMP. The decision to replace an EM will be made jointly by the UCC and/or Supervision Consultant and the Contracting Entity. Such instruction should be in writing and should clearly set out the reasons why a replacement is required and within what timeframe.

8.5 Record Keeping and Reporting

The Contracting Entity should ensure that a filing system identifying documentation related to the ESMP is established. A list of reports likely to be generated during the project is set out below:

- Environmental and Social Management Plan.
- Relevant communications detailing changes of design/scope that may have environmental implications.
- Daily, weekly and monthly site monitoring reports.
- Occupational Health and Safety reports.
- Complaints register.
- Training manual and attendance registers.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Permits and legal documents, including letters authorising specific personnel of their duties as Occupational Health and Safety representatives, or as part of emergency preparedness teams, e.g. fire teams, etc
- Weekly report from EM (regardless of whether there has been an incident).
- Monthly site meetings
- Method statements from the Contracting Entity for various phases of the project.

8.6 Environmental Document Control

The Contracting Entity should be responsible for establishing a procedure for environmental document control. The environmental document control procedure should comply with the following requirements:

- Documents should be identifiable by organisation, division, function, activity and contact person.
- Documents should identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution.
- Documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a specified period.
- The Contracting Entity should see to it that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the ESMP are performed. Documents should be made available to the external auditor, UCC and/or Supervision Consultant.

8.7 Environment, Health and Safety Training and Awareness

The Contracting Entity is expected to ensure that its employees and any third party who carries out all or part of the Contracting Entity's obligations under the Contract are adequately trained with regard to the implementation of the ESMP, as well as regarding environmental, social and legal requirements and obligations. Every employee should have an induction presentation on environmental awareness as part of the recruitment process. Where possible, the presentation needs to be conducted in the language of the employees.

The training by the Contracting Entity should, as a minimum, include the following:

- General environmental, health and safety awareness training describing the importance of policies, standards, key environmental and social sensitivities or requirements of the Project;
- Conformance to Standard Operating Procedures (SOP) as means to avoid or reduce environmental and social impacts;
- Requirements of the ESMP and how it will be implemented and monitored on site;
- Prevention and handling of fire and other incidences, including procedures to be followed in the event of non-compliance with the environmental, social and health requirements;
- The significant environmental and social impacts, actual or potential, as a result of their work activities;
- The environmental and social benefits of improved personal performance;
- The roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- Appropriate PPEs and orientation and support on the use of PPEs to all employees and visitors so that they can act in an appropriate and safe manner;
- The mitigation measures that need to be implemented when carrying out their work activities;
- General water management;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible;
- Details regarding archaeological and/or historical sites that may be unearthed during

construction, and the procedures to be followed should these be encountered; and
- The procedures which should be followed should a graveyard/cemetery be encountered or unearthed during the construction phase.

Training should be provided at pre-construction phase as well as construction and possibly operation phases, as needed. The training can be in different forms, namely:

- Induction training for staff, including modules on: health and safety, environmental and social awareness, accommodation rules, worker code of conduct, stakeholder engagement, grievance mechanisms and cultural heritage awareness;
- Toolbox training for specific tasks;
- Training for individuals involved in tasks with specific responsibilities; and
- Refresher training programs to facilitate continual improvement in environmental and social awareness for Project personnel.

Works which may pose a hazard to humans and animals are to be adequately protected and appropriate warning signs erected. The Contracting Entity should also provide adequate and operational fire safety equipment at all times, and personnel on-site should be trained on how to operate fire extinguishers, etc.

The Contracting Entity should also implement an HIV/AIDS awareness programme at the site camp. A training needs analysis should also be conducted by the EM to identify the appropriate environmental, health and safety training programs, and the appropriate target groups amongst the employees of the Contracting Entity. Environment, health and safety awareness training programs should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. The training programs should contain the following information:

- The names, positions and responsibilities of personnel to be trained.
- The framework for appropriate training plans.
- The summarized content of each training course.
- A schedule for the presentation of the training courses.

The Contracting Entity should ensure that records of training interventions are kept in accordance with the record keeping and documentation control requirements as set out in the ESMP. The training records should verify each of the targeted personnel's training experience. Assessment of the effectiveness of the training programs should be included as part of the internal audit procedures.

