ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

FOR

THE CONSTRUCTION OF STUDENTS' HOSTELS AT COLLEGE OF MEDICINE AT LILONGWE CAMPUS

Old Mutual Investment Group

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ACKNOWLEDGEMENTS

This Environmental and Social Impact Assessment (ESIA) report is for the construction of students' hostels at College of Medicine at Lilongwe Campus under the Public, Private Partnership ("PPP") Agreement. The ESIA report has been prepared with the support of many people. The Consultant is grateful to all of them. The Consultant would like to recognize in a special way the support rendered by Management and Staff of Old Mutual Investment Group; Environmental Affairs Department; Lilongwe City Council; Management and Staff of the Ministry of Lands, Housing and Urban Development; officials from the Ministry of Education; and Management and Staff of College of Medicine, Lilongwe Campus, where the project will be implemented. The guidance provided by these officials is very appreciated as it assisted the Consultant to prepare this report.

LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CoM	College of Medicine
DC	District Commissioner
DEC	District Executive Committee
DESC	District Environmental Sub Committee
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMA	Environment Management Act
ENRMC	Environment and Natural Resources Management Consultants
ESCOM	Electricity Supply Corporation of Malawi
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
GIS	Geographic Information System
Ha	Hectare(s)
HIV	Human Immunodeficiency Virus
LCC	Lilongwe City Council
MGDS	Malawi Growth and Development Strategy
NCHE	National Council for Higher Education
NCIC	National Construction Industrial Council
NGO	Non-Governmental Organization
NSO	National Statistical Office of Malawi
PPP	Public Private Partnership
STI	Sexually Transmitted Infection
ToRs	Terms of Reference
UMCM	University of Malawi, College of Medicine
WSP	Wastewater Stabilization Pond

EXECUTIVE SUMMARY

1.0 Introduction

Old Mutual Investment Group would like to construct students' hostels at College of Medicine at Lilongwe campus under the Public, Private Partnership ("PPP") Agreement. The decision to construct the students' hostels follows the realization that there is generally a critical shortage of modern and adequate student hostels facilities in both public and private universities in Malawi and College of Medicine is no exceptional. Shortage of modern and adequate students' hostels at College of Medicine in Lilongwe is negatively affecting students' enrolment and their academic performance. The college does not have enough bed spaces to accommodate an increased number of students on campus. As a result, the institution is not able to enrol many students. Again, most of the students that are enrolled at the college stay off campus and travel long distances to access university facilities. It is therefore anticipated that the project will assist to increase students' enrolment and will enhance students' academic performance at the college as the project will help to create more bed spaces which will assist to accommodate more students on campus.

Considering that construction activities for the project will generate a number of impacts on the bio-physical and socio-economic environment in the project area and beyond, Old Mutual Investment Group commissioned an Environmental and Social Impact Assessment study to identify potential environmental and social impacts related to the activities of the project; to assess the extent and significance of both positive and negative impacts; and to come up with measures to enhance the positive impacts and measures to mitigate the negative impacts.

2.0 Nature and scope of the construction of the student hostel

The project will construct students hostels at College of Medicine, Lilongwe campus, access roads and car parks. To avoid space wastage, the hostels will be high rising buildings with a minimum of three storeys. The hostels will be fitted with elevators to allow students move freely to and from different floors. The different categories of students will be accommodated in different hostels. In all there will be 1 Postgraduate (PhD and Master of Science) students' hostel with 3 storeys and 1 undergraduate students' hostels with 3 storeys. The 2 hostels will have a total capacity of 150 bed spaces broken down into 100 bed spaces for undergraduate students, 30 bed spaces for Master of Science Students, and 20 bed spaces for PhD students.

Construction activities for the project will take 36 months starting from June 2019 to May 2022. Some of the materials that will be used to construct the hostels shall include Steel structural frame; nominally reinforced concrete floor slabs, sand/cement hollow blocks or solid blocks depending on application, fiber cement boards for non-structural applications, pressed metal door frames, masonite faced flush panel solid core doors, and natural anodized aluminium windows with top hung opening sections and permanent louvre ventilation. Old Mutual will require about U$ 5,000,000.00, which Old Mutual Investment Group has already secured from investors in a form of equity and debt. Over 100 people will be employed to work at the site when construction activities begin. Once construction activities are completed, the college will use the hostels to accommodate students on campus.

3.0 Stage of the project

The project is at planning and design stage. Activities under planning and design stage include obtaining different permits and approvals for the project; conducting perimeter and topographic surveys; conducting feasibility studies, detailed engineering designs and environmental and social impact assessment studies.

4.0 Methodology for the study

The ESIA study was conducted using the following steps:

a) Site visits and meetings with the college management;
b) Desk study of literature materials pertinent to the project and its location;
c) Field survey to collect baseline information through direct observations, interviews with relevant stakeholders; and
d) Preparation of the ESIA study report as per the Environmental Impact Assessment Guidelines of 1997.

5.0 Key environmental and social issues

The study identified a number of bio-physical and socio-economic impacts that will be generated by the activities of the project. A summary of the positive and negative impacts of the project are outlined below:

5.1 A summary of the key positive impacts identified in this ESIA report include:

The following is a summary of the main positive impacts:

a) Provision of modern and adequate and affordable student hostels facilities at College of Medicine;
b) increased bed space for students;
c) increased student intake to tertiary institutions.
d) Increase in performance of students academically as most students will leave close to the campus and easily access college facilities
e) Creation of Employment;
f) Increase in market for local construction materials;
g) Increase in business activities within the project area;
h) Improve security in the area;
i) Increase in economic activities;
j) Improved aesthetic value; and
k) Increase in revenue by government through taxes

5.2 Summary of key negative impacts

The following is a summary of the main negative impacts:

a) Labour influx;
b) Increased generation of waste;
c) Injuries due to construction works;
d) Increased risk of dust emission and air pollution;
e) Risk of social conflict;
f) Increased risk of illicit behavior and crime;
g) Impacts on community dynamics;
h) Increased burden on and competition for public service provision;

i) Increased risk of communicable diseases;
j) Increased cases of accidents;
k) Possible disruption of public service utilities;
l) Disruption of flow of traffic and public mobility;
m) Visual Intrusion;
n) Increased demand for sanitary facilities; and
o) Noise Pollution;
p) Increase in the spread of HIV/AIDS and other Sexually Transmitted Infections;
q) Increased energy demand; and
r) Increased water demand.

6.0 Conclusion and recommendations of the ESIA study

From the ESIA study, it has been established that construction of the new students' hostels at College of Medicine, Lilongwe campus will generate significant socio-economic benefits to the students, people in the project area and the country. If the enhancement measures that have been proposed in this ESIA report will be properly implemented, the positive impacts will be enhanced. The study has also identified some negative environmental and social impacts that the project will generate. However, if the mitigation measures that have been proposed in this ESIA report will be properly implemented, the negative impacts will be mitigated by either avoiding, minimizing or even eliminating some of them completely.

It is therefore recommended that the proponent of the project should be allowed to implement the project and adopt the recommendations advanced in this report.

CHAPTER 1 INTRODUCTION AND BACKGROUND

1.1 Introduction

Old Mutual Investment Group would like to construct students' hostels at College of Medicine campus in Lilongwe under the Public, Private Partnership ("PPP") Agreement. Old Mutual will operate the hostels after construction activities are completed for 35 years, during which period, Old Mutual will recover all its capital investment and the associated profits. After 35 years of operating the hostels, Old Mutual will hand over the hostels to College of Medicine to become the property of the college.

The decision to construct these hostels at College of Medicine, Lilongwe campus follows the realization that there is generally a critical shortage of modern and adequate students' hostels in both public and private universities in Malawi and College of Medicine, Lilongwe campus is no exceptional. Shortage of modern and adequate hostels at College of Medicine, Lilongwe campus is negatively affecting students' enrolment and students' academic performance. The College does not have enough bed spaces at Lilongwe campus. As a result, the institution is not able to enrol many students. Again, most of the students that are enrolled at the campus stay off campus and travel long distances to access university facilities. It is therefore anticipated that the project will assist to increase students' enrolment and will enhance students' academic performance at College of Medicine, Lilongwe campus as the project will help to create more bed spaces which will assist to accommodate more students on campus.

Considering that construction activities for the project will generate a number of impacts on the bio-physical and socio-economic environment in the project area and beyond, an Environmental and Social Impact Assessment study was undertaken in order to prepare an Environmental and Social Impact Assessment report and the associated Environmental and Social Management Plan and the Environmental and Social Monitoring Plan for the project. The Environmental and Social Impact Assessment study identified potential environmental and social impacts related to the activities of the project; assessed the extent and significance of both positive and negative impacts and came up with measures to enhance the positive impacts and measures to mitigate the negative impacts.

1.2 Background information

College of Medicine (CoM), which was established in 1991 is one of the four constituent colleges of the University of Malawi, the oldest and largest public university in the country. The College was established with the aim of training doctors and other health professionals, in clinical service and medical research responsive to the health needs of Malawi and its neighbours in the southern African region. The other three constituent colleges of the University of Malawi are Chancellor College in Zomba, the Malawi Polytechnic in Blantyre, and Kamuzu College of Nursing in Blantyre and Lilongwe. College of Medicine houses the Faculty of Medicine of the University and has gradually grown from a program with an intake of 10-15 students per year to a program with an intake of 60 students on average per year with 110 faculty members, of whom approximately

67% are Malawians. As of 2018 the College has 300 students of whom 275 are undergraduate, 20 postgraduates and 5 Doctoral students. To date the college has graduated over 250 medical doctors.

The academic principles of the College are that: -

a) medical training be community and public health based in order to reflect the health needs of Malawi;
b) learning should be "problem based" to foster an attitude of enquiry;
c) research should be directed to the medical challenges and diseases specific to Malawi;
d) as far as possible the undergraduate curriculum should be integrated both horizontally in the basic medical science disciplines as well as vertically in the clinical disciplines; and
e) the college is committed to a policy of gender equality.

The Vision of the College is t**o** be a public university committed to enhancing the health of the nation while the Mission of the College is **t**o be an academic center of excellence in the training of doctors and other health professionals, in clinical service and medical research responsive to the health needs of Malawi and its neighbors in the southern African region.

The College recognizes three core tasks namely teaching and training; research; and service delivery. Teaching and training is a core task of the College and should be of the highest possible quality, following international developments, both in terms of content and in terms of teaching methodology. The College of Medicine wants to offer its students an enabling environment for their professional and personal development. It is in the process of reviewing and reforming its curriculum.

Research in the College directly or indirectly influences direction of health debate, policies and decisions in the country for the benefit of the people of Malawi. This research is closely linked to teaching and service delivery activities within the College. The quality of its research reflects directly on the College of Medicine's national and international standing.

Service delivery is one of the College of Medicine's tasks where it concerns delivery of clinical services in the teaching hospitals i.e. Kamuzu Central Hospital and Queen Elizabeth Central Hospital or provision of services that no other institution in Malawi can provide, i.e. certain laboratory and consultancy services. In some instances, service delivery is done as part of research projects.

1.2.1 Programmes offered by the College

The anchor academic program is the five-year Bachelor of Medicine and Bachelor of Surgery (MBBS) degree. Other undergraduate programs include Bachelor of Pharmacy and Bachelor of Medical Laboratory Technology.

Postgraduate degrees offered at the College include the two-year Master of Public Health, the four-year Master of Medicine in clinical disciplines, and a Doctoral degree programme in collaboration with outside institutions.

1.2.1.1 Undergraduate courses

The following undergraduate courses are offered at UMCM:

a) Bachelor of Medicine and Bachelor of Surgery (MBBS);
b) Bachelor of Pharmacy (BPharm); and
c) Bachelor of Science in Medical Laboratory Technology (BScMLT).

1.2.1.2 Graduate Courses

The following postgraduate courses are offered at the UMCM:

a) Master of Medicine (MMed) in Internal Medicine;
b) Master of Medicine (MMed) in Family Medicine;
c) Master of Medicine (MMed) in Obstetrics and Gynecology;
d) Master of Medicine (MMed) in Pediatrics;
e) Master of Medicine (MMed) in General Surgery; and
f) Doctor of Philosophy (PhD).

1.2.2 Campuses of the College

The College's main campus is located along Mahatma Ghandi Avenue, in the city of Blantyre, Malawi's financial capital and largest city, adjacent to Queen Elizabeth Central Hospital, the University's teaching hospital. Figure 1.1 provides an overview picture of the College of Medicine Campus in Blantyre.

FIGURE 1. 1 AN OVERVIEW PICTURE OF COLLEGE OF MEDICINE CAMPUS IN BLANTYRE

The medical college maintains a second campus in Lilongwe. Figure 1.2 provides an overview picture of the College of Medicine Campus in Lilongwe.

FIGURE 1. 2 AN OVERVIEW PICTURE OF THE COLLEGE OF MEDICINE CAMPUS IN LILONGWE

A third campus is planned in the town of Mangochi, along the southern shores of Lake Malawi, at the premises of Mangochi District Hospital.

1.2.2.1 College of Medicine campus in Lilongwe

College of Medicine Campus in Lilongwe started to operate in 2012. The campus has allowed the College to increase students' enrolment as it has provided extra bed spaces and teaching facilities on top of what Blantyre Campus has. Currently, College of Medicine Bachelor of Medicine and Bachelor of Surgery (MBBS) students perform their third (first clinical year) year studies at the Lilongwe Campus.

The campus admits 122 students against 104 bed spaces. This implies that 18 students stay off campus. All the 104 bed spaces are of shared room type with shared bathrooms and toilets, hence not suitable for post-graduate students. There are 4 rooms with 3 bed spaces per room and the rest of the rooms have 2 bed spaces per room. All the students who do not have bed spaces at the campus either stay with their relatives in town or find their own hostels off campus. It is therefore anticipated that the project will increase students' enrolment both at undergraduate and post-graduate levels and will enhance students' academic performance as the project will create modern and adequate hostels facilities for students.

1.3 Nature and scope of the construction works

The project will construct students hostels at College of Medicine, Lilongwe campus, access roads and car parks. To avoid space wastage, the hostels will be high rising buildings with three storeys. The hostels will be fitted with elevators to allow students move freely to and from different floors. The different categories of students will be accommodated in different hostels. In all, there will be

1 Postgraduate (PhD and Master of Science) students' hostel, and 1 undergraduate students' hostel. The 2 hostels will have a total capacity of 150 bed spaces broken down into 100 bed spaces for undergraduate students, 30 bed spaces for Master of Science Students, and 20 bed spaces for PhD students.

The hostel for undergraduate students will have rooms with 2 beds and built in furniture such as book shelves, reading desks, reading lumps, lockers/wardrobes and other storage facilities. The students will use common shower rooms, toilets and laundry facilities. Each hostel wing will be self-contained with each wing having its own set of combined toilets/bathroom, kitchen and laundry facilities. The ground floor for the hostels for the undergraduate students will consist of a lounge and a purposely-built hygiene communal area (like food court). The food court will be in a form of a combination of self-catering services and spaces which will be demarcated into several lockable kiosks (which will be let out) and provide various foods to students.

The hostel for Postgraduate (PhD and Master of Science) students will have two wings. One wing will accommodate Masters' of Science students. The rooms for Masters' of Science students will have single beds with built in furniture such as book shelves, reading desks, reading lumps, lockers/wardrobes and other storage facilities. Some rooms will be self-contained while others will not. The wing will have shared common lounge area with its own set of combined toilets/bathrooms, kitchen and laundry facilities.

The wing for PhD Students will have a combination of single studio flats each with kitchenette and will be ensuites, and 2-bedroomed family flats with lounge/dining, kitchenette and family bathroom. The hostels will have 3 floors with shared common room/lounge area on ground floor only. The lower ground floor will accommodate offices and stores for the facilities manager.

Activities for the project will be implemented in four phases namely planning, construction, demobilization, and operation and maintenance phases. Activities under **planning phase** include obtaining different permits and approvals for the project; conducting perimeter and topographic surveys; conducting feasibility studies, detailed engineering designs and environmental and social impact assessment studies.

Activities under **construction phase** shall include site establishment; mobilization of workers; transportation of equipment (bull dozers, caterpillars, heavy duty vehicles, etc); transportation of construction materials (e.g. stone aggregates, steel, cement blocks, sand, cement, gravel, fiber cement boards, pressed metal door frames, masonite faced flush panel solid core doors, and natural anodized aluminium windows etc); construction of workers' camp; clearing of access roads and diversions; excavation and stockpiling of excavated materials (gravel and aggregate stone); cordoning; fencing the area within which access will be limited to construction workers and people working at the campus; construction of the camp structures; and construction hostel facilities.

Construction will generally be of plain concrete strip footing, load bearing cement blocks walls in foundations, load bearing cement blocks walls, reinforced concrete ground slab, steel frame structure, steel roof structure, steel door frames and windows, timber doors, ceramic tiles to some floors and glazed tiles to walls in toilets, lime putty plaster and paint to the rest of the walls internally, fair face pointed externally, painted ceiling, joinery fittings, sanitary, plumbing and electrical services.

Construction activities will take 36 months starting from June 2019 – May 2022 and will require about U$ 5,000,000.00, which Old Mutual Investment Group has already secured from investors in a form of equity and debt. Over 100 people will be employed to work at the site when construction activities begin. Once construction activities are completed, the college will use the facility to accommodate students on campus.

Activities under **demobilization phase** will include laying off workforce employed during construction phase; demobilization of equipment; demolition of workers and Contractor's camp; rehabilitation/restoration of access roads; closure and restoration of materials storage yards; removal of construction wastes; re-vegetating areas that were cleared by the Contractor along the access roads and restoration of damaged areas; and places occupied by the project construction facilities to other beneficial uses.

Activities during **operation and maintenance phase** will include commissioning the use and regular maintenance of the constructed hostels facility for the intended purpose.

1.4 Project Proponent

The project proponent is Old Mutual Investment Group. Details of the project proponent are provided as follows:

Project Developer:	Old Mutual Investment Group
Project details:	Construction of a Hostel facility at College of Medicine, Lilongwe Campus
Postal Address:	Old Mutual Investment Group, Old Mutual Building, 30 Glyn Jones Road, P.O. Box 393, **Blantyre**
Contact Person:	Ms. Linda Kumsinda
Email:	lkumsinda@oldmutual.co.mw
Phone Number:	0999953970

1.5 Project Location

College of Medicine, Lilongwe Campus is along Mzimba Road, in the city of Lilongwe, approximately 312 kilometres, by road, northwest of the main campus in Blantyre. . Figure 1.3 provides the location details of the campus while Figure 1.4 provides a site-specific map of the students' hostels.

FIGURE 1. 3 LOCATION MAP FOR COLLEGE OF MEDICINE AT LILONGWE CAMPUS

FIGURE 1. 4 MAP OF EXISTING ESTABLISHMENTS IN THE PROJECT AREA AND THE LOCATION OF THE PROPOSED HOSTELS

1.6 Current Status of the Project

The project is at design stage. Activities at this stage include obtaining different permits and approvals; conducting perimeter and topographic surveys; conducting feasibility studies, detailed engineering designs and environmental and social impact assessment study. It is expected that the environmental and social management measures that have been prescribed in this ESIA report will be incorporated into the project activities during construction phase.