8.8 Emergency Preparedness and Response

The Contracting Entity should compile and maintain its own environmental and social emergency procedures approved by the Client so that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction and maintenance stages of the project. Such activities may include:

- Accidental discharges to water and land.
- Accidental spillages and exposure of employees to hazardous substances.
- Accidental fires.
- Traffic accidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.
- A list of key personnel.
- Details of emergency services applicable to the various areas along the route (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.
- Contracting Entities performing work for UCC should be appropriately trained and have ready access to equipment and supplies that would allow them to contain and control some emergencies to an extent until the arrival of an Emergency Response Team.

8.9 Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on-site, the local emergency services should be immediately notified of the incident. The following information should be provided:

- The location.
- The nature of the load.
- The status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records should be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

8.10 Checking and Corrective Action

The EM and Supervisory Consulting firm should monitor the ongoing conformance or lack thereof by the Contracting Entity and sub-contractors. The Supervisory Consulting firm should consult with and report non-conformances with the ESMP to the EM, with a copy of such report being given to the Contracting Entity, UCC. In any non-conformance report ("NCR"),

the Supervisory Consulting firm should also stipulate the recommended corrective action that needs to be taken to remedy such non-conformance. The Contracting Entity is deemed not to have complied with the ESMP if, inter alia:

- There is evidence of contravention of the ESMP specifications within the boundaries of the construction site. site extensions and haul/access roads.
- There is contravention of the ESMP specifications that relate to activities outside the boundaries of the construction site.
- Environmental damage ensues due to negligence.
- Construction activities take place outside the defined boundaries of the site without the approval of the Supervision Consultant or EM.
- The Contracting Entity fails to comply with corrective or other instructions issued by the Supervision Consultant within a specific time period.
- The EM has failed to recognize, act on or bring the non-compliance issue to the attention of the Supervision Consultant.
- Littering by the Contracting Entity on site.
- Lighting of illegal fires by the Contracting Entity on site. Persistent or unrepaired oil leaks from the Contracting Entity's vehicles.
- Excess dust or excess noise emanating from site.
- Possession or use of intoxicating substances by the Contracting Entity on site.
- Any Contracting Entity vehicles being driven in excess of designated speed limits.
- Removal and/or damage by the Contracting Entity to fauna, flora or cultural or heritage objects on site.
- Urination and defecation by Contracting Entity staff anywhere except in designated areas.

8.11 Remedial Action

Remedial action would be managed by the EM in two categories as described below.

Specified Corrective Action: This constitutes remedial or mitigatory measures specified by the Supervisory Consulting firm in any NCR, coupled with a specified time limit within which the specified corrective action needs to be completed, at the expense of the party identified in the NCR as being responsible for carrying out the said work. The Supervisory Consulting firm may on requests grant an extension of time for the implementation of such corrective action. If the said corrective action has not been carried out within the period stipulated by the Supervisory Consulting firm in the NCR or agreed on between the Supervisory Consulting firm and the Contracting Entity, the non- conformance in question would be dealt as Formal Remedial Work.

Formal Remedial Work: Where a non-conformance has resulted in environmental damage to the site which cannot be rectified as per the Supervisory Consulting firm 's specified corrective action or where the Contracting Entity has failed to carry out any of the Supervisory Consulting firm's specified corrective actions within the prescribed time limit (or permitted extension

thereof), the Supervisory Consulting firm should convene a meeting between representatives of the Contracting Entity and UCC. At this meeting, appropriate remedial work/mitigatory measures should be discussed and agreed, and failing agreement within 10 days, such dispute should be resolved in accordance with the dispute resolution provisions contained in the Contract. The Supervision Consultant should issue an instruction to the Contracting Entity to procure execution of the remedial work as agreed between the parties, and the Contracting Entity should be obliged to procure such remedial work within the prescribed period to the satisfaction of the Supervision Consultant. Failure by the Contracting Entity to comply with an instruction from the Supervision Consultant to procure the carrying out of the required remedial work would constitute a material breach of Contract, entitling the Client to the applicable remedy provided for in the Contract.