1.7 Project Objectives

The objective of the project is to create modern and adequate students' hostels facilities at College of Medicine, Lilongwe campus. The students' hostels that will be constructed will assist to enhance students' academic performance at the College and will also assist to increase students' enrolment as enough bed spaces will be available to accommodate increased numbers of students on Campus. Once construction activities are completed, the college will use the students' hostels to accommodate some students who will then have easy access to different learning facilities at the college. Besides, the new students' hostels will provide conducive amenities to facilitate learning.

1.8 Objective of Environmental and Social Impact Assessment study

The objective of the ESIA study was to ensure that environmental concerns are integrated in all the project activities in order to contribute to sustainable development. The specific objectives of conducting the Environment and Social Impact Assessment study with respect to the project was to:

a) Examine in detail the likely adverse environmental impacts;
b) Propose appropriate mitigation measures for the significant negative impacts; and
c) Develop an Environmental and Social Management Plan with mechanisms for monitoring and evaluating compliance and environmental performance.

1.9 Scope of the ESIA study

The ESIA study was prepared as per the guidelines provided under the Environmental Impact Assessment Guidelines of 1997. The ESIA contains Introduction and background to the project in Chapter 1, Project Description in Chapter 2, Consideration of Alternatives in Chapter 3, Biophysical and Socio-Economic Environment in Chapter 4, Malawi's Environmental Regulatory Framework in Chapter 5, Impact Identification and their Management Measures in Chapter 6, Environmental and Social Management and Monitoring Plans in Chapter 7 and Conclusion and Recommendations in Chapter 8.

1.10 Potential Users of the ESIA report

The ESIA and the associated ESMP has been prepared for use by different stakeholders to be involved in the planning, implementation, management and monitoring of the project activities. Some of the users will include the Developer; Contractor; Lilongwe City Council; College of Medicine, Lilongwe Campus; Environmental Affairs Department; and Ministry of Lands, Housing and Urban Development. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of the project activities.

1.11 Methodology

The ESIA study for the project was carried out in accordance with the Terms of Reference that were provided by Environmental Affairs Department as provided in Annex 1. The study was undertaken between August and October 2018 and included the following methodology:

a) Literature review;
b) Site visits; and
c) Stakeholder consultation.

1.11.1 Literature Review

Literature review involved acquisition and review of project documents, reports maps and drawings relevant to the project. Other documents reviewed included different pieces of national legislation, policies, guidelines and regulations as well as international policies and guidelines and procedures. Examples of the information obtained from the different documents include project design and planned project activities.

1.11.2 Site visits

The objectives of site visits were to observe and capture baseline data on the existing biophysical and socio-economic environment of the project area. In addition, the visits provided an opportunity to consult stakeholders and senior government officials on their views regarding the project and its potential impacts.

1.11.3 Stakeholder consultations

Stakeholder Consultations formed an important feature of the ESIA study. The consultation meetings provided an opportunity for stakeholders, particularly community members around the project area to express their views on the project as well as to raise any issues of concern relating to the Project. The methodology employed for Stakeholder Consultations included:

a) Public meetings (where general information about the project was delivered, Questions and Answers conducted); and
b) Focus Group Discussions with only those who will be potentially affected by the project.

The consultation meetings were conducted in the project area in order to:

a) Inform the different stakeholders about the project;
b) Provide an opportunity for the stakeholders to discuss their opinions and concerns;
c) Manage their expectations and misconceptions regarding the project;
d) verify the significance of environmental, social and health impacts identified;
e) get inputs on compensation issues;
f) disseminate concepts of the Project activities with a view to provoking Project interest amongst the stakeholders;
g) promote sense of ownership for the Project; and
h) inform the process of developing appropriate mitigation measures.

People consulted and issues raised are presented in Annex 2, while Details of the Consultants who conducted the Environmental and Social Assessment studies are provided in Annex 3.

1.12 Existing Land Uses in the Project Area

Land for the project belongs to College of Medicine, Lilongwe Campus, which is about 8 ha out of which 6,600m^2 will be used by the project. The project therefore will not require any additional land out of the campus hence no issues of land take, resettlement and compensation will arise as the project will only use land that belongs to the college.

CHAPTER 2 PROJECT DESCRIPTION

2.1 Project design considerations

The overall design of the hostels will promote use of construction materials, which are environmentally friendly, durable, and vandal-proof and those which require minimal periodic maintenance. The general design considerations will incorporate aspects of modern architecture, the current local government building policy guidelines and the latest standards developed by (National Construction Industry Council) NCIC and the National Council of Higher Education (NCHE) Architectural Metric Handbook which will include:

a) **Ventilation:** The design will cater for natural ventilation with features that encourage natural air circulation (including use of permanent air vents above all doors and windows);

b) **Lighting**: The design caters for various types of energy efficient luminaries including fluorescent lamps and natural lighting through glass windows and doors as appropriate for both security and lighting;

c) **Sanitary hostels**: The number of toilets and wash hand basins will be selected according to the number of students in each hostel;

d) **Waste water management:** Waste water will be connected to the sewer line that passes through Kamuzu Central Hospital and is discharges at Kauma WSPs.

e) **Sustainable resource use:** The design of the hostels will incorporate landscaped gardens which will be planted with suitable species of trees / shrubs and grass to prevent ecological deterioration and improve aesthetic value of the site. Part of the excavated soil will be used for landscaping therefore reducing the amount of soil to be transported away from the site;

f) **Solid waste management:** The campus management will be required to contract a waste handler for proper waste disposal; and

g) **Fire protections**: The design of the hostels will incorporate fire- fighting equipment to be installed in each building.

2.2 Description of main project activities

Activities for the project shall be implemented in four phases namely planning, construction, demobilization, and operation and maintenance phases. Details of each of the phases are provided in the sections that follow.

2.2.1. Planning phase

Planning phase for the project commenced in August 2017 and will be concluded in April 2019. Activities during planning phase include identification of land for the project; land surveying; preparation of a master plan; preparation of detailed lay out plans; preparation of building designs,

tender processing, obtaining approvals under the Physical Planning Act of 2016 and the Bye-Laws and obtaining different approvals necessary for construction and operation of the project facilities. Environmental and Social Impact Assessment study is part of the planning phase.

2.2.2. Construction phase

2.2.2.1 Consideration for constructing different structures

Different considerations will be given when constructing different project structures. These will aim to provide stability and durability of the structures. Some of the considerations are discussed in the sections that follow.

a) Founding conditions

The hostels will require foundation on a good and uniform soil to avoid deferential settlement. A full geotechnical investigation shall be conducted to ascertain the exact founding conditions of the structures for the hostels. A soil raft of min 300mm thick G5 material will be used as pioneer layer.

b) Durability of the concrete

Durability of any concrete is dependent on the cement being used, aggregates, admixtures, concrete mix design and curing. Ordinary Portland Cements (OPC) shall be used to construct the hostels. Rapid hardening cements will be avoided due to greater evolution of heat which can lead to increased shrinkage cracking.

Local quarries will be inspected and aggregates which will be used will be tested and certified. Care shall be taken not to use admixtures containing calcium or chlorides, as these will increase the risk of reinforcement corrosion. Plasticizers will be considered, as increased workability is advantageous when working with complex shaped structures and structural forms.

Construction activities will take 36 months starting from June 2019 – May 2022. Over 100 people will be employed to work at the site when construction activities begin and 40 percent will be women. Construction activities will involve land clearing; landscaping; grading; excavation; compacting; trenching; construction of service infrastructure such access roads and a car park, construction of a workers' camp which will provide hostels to workers, storage facilities and an office facility; backfilling with compaction consolidation; levelling and earth marking; transportation of building materials; and construction of different infrastructures and other related buildings. Other infrastructure such as drainages and utility reticulation shall also be constructed. Details of facilities that will be constructed are provided in Table 2.1 and Figure 2.1 provides a site plan, which provides the location of the hostels in relation to other facilities on the project site.

TABLE 2. 1 DETAILS OF THE HOSTELS TO BE CONSTRUCTED

Beds	No. of buildings	Type	Block area (m^2)	Total gross area (m^2)
100	1 x 3 storeys	Undergraduate students	3300	3300
50	1 x 3 storeys	Postgraduate (PhD and MSc students)	3360	3360
150	**2**			**6660m^2**

Note: Gross Area includes service areas, covered walkways and terraces, drying yards.

FIGURE 2. 1 LAY OUT PLAN FOR THE PROPOSED HOSTELS AT COLLEGE OF MEDICINE IN LILONGWE

2.2.2.2 Construction activities

a) Site Preparation

Activities under site preparation will include land clearing, grading and excavation, construction of auxiliary structures where necessary such as access roads etc., leveling and earth marking.

b) Construction of the workers' camp

The project contractor will build a workers' camp at the project site which will be used to provide residence for workers as well as act as project administration offices, storage facilities for different building materials and equipment, workshop for servicing the vehicles and construction machinery. A number of factors will be considered when selecting the camp site. The factors shall include topography of the site, proximity of the site to the project site, availability of water and other considerations.

Toilets as well as bath rooms shall be constructed on the site for use by the workforce. The ground shall be covered with aggregate stone to minimize dust and prevent mud when it rains. Retention bunds shall be constructed around fuel and oil storage areas and all drainages and effluents from the workers' camp shall be treated before being discharged into the drainage system.

c) Construction of new hostels

Some of the activities to be undertaken will include excavation of foundation footing, laying down a brick base; pouring a concrete slab, installation of framework, installation of plumbing workers, putting a wall frame, roofing and finishing.

2.2.2.3 Construction workers

In all, about 100 people will be employed during construction phase. The people to be employed will include a minimum of 40% women in the workforce. The people will include supervisors, skilled and unskilled laborers. For the semiskilled and unskilled workers, the Contractor will employ people from the communities which live around the project area as a way of making sure that the project benefits the people community members in the project area.

2.2.2.4 Construction equipment

Different machinery will be used to construct the project facilities. These will include:

i) Bull Dozers for clearing the site, removal of top soil and vegetation materials, and pushing out stumps;
ii) Graders for grading and levelling land for buildings and access road formation;
iii) Tippers/lorries for transporting construction materials and workers;
iv) Light machinery like pedestrian rollers for access road compaction;
v) Heavy rollers for access roads compaction;
vi) Front end loader for loading materials onto tippers and lorries;
vii) Several light equipment like wheel burrows, shovels, picks;
viii) Concrete mixers;

ix) Earth mover;
x) Compactor;
xi) Wheelbarrow; and
xii) Hammers and bolt and nut fasteners, hand saw, electric and gas welders, electric saws and grinders, load roller, trucks, hand drills and drill bits, wire cutters, concrete mixer trucks, wheel loader, fork lift, excavator etc.

f) Construction materials

Different raw materials will be required during construction phase. Materials such as sand, gravel and quarry stone will be sourced from the surrounding areas. Quarry stone will be obtained from Nanjiri Quarry. Sand will be obtained from Salima while gravel will be obtained from Njewa borrow pit. The sites where quarry stone, gravel and sand will be collected from are approved sites.

Use of concrete blocks for construction of different infrastructures will be more environmentally friendly than use of burnt bricks, which contribute to deforestation. The concrete blocks are stronger and long lasting, do not lead to deforestation as burnt bricks do and that procurement of large quantities of cement for making the concrete blocks will contribute to increased growth of the local economy.

Other materials such as cement, paints, timber, roofing materials, windows, doors and other joinery, tilt and roller doors, wallboard and plasterboard, light fittings, fuel and oil, electricity, water, ceramic tiles, polythene, steel, steel pipes, PVC pipes, adhesives, copper wires, gas (acetylene and oxygen), cardboard will also be sourced for the project. Construction materials will be sourced depending on the construction stage.

Construction will be done by a private contractor and the client will hire a supervision engineer to supervise the construction phase of the project to ensure that the contractor complies with the design standards. The developer together with the Ministry of Transport and Public Works Officials (Buildings Department) will closely be involved in supervision of works and monitoring progress. Construction will require various input materials to produce several outputs. Table 2.2 outlines the inputs and outputs during the construction and operation phases.

TABLE 2. 2 OVERVIEW OF THE MAIN INPUTS AND OUTPUTS FROM THE PROJECT

Category of developments on the site	Main inputs into the activities	Main outputs from the activities
Construction of service infrastructure		
Land preparation activities		
Land surveying	Excavators, graders and surveying equipment	Lay out plan for the different hostel
Site development activities		
Land harrowing and land levelling	Excavators and graders	Levelled land
Construction of an access road	Graders, caterpillars, compactors, gravel	Earth access road upgraded to gravel standard
Reticulation of water facilities	Water pipes and accessories	Underground reticulation of water facilities
Reticulation of electricity facilities	Wooden poles, a transformer, Electrical wires and tubes	Installation of electricity facilities in the new and rehabilitated structures
Telecommunication	Poles, wires, radio receivers, dual channel lines	Installed telecommunication network
Construction of students' hostels and other infrastructure		
Construction of the students' hostels, access road and car parks	Stabilized soil blocks, cement, quarry, planks, iron sheets, steel, steel windows, steel doors, window panes, sand, gravel and water	Complete students' hostels, access roads and car parks
Construction of waste water management systems		
Construction of septic tanks and soak ways	Stabilized soil blocks, cement, quarry, rocks, pipes and planks	septic tanks and soak ways in place

2.2.3 Demobilization Phase

Decommissioning of the students' hostels is not expected to occur under the project, and potential future issues can be minimized by avoiding use of hazardous materials in the initial construction stage. Decommissioning of auxiliary facilities such as quarries/ borrow pits could be an issue, but

these are unlikely to be opened specifically for the construction of the students' hostels hence construction works will use existing quarries/borrow pits to obtain aggregate stone and gravel.

The main activities to be undertaken during demobilisation phase shall include demolition of the storage facility, which will take place from June – August 2022. Rubble from construction activities and demolished storage facility and other waste from construction activities will be used as fillers during foundations. Any leftover solid materials likely to be composed of bricks and crumbles of cement will be disposed by levelling off other degraded areas within the project area and within the surrounding communities in collaboration with Council Engineer responsible for roads.

Demobilization will further involve laying off of construction workers, removal of construction equipment and left-over materials, dismantling of workers' camp and levelling the site, landscaping and filling of borrow pits.

2.2.4 Operation and maintenance phase

Activities during operation and maintenance phase will include commissioning the use and regular maintenance of the student students' hostels. The effect of this is that different wastes both solid and liquid will be generated in a year and substantial liquid waste will be generated within the same period, which will require to be managed properly.

CHAPTER 3 CONSIDERATION OF ALTERNATIVES

Alternatives to projects are different ways to achieve the same purpose that the project intends to achieve. Environmental and Social Assessments require looking into alternatives to the projects in order to make prudent decisions.

The project alternative is defined as a possible course of action, in place of another that will meet the same purpose and needs. The role of project alternatives is to find the most effective way of meeting the need and purpose of the project, either through enhancing the environmental benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts. The assessment has therefore analyzed the following alternatives: Do-Nothing /'Without Project' Option; Develop the project; Technologies alternatives; Alternatives to building materials for Associated Civil and Building Works; and environmental and social considerations of alternatives.

3.1 Factors considered

3.1.1 Existing policies, legislation and standards regarding construction industry in Malawi

A review of available policies, legislation and standards of construction industry in Malawi was carried out to ensure that construction of the students' hostels conforms with the required standards. This was done to ensure the safety of the buildings.

3.1.2 Environmental considerations

Environmental factors were also considered in the choice of building materials, citing of other facilities such as wastewater treatment facilities and choice of wastewater treatment technologies. This was done in order to ensure that the project does not cause irreparable damage to the environment.

3.1.3 Cost benefit analysis

An analysis of technologies to be used was done to ensure that the amount of money that was budgeted for the project is adequate. However, this was done without compromising the quality or safety of the buildings.

3.1.4 Location and layout alternatives

The location and layout alternatives were not considered since the construction works will take place within the premises where other structures for College of Medicine, Lilongwe campus exist and therefore alternative sitting and layout was not an option.

3.2 Project Alternative

Below is the discussion of project alternatives that has been considered in relation to the proposed project.

3.2.1 Do-Nothing /'Without Project' Option

The "Do Nothing alternative" sometimes referred to as the 'no-action' alternative' assumes that the project does not go ahead, implying a continuation of the current situation or the status quo.

Construction of the students' hostels and other support facilities will not be undertaken. Table 3.1 presents the advantages and disadvantages of the alternative. It is important to note that this Do-Nothing alternative is the baseline against which all other alternatives and the development proposal have been assessed. The Do-Nothing alternative will not register any of the impacts (both positive and negative) associated with any specific alternative or the development proposal. Assessing the other alternatives would therefore unintentionally provide an assessment of the Do-Nothing alternative. In addition to the direct implications of retaining the status quo there are certain other indirect impacts, which may occur should the Do- Nothing alternative be followed. The Do-nothing alternative will entail continued absence of modern and adequate hostels facilities at the campus. Failure to build the new students' hostels at the campus will affect students' intake at the college as the college will not be able to accommodate many students. Besides, the absence of modern and adequate hostels facilities at the campus will negatively affect students' performance as most students will continue to leave far away from the college there by having difficulties to access college facilities.

TABLE 3. 1 ADVANTAGES AND DISADVANTAGES OF THE "DO NOTHING ALTERNATIVE"

Advantages	**Disadvantages**
The natural resources meant to be used for construction works at the site such as sand, water, and quarry will be saved.	The new students' hostels at the campus will not be constructed. Instead, the hostels problems being experienced at the campus will continue, which will continue to affect students' enrolment and their academic performance.
The different social and economic impacts the project would cause in the project area will not occur.	The access road to the new students' hostels facilities will not be constructed.
	Loss of employment opportunity for both skilled and unskilled workers expected to be employed during construction of the new students' hostels.
	Lack of a modern and adequate students' hostels facility at the campus which will continue to affect students' enrolment and their academic performance.

The Do-Nothing alternative means that the new students' hostels will not be constructed at the campus. Without constructing the modern and adequate hostels facilities at the campus, the college will not be able to increase its intake and students' performance will not be improved as the students who stay off campus will continue to walk long distances to access college facilities. Therefore, the "Do Nothing" was not a preferred alternative.

3.2.2 Develop the project alternative

The alternative was considered assuming that construction of the new students' hostels will

proceed as proposed. The project will proceed with construction of the new students' hostels. The alternative will cause several environmental and socio-economic impacts both positive and negative. Table 3.2 provides the positive impacts (advantage of the alternative) and the negative impacts (disadvantage of the alternative).