8.12 Grievance Redress

When grievances are reported they need to be addressed in a consistent and verifiable manner. This will be done through the implementation of a grievance procedure or a Grievance Redress Mechanism (GRM) that will be operated by the ACECoR and will allow project beneficiaries to submit questions, complaints or suggestions via email, phone, text message, or regular mail.
The Environmental and Social Safeguard Office will be the first point of contact and for resolution of grievances. The GRM (grievance procedure) should be followed for all grievances relating to the Project, and is divided into the following six (6) steps:

- Step 1: Receive and log grievance - a grievance form will be filled for all complaints received and added to the on-site grievance system for tracking.
- Step 2: Acknowledge grievance.
- Step 3: Assess and prioritise grievance and forward to relevant function.
- Step 4: Investigate and resolve grievance.
- Step 5: Sign off on grievance - The resolution will be documented on the relevant consent (grievance) forms and verified.
- Step 6: Monitor.

8.13 Environmental and Social Mitigation and Monitoring Plan

The ESMMP below specifies the actions that will be taken and specifies the parties responsible for these actions and the schedule for these tasks. It also sets out the indicators or criteria that will be used to monitor (1) whether the mitigation actions have been implemented, and (2) whether they are effective and sufficient. The ESMMP provides a basis for systematic implementation of ESIA. In addition to establishing responsibilities and schedules, ESMMP is the vehicle for translating ESIA conditions (which are often very general) into specific, implementable, verifiable actions.

Table 8-1: Project Environmental and Social Mitigation and Monitoring Plan (ESMMP)

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBLITY	COSTS (GHC)	INDICATOR	FREQUENCY
CONSTRUCTION PHASE					
Loss of Flora and Faunal Habitats	Landscaping with indigenous species on completion of construction. Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. Clearing vegetation only in construction areas and demarcating areas where no clearing will happen	Contractor Entity Environmental Manager, ACECoR Safeguards Officer	Within project costs	% of paved vegetated area	Once
Changes in surface and sub- surface hydrology	During construction, the design (of the drainage system) should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site. Drainage channels should be installed in all areas that generate or receive surface water such as car parking, driveways and along the building block-edges of the roofs. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off. They channels should be designed with regards to the peak volumes such as periods or seasons when there is high intensity of rainfall which is also not common in the project area but just in case such an event occurs. They should never at any time be full due to the resulting heavy downpours. The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which	Contractor Entity Environmental Manager, ACECoR Safeguards Officer	Within project costs	Presence of channels % of paved area drainage	

	means it should have a suitable gradient. Storm water generated from roof catchments should be harvested, stored and made use in various household activities such as general cleaning. This will reduce run-off reaching the drainage channels. Paving of the side walkways, driveways and other open areas should be done to encourage water recharge and reduce run- off volume. Ensuring there is enough space for normal percolation of water. Proper installation and configuration of drainage structures to ensure their efficiency. Installing cascades to break the impact of water flowing into the drains.				
Changes in soil characteristics	Sprinkling water on the soil to prevent dust from rising. Creating specific paths for the trucks. Preventing pollution from construction wastes by having specific sites for collection, sorting and transport of wastes. Controlling the earthworks and ensuring the management of excavation activities. Compacting areas with loose soil. Landscaping. Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA	Within project costs	Amount of dust per volume of air. % of paved area to vegetated area. Amount of run-off i.e. flow rate of run-off in m^3/s. Amount of soil in run-off or drained water – kg/m^3	Weekly Once Daily Daily
Air pollutants	Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dusts.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR	TBD	Amount of gaseous emissions per day: ppm in air per day	Monthly

	Enclosing the structures under construction with dust proof nets. Using efficient machines with low emission technologies for the ones that burn fossil fuels. Controlling the speed and operation of construction vehicles. Regular maintenance and services of machines and engines. Use of clean fuels e.g. unleaded and de-sulphurized fuels. Educate and raise awareness of construction workers on emission reduction techniques.	Safeguards Officer, EPA		Amount of particulate emission per day: ppm in air per day	