TABLE 3. 2 ADVANTAGES AND DISADVANTAGES OF THE "DEVELOP THE PROJECT ALTERNATIVE"

Positive impacts (advantage of the alternative)	**Negative impacts (disadvantage of the alternative).**
Increased employment opportunities at local and national level especially during construction phase	Loss of vegetation due to land clearance during construction
Creation of market for goods and services	Solid and liquid Waste generation from construction camps
Increased economic activities within the project area	Population influx due to migration of construction workers to the site
Skills transfer to different people at local and national level	Social disruption and family instability due to influx of people to the area
Increased students enrolment	Generation of construction waste
Improved students' performance	Construction related accidents
	Increased risk of illicit behavior and crime
	Influx of additional population ("followers")
	Impacts on community dynamics
	Increased burden on and competition for public service provision

The alternative will generate a number of positive and negative impacts once the project activities proceed as proposed. However, the anticipated negative impacts can be easily mitigated during construction and operation phase. "Develop the Project" alternative is therefore a preferred alternative since it will lead to socio- economic development of the country through increased students intake and improved students' performance.

3.3 Alternative building technologies

In the construction industry, there are a number of choices on the building materials. The choice of building materials can determine the durability of the structures to be built, the beauty of the structures, the cost of building the structures and the damage that can be impacted on the environment. Four options, use of burnt bricks, use of eco bricks, stabilized soil blocks and concrete bricks were considered as follows:

3.3.1 Use of burnt bricks

In Malawi, use of burnt bricks is cheap because they are locally made and can be close to the project sites. The traditional fired/burnt bricks are made from soil that is mixed with water, dried in the sun there after baked using wood fuel.

Disadvantage of burnt bricks

For large projects, large amounts of firewood and soil will be required to produce adequate amount of bricks. This can lead to destruction of natural forests and land degradation due to formation of borrow pits.

Advantages of burnt bricks

a) Bricks are strong and durable;
b) They require low maintenance cost;
c) Have excellent thermal mass i.e. in winter they keep the buildings warmer while in summer they keep the buildings cooler; and
d) They are fire resistant.

3.3.2 Stabilised Soil Blocks (SSB)

Stabilised Soil Blocks are made by mixing soil and cement in appropriate proportions. The process requires skilled labour because the strength of the bricks depends on the mixture and quality of soil used.

Disadvantage of SSB

The use of soils for a large project can lead to borrow pits which can lead to ponding and creation of breeding grounds for disease victors. However, the cost is lower than the cement blocks.

Advantages of SSB

a) SSB allows users to produce uniform blocks of greater strength than typical fired blocks that provide better thermal insulation;
b) The total cost of building a structure with SSB is 20%-30% cheaper than building with fired bricks because far less mortar is required;
c) SSB can be made on site so transportation costs are minimized;
d) SSB are environmentally friendly because they are cured in the sun as such do not contribute to deforestation as compared to fired/burnt bricks; and
e) The bricks have an appealing aesthetic with an elegant profile and uniform size that doesn't require plastering.

3.3.3 Concrete blocks

Concrete blocks are made from a mixture of quarry dust and cement to which water has been added. Like SSB, the mixture is compacted using a manual machine to ensure strength and quality.

Disadvantage of concrete blocks

The bricks are usually expensive due to increased costs of cement.

Advantages of Concrete blocks

a) Like SSB, concrete blocks allow users to produce uniform blocks of greater strength;
b) Concrete blocks can be made on site so transportation costs are minimized; and
c) Because Concrete blocks are cured in the sun, there is no fuel needed thereby helping to curb deforestation as such they are environmentally friendly like SSB;
d) Concrete blocks are strong and durable; and
   Concrete blocks are fire resistant.

3.3.4 Eco bricks

The main building materials in Malawi in both urban and rural setting are burnt bricks, which are made from soil that is mixed with water, dried in the sun thereafter baked using wood fuel. Two major concerns in the Malawi brick sector are increased deforestation due to use of fuel wood and poor brick quality resulting in poor construction quality. All the brick making activities use fuel wood fired in clamps. It has been calculated that the brick industry in Malawi alone consumes around 850,000 metric tonnes (MT) of fuel wood per year. At this rate of fuel wood consumption, the entire country will be deforested within 25-30 years only from the brick industry. In Malawi, because more fuel wood is consumed than re-grown, the combustion of wood results in an increased amount of carbon dioxide emission in the atmosphere which adds to the greenhouse gas effect. In the clamp around 20MT wood is consumed to fire 40,000 bricks. For smaller diameter wood, the consumption is more. With the kind of wood being used the average specific energy consumption in clamps is around 3.66 MJ/kg. This is expected to be much higher since the required temperature and quality is not achieved.

Eco bricks are made using the Vertical Shaft Brick Kiln (VSBK) Technology for firing the green bricks. The VSBK (Eco Kiln) technology is based on vertical shaft principles and is the most energy efficient and environmentally friendly burnt brick production technology available globally. The technology does not use fuel wood. Instead it uses waste material containing carbon to fire green bricks. Thus, if VSBK is adopted to replace clamps, then it will result in:

a) Saving of 850,000 tonnes of fuel wood annually;
b) Saving of 1,500,000 tonnes of CO_2 annually;
c) Recurring income of USD 9 million worth of foreign exchange annually;
d) Creation of more than 1,000 small to medium scale enterprises in the SME sector and ancillary industries;
e) Creation of more than 20,000 sustainable "GREEN JOBS" thereby helping in reducing poverty;
f) Use of more than 90,000 tonnes of industrial waste (e.g. boiler ash and leftovers of tobacco industry, duff coal) supporting the Malawi's contribution towards reducing pollution;
g) Recurring use of 50,000 tons of coal creating a business of USD 10 million within the country thereby promoting inclusive growth;
h) Improving the quality of housing in Malawi and incurring a saving of around 40% from bricks and mortar alone;

i) Reducing the embodied energy in housing, thereby pioneering the path of energy saving in Africa;
j) Greenhouse gas emissions are also enviably less making it an obvious choice for the carbon market;
k) VSBK is versatile and can be adapted to any scale of production;
l) It produces consistent quality bricks with higher returns than clamp brick production; and
m) Is cheaper than SSB and concrete blocks.

After analysing advantages and disadvantages of using SSB, concrete blocks, burnt bricks, and eco bricks, it was found that not only are eco bricks environmentally friendly since they do not use wood fuel for curing but also their use is cost effective since they do not use cement, which raises the cost of producing SSB and concrete blocks. Considering all these, Eco bricks are the preferred building materials compared to SSB, burnt bricks and concrete blocks and are followed by SSB as one saves on transport costs when using SSB since these can be made on site. The walling material for construction of the project facilities should therefore be made of SSB and Eco bricks.

3.4 Alternative sewage disposal methods

It is expected that during operation phase more than 15,000 liters of wastewater will be generated on daily basis. This volume was calculated based on assumption that one individual generates about 100 liters of wastewater per day. As such, there is need to consider how to properly manage and dispose of this volume of wastewater. Considering that most areas in Lilongwe are not connected to any sewerage for wastewater treatment, options such as use of septic tanks and use of wastewater stabilization ponds were considered and are discussed as follows:

3.4.1 Use of septic tanks

Use of septic tanks to manage wastewater was one of the options that were considered. Advantages of using septic tanks over wastewater stabilization ponds (WSP) include:

a) Septic tanks are easier to operate than WSP as such they do not require personnel to manage its operations except when there are blockages;
b) Septic tanks do not generate odor as they are usually under cover;
c) Septic tanks do not require a lot of space as compared to WSP; and
d) Septic tanks are not left open as the case is with WSP which become breeding ground for vector insects and pose as potential hazards to the general public and children in case of drowning.

The main disadvantage of using septic tanks is that they need periodic emptying, and this could raise the operation cost over time. With the large volume of effluents that will be discharged from the project during operation, the septic tanks will need to be emptied time and again making the alternative not viable.

3.4.2 Use of wastewater stabilization ponds

Use of wastewater stabilization ponds is one of the commonly used methods of treating wastewater in the tropics. Although this is one of the cheapest ways of treating wastewater, the method requires

more space than the other wastewater treatment facilities. Since space is a limiting factor for the project, this is not a preferred option.

Disadvantages of using WSP include:

a) WSP require more space than other wastewater treatment facilities;
b) If not properly managed, wastewater stabilization ponds result into breeding grounds for mosquitoes;
c) Can generate odour if the system is not operating effectively; and
d) Has the potential to pollute recipient water body if there is system failure as such it needs personnel to manage to ensure that it operates effectively and efficiently;

Advantages of using WSP include:

a) As compared to septic tanks, WSP do not require emptying of wastewater as it is discharged into the environment after its treatment;
b) Cheap and easy to operate;

Considering that the campus does not have enough space to accommodate the wastewater stabilization ponds away from other structures such as class rooms, students' hostels and the administration block, the alternative was not preferred. However, use of a sewer line that is in close proximity to the project area was preferred than using waste water stabilization ponds.

3.4.3 Discharging liquid waste to the sewer line to Kauma wastewater treatment plant

There is a sewer line that passes through Kamuzu Central Hospital about 500 m away from College of Medicine, Lilongwe campus that transports liquid waste from the hospital to Kauma waste water treatment plant. Considering that a large volume of liquid waste will be discharged from the campus on daily basis, it will be environmentally friendly to discharge the liquid waste into the sewer line for treatment at Kauma.

Advantages of discharging liquid waste to the sewer line to Kauma wastewater treatment plant:

a) No space will be required at the campus for treating waste water as in the case of waste stabilization ponds;
b) If not properly managed, wastewater stabilization ponds result into breeding grounds for mosquitoes. With the sewer lines, no breeding grounds for vector insects will be constructed on site;
c) There will be no odor at the campus as the case is with stabilization ponds;
d) The waste water is contained properly with no potential to pollute recipient water body if there is system failure as such it needs personnel to manage to ensure that it operates effectively and efficiently; and
e) No need for periodic emptying as the case is with septic tanks;

The only disadvantage of discharging liquid waste to the sewer line to Kauma wastewater treatment plant is that the initial connection to the sewer line will require a lot of capital investment. But once this is done there will be minimal maintenance costs for the operation of the facility.

Considering that the campus does not have enough space to accommodate the wastewater stabilization ponds away from other structures such as class rooms, students' hostels and the administration block, and that septic tanks will need to be emptied from time, the preferred alternative is that to discharge waste water into the sewer line that discharges all the waste water to Kauma waste water treatment plant.

3.5 Alternative solid waste disposal methods

3.5.1 Food Waste

With the increased number of students at the campus, it is expected that food waste will be generated on daily basis and an analysis of alternative disposal methods was made as follows:

3.5.1.1 Use of rubbish pits

The use of rubbish pits inside the college compound to dispose of food waste was considered as one of the alternatives. However, this option was not favoured because this could lead to breeding of houseflies and could attract scavengers such as dogs and cats. Despite this, advantages include low cost in terms of operation because there will be no costs related to transportation and handling of the waste.

3.5.1.2 Use of waste disposal site operated by Lilongwe District Council

This method involves arranging with Lilongwe District Council to collect waste food for disposal at designated dumping site for the council. However, in an event that the council fails to collect the waste food, the waste food can produce bad odour which can attract flies, dogs etc. As such for this arrangement to work properly, the college needs to have a standby vehicle to assist when such a situation arises. In addition, in order to reduce the volume of waste food, an arrangement will be made with people/institutions that are in piggery business to come and collect waste food to feed their stock. This alternative was considered to be favourable for the disposal of waste food.

3.5.2 Paper Waste

The teaching and learning activities at the college are likely going to generate paper waste that will need to be disposed of. There are a number of disposal alternatives that were analyzed and these include:

3.5.2.1 Use of rubbish pits

This alternative was not favored because waste paper could easily be blown off by wind from the rubbish pit and litter the college campus. An advantage to this alternative includes low cost in terms of operation because there will be no charges related to transportation and handling of the waste.

3.5.2.2 Recycling of paper waste

The college will either embark on waste recycling project or arrange with paper waste recycling companies to come to collect paper waste periodically. It was envisaged that this initiative will not

only benefit the college but also the whole Lilongwe City Council because the volume of waste paper flying around the Council will be reduced. As such this was the favored option in the management of paper waste.

CHAPTER 4 BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT

This Chapter presents the descriptions of the biophysical and socio-economic environment of the project area. A study of the existing environment for the project has been carried out on the physical, biological and socio-economic environment of the project impact areas. The study has provided a measure of the existing state of the environment against which future changes imposed by the project activities will be measured and monitored. The physical and biological environment that have been studied included climate, topography and geology, soils, hydrology, flora and fauna and socio-economic factors among others.

4.1 Biophysical Environment

4.1.1 Topography

The topography of Lilongwe and of the project area is largely flat with an elevation ranging from 1,000 to 1,200 meters above sea level. The northern part of the city is undulating with several small streams flowing eastwards. In the past these drainage lines were retained as open spaces, however with pressure for land in the more affluent north they have been developed. This has an impact on the flood levels and groundwater.

4.1.2 Geology

The geology of the project area is dominated by crystalline precambrian to Lower Palaeozoic rocks that have been affected by the polycyclic Mozambique orogeny (Carter and Bennett, 1973) and generally referred to as the Basement Complex (Carter and Bennet, 1973). Pelitic to semi-pelitic rocks including banded hornblende-biotite gneisses with intercalations of marbles, calc-silicate gneisses, quartzites and mica schists cover much of the country.

4.1.3 Soil

The project area has clay loamy reddish-brown soils with typical properties of the ferruginous subdivision of the latosols group. The latosols, characterizing the Lilongwe Plain, are relatively fertile, although crop yields can be increased by the addition of fertilizer. They are freely drained soils and comprise by far the greatest proportion of cultivable soils in Lilongwe. The soils are less exposed to the risk of erosion due to their deep sub layer which encourages infiltration.

4.1.4 Climate

Like the rest of the country, the city is characterized by two distinctive seasons. The dry and cool season is from April to October while from November to March it is hot and wet. Average maximum temperatures range from 23.4 degrees Celsius in July to 32 degrees Celsius in October. In October and November, temperatures more than 30 degrees Celsius are not uncommon. The lowest temperatures are experienced in July with the monthly average minimum temperatures ranging from 9.5 to 18.9 degrees Celsius.

Annual rainfall data and average rainfall data ranges from 808mm to 1, 080mm. January is the wettest month with an average of 239 mm of rain for the period 2004 to 2010. The months of February and December also experience a lot of rains with an average of 200mm and 194mm over

the period 2004 – 2010. February 2010 recorded the highest rainfall of 322.4mm. May to October is the driest period of the year with virtually no rain at all recorded over the seven-year period of 2004 – 2010.

The recent trends in rainfall have been generally a reduction in the total amount with the average for the last 10 years 100mm less than the previous 10 years. The rainy seasons are also characterized by dry spells of 2 – 4 weeks in late January and February. In discussions with the brick makers on site they said that there was very little water in the stream during the rainy season last year (2014 – '15) which is explained by the figure of 578mm, 214mm less than normal / average.

4.1.5 Flora and fauna

Vegetation around the project area is comprised of a considerable sparse vegetation characteristic of open grassy woodland and ruminant Gmelina trees in particular on the plain terrain as it slopes towards Lilongwe River. Currently because of industrial development activities taking place in the area, most of the surrounding areas are bare devoid of vegetation.

A field survey in the project area showed that the partial vegetation in the surrounding area supports substantial populations of flora and fauna species. Observations mainly were used to collect information on the flora and fauna. Also interviews with people working/living around the site were used to collect data on fauna that was not observed during the field observations.

4.1.5.1 Fauna

The field survey revealed that there were forty-three bird species whose checklist showing distribution of these species across various taxonomic categories. In addition, about 10 mammals were recorded in the surroundin area. These included Wehlberg's fruit bat (*Epmophorus wehlbergi),* Common lit-faced bat *(Nycteris thebiaca),* Lander's horseshoe bat (*Rhinolophus landeri),* Elephant shrew (*Elephantulus fuscus*), Sun squirrel *(Heliosciurus mutabilis),* Silvery mole rats *(Heliophobius argenteocinereus),* Spiny mouse (*Acomys spinosissimus),* Woodland mouse *(Grammomys dolichurus),* African dormice *(Graphiurus microtis).*

There were twelve reptiles that were recorded during the survey. These included Flap-necked chameleon (*Chamaeleo dilepis)* Common house gecko (*Hemidactylus mabouia)* Boulenger's skink (*Mabuya boulengeri),* Striped skink (*Mabuya striata),* Variable skink (*Mabuya varia),* Monitor lizard (*Varanus niloticus),* Brown house snake (*Lamprophisfu liginosus),* Spotted bush snake (*Philothamnus semivariegatus),* Olive grass snake (*Psammophis mossambicus),* Vine snake (*Thelotornis capensis),* African Rock Python (*Python sebae*) and Mozambique spitting cobra (*Naja mossambica).* Of these species, the African Rock Python (*Python sebae*) is listed on Conservation on International Trade of Endangered Species (CITES) Appendix II List.

Six amphibian species were also recorded during the survey. These included Guttural toad (*Bufo gutturalis),* Argus reed frog (*Hyperolius argus),* Mueller'splatanna (*Xenopus muelleri),* Anchieta's ridged frog (*Ptychadena anchietae),* African bull frog (*Pyxicephalus adspersus),* Gray tree frog

(*Chiromantis xerambelina).* The survey also recorded the following insect families: Carabaeidae, Buprestudae, Meloidae, Curculionidae, Gyrinidae, Pentatomidae, Papilionidae, Coreidae, Reduviidae, Nymphalidae, Acraeidae, Hesperiidae, Pieridae and Noctuidae.

4.1.5.2 Flora

The site lost its natural vegetation due to urban development. During the field survey that was carried out, it was observed that there were a number of plant species that were observed, most of which were indigenous plant species. Some of the plants that were recorded are protected tree species. All the protected tree species that will be affected by the construction activities will be replanted.

4.1.6 Hydrology

The hydrology of the project area is influenced by Lilongwe River which is the source of raw water for Lilongwe Water Board. Lilongwe River is the biggest and longest of all rivers in Lilongwe City and supplies raw water to Lilongwe Water Board which is distributed to almost 80% of the City residents. Lilongwe River runs from the west to the east of the City and is a tributary to Linthipe River that empties its water in Lake Malawi.

City of Lilongwe has a number of rivers and streams that provide water for various uses but the most notable ones are Lilongwe, Lingadzi, Nankhaka and Chankhandwe.

4.2 Socio-economic environment

The socio-economic aspects that were studied in the project area included:

4.2.1 Population

Lilongwe is the fastest growing urban area in the country. It has an area of approximately 728,000 Ha. According to the 2018 Population census, Lilongwe has a population of 1,227,100. The City had a population of only 19,425 in 1966 which means that it has grown over 55 times in the last 50 years. The population growth has had a corresponding increase in the population density, from 43 persons per square kilometre in 1966 to 1,479 persons per square kilometre in 2015, which has exerted so much pressure on the requirements for water distribution network to service the residents in the city and surrounding areas.