Generation of Noise	Using equipment with noise suppressing technologies. Providing workers with PPEs against noise e.g. ear plugs. Placing signs around the site to notify people about the noisy conditions. Regular maintenance of equipment to ensure they remain efficient and effective. Complying with the EPA noise regulation. Construction works should be carried out only during the specified time which is usually as from 0800 hrs to 1700 hrs. There should not be unnecessary horning of the involved machinery. Provision of bill boards at the construction site gates notifying of the construction activity and timings	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA Member of the public	TBD	Quality of PPEs (ear muffs, ear plugs) Amount of noise generated: dB	Daily Daily
Increased Pressure on Utilities	Employing water conservation techniques and only using the required amounts of water to prevent wastage. Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible. Using machines with power saving technologies i.e. high efficiency equipment.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA, GWCL, PDS	Within project costs	Amount of water consumed per day: m3/day Amount of electricity consumed per day: Kwh Number of machines and equipment serviced	Daily

	Providing proper sanitary facilities for construction workers. Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency. Employing water conservation techniques and only using the required amounts of water to prevent wastage. Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible. Using machines with power saving technologies i.e. high efficiency equipment. Providing proper sanitary facilities for construction workers. Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.			per month Amount of fuel consumed per day: m3/day Number of drainage blockages per month Amount of water consumed per day: m3/day Amount of electricity consumed per day: Kwh Number of machines and equipment serviced per month Amount of fuel consumed per day: m3/day Number of drainage blockages per month	
Increased Heavy Traffic	Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA, CCMA	TBD	Quality of the signs Number of incidents/complaints per month	Daily Monthly

	legally and commensurate to their intended use.				
Population Influx	Workers to be issued with jobs cards to monitor their movements in the site area. Only authorised personnel should be allowed entrance to the site. Presence of a work registry book where workers sign in and out Educating the workers on proper sanitation methods Sensitizing the worker on HIV/AIDS	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	Within project cost	Presence of a work registry book Issuing of job cards Presence of sanitary services	
Generation of Construction waste	Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all waste is dumped in their designated areas and legally acceptable methods. Following Cape Coast Metropolitan Assembly regulations on Waste. Management. Employing a waste management plan. Using waste minimization techniques such as buying in bulk. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc. Ensuring all wastes are dumped in their designated areas and through legally	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA, CCMA	TBD	Amount of waste generated per day i.e. Kg/day per specific waste type Amount of wastes generated per day i.e. kg/day per specific waste type. Quality of PPEs Quality and capacity of Waste management equipment (bins, signs, PPEs etc.)	Daily

	acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain and animals.				
OHS Risks	Employing an OHS plan that will outline all OHS risks and provide a strategy for their management. (See Appendices 7 & 8). Ensuring all potential hazards such as movable machine parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks. Ensuring there is security in and around the site to control the movement of people. Providing safe and secure storage for equipment and materials in the site and maintaining MSDSs. Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. Providing fire fighting equipment and in	UCC Site personnel Contractor, EPA Area OHS Officer, City Council, District Public Health Officer	TBD	Number of incidents/accidents per monthly Quality of all PPEs Number of drills per quarter. Effectiveness of drills Visibility and clarity of signs and alerts Efficiency of equipment such as fire fighting equipment Quality and efficacy of storage Level of awareness of workers Number of assembly points	Weekly Daily and as often as possible Quarterly After every drill Daily and spot checks Weekly and spot Checks Daily and spot checks Quarterly and spot checks Once

	easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. Labelling chemicals and material according to the risks they possess. Creating safe and adequate fire and emergency assembly points and making sure they are well labelled. Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.				
OPERATIONAL PHASE					
Increased Pressure on available utilities	Implementing water conservation techniques such as having faucets with dead man tap openers. Using only the required amounts of water during normal operations. Creating awareness through signs of conservation of water and electricity. Using natural light during the day for lighting purposes. Using machines and equipment with a high level of power efficiency in the offices and residential houses and servicing them as often as required to maintain their efficiency. Using gas in the kitchens/restaurants for cooking purposes.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer, EPA, GWCL, PDS	TBD	Amount of water consumed per day: m3/day Amount of electricity consumed per day: Kwh Number of machines and equipment serviced per month Amount of fuel consumed per day: m3/day Number drainage blockages per month	Daily Daily Monthly Daily Monthly
Micro-climate modification	Advocating for the use of other renewable sources of energy such as wind and solar energy. Use of clean fuels e.g. unleaded and de- sulphurized fuels in vehicles.	ACECoR Safeguards Officer, EPA	TBD	Numbers of trees planted Ratio of paved surface to unpaved surfaces	TBD