The population of the City has been growing since many people have steadily been moving to the City from the rural areas in search of employment and better living conditions. Over 70 % of the population of Lilongwe City live in the poor high-density areas (squatters) and Traditional Housing Areas (THAs). Close to the project area are Kawale, Ntchesi and Biwi.

It is expected that much of the unskilled labour force for the construction activities will be sourced from surrounding areas of Kawale, Nchesi and Biwi. This is so because apart from being high density areas and close to the project area, most of the people (from these areas) are from low socio-economic status as compared to Area 33.

4.2.2 Health

The closest public health facility to the project area is Kamuzu Central Hospital, which is a referral hospital. Other health facilities include Bwaila District Hospital, Kawale Health Center, Area 18 Health Centre, African Bible College Clinic and Likuni Hospital. According to Lilongwe District Health Office, the top 3 diseases that are of public health importance, which have been recorded at Kamuzu Central Hospital include Malaria, Common Cold and Diarrhoea (Table 4.1).

TABLE 4. 1 COMMON DISEASES IN AREA 33 AND SURROUNDING AREAS (JANUARY - MARCH 2017)

S/N	Name of Disease	Reported cases	Recommendations
1	Malaria	57	Indoor residual spraying at least every six months
2	Common cold	54	Ensuring clean surfaces/ personal hygiene/good ventilation
3	Diarrhea	37	Ensure clean water, good sanitation and personal hygiene

Source: Lilongwe District Health Office (March, 2017)

This data was isolated from the Out- Patient Department (OPD) register of Kamuzu Central Hospital and it for areas 6, 47, 14, 15, 33, 9, 3 and area 4. The environmental health department's assessment also confirmed that these are the common health problems that these areas face with regards to housing standards. Other common cases were high blood pressure, diabetes and cancers. Furthermore, being a middle to high income area, the residents in these areas also get medical services from private clinics such as MASM and African Bible College.

Lilongwe has the full range of diseases including cholera, typhoid, tuberculosis (TB), measles, infectious hepatitis, malaria, and HIV/AIDS. Malaria is the leading cause of morbidity and mortality in the City, especially among children under five years old. Malaria accounts for 40 percent of all outpatient visits to health facilities. Pneumonia and diarrhoea are the other leading causes of death in children under five years old. Despite the continuing presence of these diseases, on the whole, Malawi's health conditions appear to be improving. The impact areas are mainly affected by malaria, pneumonia, diarrhoea, common injuries, chicken pox outbreaks and HIV and AIDS. The general HIV and AIDS picture for Lilongwe district based on HIV testing and counselling (HTC) and prevention of mother to child transmission (PMTCT) observations indicates that the average HIV prevalence is at 8.4% (MDHS, 2010).

4.2.3 Education

According to information provided by District Education Manager for Lilongwe, the project area (Area 33) is located in Chimutu Education Zone.

Lilongwe City has 55 full public government primary schools, 48 registered private primary schools and 51 unregistered private primary schools. There are a total of 1,100 classrooms in the 55 public schools. The district has a total of 2,144 teachers of which 1,920 are female and 224 are male and there are 70, 999 boys and 75,214 girls making an enrolment of 146, 213 which translate into pupil: teacher ratio of 68:1.

There are 29 public secondary schools. Out of these, 24 are Community Day Secondary Schools (CDSSs).Out of the five conventional secondary schools, one is a girls' national boarding secondary school, three are double shift day secondary schools and the remaining is a day secondary school. There are 10 registered and more non-registered private secondary schools.

4.2.4 Employment

Lilongwe registers the highest unemployment rate at 16.1% compared to other cities. The economy of Lilongwe relies on various sectors such as the civil service, tobacco industry services, construction industry and informal sector. Some of the employers are investors from outside the country. The civil service remains the largest formal employer in the city with 25% of the city's work force.

Employment rate in Lilongwe City has been increasing since 2007 due to several construction projects currently taking shape in the city. The employment rate rose to 83.9 in 2007 from about 81% in 2005 (NSO, 2007). Whereas the majority of those classified as employees or in wage employment totaling 50.4% worked in the social and community services sector (58.8%), a good proportion was in the manufacturing sector.

4.2.5 Industry and Commerce

Commerce: Although the sector has been facing some challenges, there is significant growth. The opening of major chain stores has created windows for commercial suppliers in the City. New shopping malls are under construction and small and medium scale businessmen are investing in various enterprises.

Informal Sector: Many people in the City are self-employed in family (24%) or private (22%) businesses. There are people who are employed by private individuals (18%). The sector is a major contributor to commercial, services and industrial growth in the city.

Manufacturing Sector: The manufacturing sector is the second largest wage employer (12.6%) after social and community services sector. Although it is still underdeveloped, the sector contributes significantly to the local and national economies.

4.2.6 Water supply

Lilongwe Water Board (LWB) is responsible for providing potable water supply in the city of Lilongwe. LWB is an executing agency under the Ministry of Agriculture, Irrigation and Water Development (MoAIWD) and reports both to MoAIWD and Comptroller of Statutory Bodies. The

main water source utilized by Lilongwe Water Board is Lilongwe River where the two reservoirs of Kamuzu 1 at Malingunde and Kamuzu 2 at Msinja have a combined safe yield of 86,000 cubic meters per day. According to LWB, the average daily water production is 85,000 cubic meters per day. LWB currently supplies water to 80% of the City residents.

The installed capacity of the treatment plants at LWB is 95,000 cubic meters per day while the average sales volume is 55,000 cubic meters per day. Requirements for high, medium and low density residential areas are 25, 80 and 150 liters per person per day respectively. The actual average consumption is 105 liters per person per day. Supply of water in the city is through house connections, yard connections and kiosks. In the project area in Area 3, the supply is mainly through house connections.

The water supply system for Lilongwe city is facing a number of challenges such as the lowering water levels at Kamuzu dam I and II, an aged pipeline system, which, coupled with the rapid population and business growth in the city require huge investments to improve the water availability situation. In 2016, 1800m^3/day was added into the supply system from boreholes.

4.2.7 Power supply

Electricity Supply Corporation of Malawi (ESCOM) supplies electricity to Lilongwe City. According to National Statistical Office of Malawi (NSO), about 46 percent of the households used electricity for lighting in 2007, while only 18.5 percent used electricity for cooking. Firewood and charcoal are still the dominant sources of energy for cooking with attendant problem of deforestation.

Nationwide, power demand surpasses power supply, leading to frequent power outages. ESCOM carries out planned load shedding throughout the country including Lilongwe City. A standby generator will be required at the project site to avoid disruption of operations of the facility. The power transmission network is composed of high and medium voltage lines. Low voltage lines of 400 V and 230 V are utilized to user's connection. ESCOM power sales increased from 902 GWh in 2000 to 1,116 GWh in 2006. Daily power demand usually peaks around 18:00 to 20:00.

4.2.8 Gender analysis and mainstreaming

Sections 20 and 41 of the Constitution of Malawi uphold the principle of equal rights for men and women and prohibit any discrimination based on gender or marital status.The Republic of Malawi ratified the Convention on *'The Elimination of All Forms of Discrimination against Women'* in 1987. Malawi signed the Optional Protocol in 2000, but has yet to proceed with ratification. It ratified the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa in 2005. Malawi has achieved gender parity with respect to primary school enrolments, which indicates an improvement in attitudes towards girls' education.

Old Mutual has deliberate Policy to encourage the employment of both men and women. The policy also encourages that there should be equal employment benefits for both men and women.

The contractor for the project will therefore be encouraged to use the policy to ensure that there are equal employment opportunities for both men and women.

4.2.9 HIV and AIDS

Lilongwe City treats gender and HIV and AIDS as crosscutting issues in all programmes being implemented with the Department of Health taking the lead in the implementation of Gender and HIV and AIDS initiatives. HIV and AIDS rates stood at about 15 percent in 2007 down from about 25 percent in 1996. Other institutions that have contributed to efforts to tackle HIV and AIDs include the National AIDS Commission (NAC) and local development and humanitarian organizations.

Old Mutual has an 'HIV and AIDS Work Place Policy' where workers have been sensitised against decsrimination and encouraged to go for HIV testing. The contractor for the project will therefore be encourged to use the Policy for the benefit of its workers.

4.2.10 Solid Waste Management and sanitation

a) Solid waste management

Lilongwe City Council (LCC) is in charge of waste management in the city. The Cleansing Services within the LCC is responsible for waste collection and disposal. Waste management is largely focused towards planned areas. The informal urban areas, which include over 60 percent of the urban population, have little access to waste management services provided by the LCC, mostly serving the markets.

Due to distance from the project development areas to the dumpsite in Area 38, it is recommended that waste requiring removal from the construction sites should be minimized by activities within the site, e.g. composting of organic material and recycling of combustible material. There will be need for appropriate on-site garbage storage facilities during project construction phase.

The project will generate solid waste both during construction and operation phases. The waste will range from offcuts from pipes, construction materials as well as waste from domestic activities. Domestic as well as office solid waste will be disposed in bins which will be collected for disposal by Lilongwe City Council on arrangement for disposal at Area 38.

During operation phase, waste from the screens at water intake and the sludge will be collected and will be used to rehabilitate large holes which have been created by sand miners across Lilongwe River where sand miners collect sand.

b) Sanitation

The project contractor will set up a workers' camp for the project, which will be used to provide shelter for workers during day time as well as act as project administration offices, storage facilities for different building materials and equipment, workshop for servicing the vehicles and construction machinery. Considering that there will be a number of workers at the camp site during day time, issues of sanitation will arise.