	Paving should only be carried out where necessary to reduce the reflection of the solar radiations. Landscaping the site with indigenous species of plants. Using sustainable drainage systems that mimic the natural percolation of water into the soil, and green roofs where possible. Using efficient equipment that emit little or no waste heat				
Security Threats	Employing of security guards/ competent security firm at the site and searching all vehicles and people entering the project. If possible the use of CCTV cameras to monitor security within the site. Collaborating with the national police on security matters. Placing alarms around the project and establishing emergency preparedness and response procedures.	Contractor – Site Foreman, Contractor Entity Environmental Manager	TBD	Presence of a security personnel Number of security incidences Number of security drills and emergency response drills	
Sociocultural Impacts	Integrating Equal Opportunity Principles in Procurement and human resource policies. Promoting social cohesion and integration among people in the area. Creating awareness towards the diversity of cultures and different economic background of the people in the project staff and residents through sensitization. Allowing the residents and businesses to form social groups and networks that build social capital. Targeting social investment programs towards the local communities and region.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Staff Diversity ratios Number of discrimination incidences and reports Number of social groups Number of social investment strategies targeted at the local community Level of integration of	Quarterly Quarterly Yearly Yearly Every time training is held and reviewed.

				cultural appreciation into staff training programs	
Increased Air pollution	Install scrubbers in the exhausts of motor vehicles to filter the toxic fumes Use of clean fuels such as solar and wind energy sources. Use of de-sulphurized and unleaded fuels in vehicles. Banning the burning of wastes and other materials at the site. Using efficient equipment, machines and engines that emit less pollutants	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer		Efficacy of equipment and machinery Amount of gaseous emissions per day: ppm in air per day Amount of particulate emission per day: ppm in air per day	Weekly and on procurement Bi-weekly Bi-weekly
Increased surface runoff	Using materials that mimic natural percolation of water. Landscaping to ensure there are areas where water will percolate underground. Constructing proper drains and monitoring them to ensure there are no blockages. This also includes ensuring the size of the drains can accommodate storm flows during the rainy season.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	Within project costs	Drainage flow rate: m^3/day Ratio of paved areas to vegetated areas Number of drainage blockages	Daily Quarterly Quarterly
Increased traffic	Erecting visible and clear signs to control the movement of vehicles in and out of the site. Having alternative entrances and exits for emergency operations. Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to traffic regulations Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations.		Within project costs	Number of traffic jams per day Duration of traffic jams: hours Number of traffic incidents and accidents per month	Daily Daily Monthly

	Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.				
Generation of waste	Developing and implementing a waste management plan. Following Cape Coast Metropolitan Assembly regulations on Waste Management. Using waste minimization techniques such as buying in bulk, buying pre-processed foods in the restaurants etc. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, paper, electrical equipment etc. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Amount of waste generated per day per waste type: Kg/day Adequacy/quality of waste management equipment (bins, PPEs such as gloves, boots etc.) Visibility and clarity of notices and signs	Daily Weekly Daily

	and animals.				
OHS Risks	Employing and EHS/OHS plan. (See Appendices 7 & 8) Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear. Placing readable signs alerting people of hazardous such as for slippery floors. Servicing equipment and machine to ensure efficiency. Providing firefigh ting equipment and maintaining them to ensure they are fully functional. Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use maps on elevators, staircases etc. Putting in place and ERP and ensuring all people in the project are aware of it and the procedures to follow commensurate to the level of emergency. Providing adequate storage for hazardous and flammable substances and controlling access to them. Monitoring the movement, handling and management of wastes to ensure they safely managed and don't present any EHS risks. Working state agencies in the management of emergencies and disasters to ensure multilateral and inter-sectoral approaches to this management. Performing emergency drills on a frequent basis, setting benchmarks for	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	Within project costs	Number of incidents/accidents per monthly Quality of all PPEs Number of drills per quarter Effectiveness of drills Visibility and clarity of signs and alerts Efficiency of equipment such as fire fighting equipment Quality and efficiency of storage Level of awareness of workers Number of assembly points	Weekly Daily and as often as possible Quarterly After every drill Daily and spot checks Weekly Daily and spot check Quarterly, Once

	response and evaluating performance to ensure continuous improvement of response and preparedness.				
Generation of Noise	Erecting signs and notifying other users of noisy activities. Conducting all noisy activities during the day when permissible levels are higher. Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. Using equipment with low noise ratings or noise reduction technologies such as for the generators	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Visibility and Clarity of Signs Amount of noise generated per day: dB Adequacy and quality of noise PPEs (ear muff, ear plugs)	Daily
DECOMMISSIONING PASE					
Generation of Noise	Carrying out the decommissioning works only during the specified time from 0800hrs to 1700hrs where permissible levels of noise are high and acceptable. Machineries should be maintained regularly to reduce noise resulting from friction. Providing workers with Personal Protective Equipment such as earmuffs when operating noisy machinery and when in a noisy environment. Provision of bill boards at the construction site gates notifying people of the activities and timings. Shielding the area to reduce noise propagation	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Quality of PPEs (ear muffs, ear plugs) Amount of noise generated: dB	Daily and as often as possible Daily
Generation of demolition waste	Following Cape Coast Metropolitan Assembly regulations on Waste Management. Employing a waste management plan, which will involve assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Amount of wastes generated per day i.e. kg/day per specific waste type. Quality Of PPEs	Daily Daily and as often as possible

	Renovation. Removing reusable and recyclable material from the building before demolition to minimize the amount of waste. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods.			Quality and capacity of waste management equipment (bins, signs, PPEs etc.)	Daily
Increased Heavy Traffic	Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Quality of the signs Number of incidents per month Complaints per month	Daily and as often as possible. Monthly Monthly
OHS Risks	Employing an OHS plan that will outline all OHS risks and provide a strategy for their management. Ensuring a11 hazards such as movable parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training	Contractor – Site Foreman, Contractor Entity Environmental Manager, ACECoR Safeguards Officer	TBD	Number of incidents/accidents per monthly Quality of all PPEs Visibility and clarity of	Monthly Daily and as often as possible Daily and as often

	on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks and undertaking the riskier demolition activities first and in isolation. Emergency assembly points and making sure they are well labelled. Ensuring there is security in and around the site to control the movement of people. Providing safe and secure storage for the waste and materials in the site. Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. Labelling chemicals and materials according to the risks they possess. Creating safe and adequate fire and Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.			signs and alerts Efficiency of equipment such as fire fighting equipment Quality and efficiency of storage Level of awareness of workers Number of assembly points	as possible Weekly and as often as possible Weekly and spot checks Bi-weekly and spot checks Once
Emission of Air Pollutants	Using efficient equipment and machines with efficient engines meaning low emission. Using clean fuels such de sulphurized	Demolition Contractor Contractor – Site Foreman, Contractor Entity Environmental	TBD	Amount of gaseous emissions per day: ppm in air per day	Daily

	diesel and unleaded fuels. Using Dust screens. Removing components with potential of emitting hazardous gases or particulates separately and under caution to prevent emissions.	Manager, ACECoR Safeguards Officer, EPA		Amount of particulate emission per day: ppm in air per day	Daily

9.0 CONCLUSION

In conclusion the proposed project will have several positive economic and educational impacts. The project will play an important role in enhancing the capacity of the University of Cape Coast to deliver high quality postgraduate courses and to conduct and disseminate international caliber applied research focused on addressing development challenges in West Africa. However, the project will present environmental and social risks similar to most building and infrastructure projects, which include: generation of wastes (municipal, construction and demolition wastes; changes in soil characteristics; emission of air pollutants amongst others. These risks can be adequately managed and monitored through the proposed mitigation measures, that includes frameworks for developing waste management plans, OHS plans and hazardous materials safety plans.

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