Toilets, wash rooms and change rooms will be constructed within the campsite. The toilets will be used to manage all humans wastes such as urine, faeces and sanitary pads for women. The Contractors and senior staff members will have flush toilets where the liquid waste management system is characterized by septic tanks.

4.2.11 Liquid waste management

The liquid waste management system is characterised by septic tanks. All building at the college are connected to septic tanks. However, it was established that the septic tanks fill up time and again and require emptying quite often.

There is a sewer line that passes through Kamuzu Central Hospital about 500 m away from College of Medicine, Lilongwe campus that transports liquid waste from the hospital to Kauma waste water treatment plant. Considering that a large volume of liquid waste will be discharged from the campus on daily basis, it will be environmentally friendly to discharge the liquid waste into the sewer line for treatment at Kauma instead of using septic tanks.

4.2.12 Transport and Communication

Minibuses, tricycles and bicycle taxis (Figure 5.1) are the common modes of transport in the city of Lilongwe. An average of about 40 percent of the population rely on minibuses to transport them from one location to another. Taxi services are available but they are too expensive for the poor majority. Bicycle taxis are also increasing in popularity in the peri-urban and low-income areas. However, the current roads infrastructure is inadequate to support the growing number of vehicles leading to increased traffic congestion and a lot of time wasted in traffic jams.

FIGURE 4. 1 SOME OF THE TRANSPORT SYSTEMS IN THE CITY OF LILONGWE

The city has one international airport and railway station. Many people however still walk to their various places of work resulting in a high number of pedestrians. However, the absence of footpaths creates conflict between motorists and pedestrians and has resulted in a high increase in road accidents. The local authorities need to provide adequate transport infrastructure such as footpaths, bicycle paths, safe pedestrian crossings and flyovers, and well-protected bus lay-bys.

The Road Traffic Directorate in the Ministry of Transport and Public Works provides the legal framework for the transport industry. It administers regulatory provisions governing motor vehicle administration, driver licensing, operator authorization, permit control and other related traffic management controls.

The road network in the City comprises main, secondary and minor roads. M1 forms the north-south trunk axis. Secondary and (minor) urban roads extend from M1 to main urban development areas and settlements, especially in the southern part of the city. The total road length is approximately 585 km. Overall, the main and secondary roads are well developed in terms of pavement condition.

The traffic survey carried by the JICA Team in 2010 indicates that traffic volumes in the city vary between 1,200 and 27,000 cars per day. The most serious bottleneck point is between the Lilongwe Town Hall roundabout and the Old Town in Area 1 where the daily traffic volume is 27,000 cars per day. The traffic volumes of other sections are within the road capacities.

The area is within the coverage of Access, Airtel, MTL and TNM networks hence people are able to make and receive calls and send and receive messages from friends and relatives using cell phones and land lines and there are a number of service providers of internent including Skyband, Malawi Net, Globe Internet, and Broadband Digital Solutions.

4.2.13 Cultural, Ancestral framework and Local customs and traditions

According to Population and Housing Census carried out by the National Statitistics of Malawi(NSO) in 2008, there is mixing of cultures in Lilongwe City, as a result of co-existence of the major tribes Mang'anja, Chewa, Ngoni, Senga, Tumbuka, Yao and foreigners. Almost all the areas in the study area are ethnically mixed, reflecting a regional trend with significant numbers of settlers from other parts of Malawi. Chichewa is the most common language that is used; other languages spoken are mang'anja, yao and tumbuka. All the tribes have beliefs such as witchcraft and evil spirits/ supernatural gods. All people in the area have different beliefs according to their customs and norms.

4.2.14 Monuments and buildings

In terms of specific places of cultural and historical interest, Lilongwe has a few, including original mission stations and centers of excellence for handicrafts however, the project will not interfere with any monuments or buildings. The project area is already disturbed, and no cultural heritage is expected to be affected by the construction activities of new Hostels. However, should any physical cultural resources be found during excavations, the Contractor will link up with Department of Museums and Monuments according the Monuments and Relics Act of 1990.

4.2.15 Security

In an attempt to promote safety and security in the project area, residents of Area 33 established community policing in partnership with Sanctuary Police Station. The Community Policing Services patrol the area during night in oder to ensure that robbers do not attack residents. In order

to beef up security of College of Medicine premises, Old Mutual will hire services of Private Security Company. It is expected that during construction phase of the project the Private Security Companty will be key in ensuring that property belonging to Old Mutual is secured as there will be an influx of people searching for employment.

CHAPTER 5 REVIEW OF RELEVANT POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Malawi's environmental regulatory framework

Malawi has over the years, developed a number of policies and legislation to guide environmentally and socially sustainable development in various sectors of the economy through mainstreaming of environmental and social issues in project planning and implementation. These include the Constitution of the Republic of Malawi of 1995; different policies and pieces of legislation. Besides, Malawi also uses different international procedures, policies and guidelines where national laws, policies, procedures, guidelines and legislation are falling short to guide sustainable development.

This chapter therefore outlines the policies, legislative and administrative frameworks relevant to guide implementation of activities of the project.

5.2 Policy framework

Over the years Malawi has developed various national policies to guide implementation of different project activities in the country. Some of the policies relevant to the activities of the project are discussed below.

5.2.1 National Environmental Policy, 2004

The National Environmental Policy of 2004 is based on the principles of National Environmental Action Plan and provides a policy framework on environmental planning in development programmes including undertaking environmental and social impact assessments for different development projects. The overall goal of the Policy is to promote sustainable social and economic development through sound management of the environment in Malawi. The policy among other things seeks to:

a) promote efficient utilisation and management of the country's natural resources and encourage, where appropriate, long-term self-sufficiency in food, fuel wood and other energy requirements; and
b) facilitate restoration, maintenance and enhancement of ecosystems and ecological processes essential for functioning of the biosphere and prudent use of renewable resources;

Activities for the project shall among other things involve clearing, excavation and levelling of soil, extraction of gravel and quarry, transportation of materials, compaction of sub-base material and construction of students' hostels and different infrastructure at College of Medicine, Lilongwe campus, which will have the potential to cause occupational harm and pollution of the environment and water bodies. The implication of the policy is that the project has to put in place measures to reduce adverse impacts arising from the activities of the project and that implementation of the activities of this project has to take sustainability issues on board.

The Policy has implications on the project as the project will cause negative impacts in the project area and beyond. Some of the impacts will include increased generation of waste; injuries due to construction works; increased risk of dust emission and air pollution; risk of social conflict; increased risk of illicit behavior and crime; impacts on community dynamics; increased risk of communicable diseases; increased cases of accidents; possible disruption of public service utilities; increased demand for sanitary facilities; and increased disruption of activities at College of Medicine, Lilongwe campus. As a requirement under the environmental policy, the developer will therefore prepare an environmental and social management plan, which will be implemented during project construction and operation phases.

In line with this policy and through this ESIA, the project developer will integrate the environmental and social concerns into their planning processes and will promote public participation, enhance public awareness, and cooperation with other institutions.

5.2.2 National Land Policy, 2002

This is the principal policy that guides land management and administration issues in Malawi. The policy introduces major reforms intended in land planning, use, management and tenure. It provides clear definition of land ownership categories (Section 4) and addresses the issue of compensation payment for land (Section 4.6).

The policy also has provisions for environmental management covering issues related to both urban and rural management of solid and liquid waste, protection of sensitive areas, agricultural resource conservation and land use, community forests and woodland management, over-dependence on fuel wood, forest programs, co-ordination of multiple land use, water resources and wetlands, lakeshore environmental management and mining and minerals. Of particular importance is Section 9.8.1 (c) which states that development activities in fragile ecosystems such as wetlands, game reserves, forest reserves and critical habitants will only be permitted after the appropriate authority has conducted an environmental and social impact assessment.

The project will not cause loss of land and property by the people in the project area as the project will be implemented on land that already belongs to College of Medicine, Lilongwe campus. Issues of resettlement and compensation will therefore not arise as a result of the project. Furthermore, the ESMP in the ESIA report will cover all issues to do with waste management, deforestation, conservation and land use and protection of sensitive areas.

5.2.3 National Construction Industry Policy, 2015

Construction of the students' hostels at College of Medicine, Lilongwe campus will trigger the Construction Industry Policy in that the project developer must ensure that the contractor protects the environment, in line with national and international policies for environmental sustainability. Areas of focus include occupational health and welfare; gender; and HIV and AIDS.

5.2.4 National Water Policy, 2005

The policy aims at providing comprehensive and integrated water resources conservation and management. It addresses all aspects of water including resource management, development, and service delivery conforming to the current global and regional trends and the requirements as reflected under the Sustainable Development Goals. The overall policy goal is sustainable management and utilization of water resources in order to:

a) Provide water of acceptable quality and of sufficient quantities;
b) Ensure availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian; and
c) Enhance the country's natural ecosystems.

One of the objectives of the policy is promotion of public and private sector participation in water resources management, development, supply and conservation. The principles that will guide the implementation of the project in relation to the policy include the following:

a) Management, protection and conservation of water resources to be undertaken in an integrated manner;
b) All people to have access to potable water and sanitation services in order to reduce incidences of water related diseases;
c) Water resources shall be optimally, equitable and rationally allocated and regulated to ensure sustainable optimal economic returns and social enhancement;
d) Water resources management will be based on the concept of decentralization and will promote local participation with the catchment as the unit of water management;
e) Promote the empowerment of user communities to own, manage and invest in water resources development; and
f) Pollution of water resources shall follow the "Polluter Pays" principle in order to ensure water user responsibility.

Activities of the project have the potential to negatively affect the water resources. It is therefore recommended that implementation of the activities of the project should minimize pollution of the public water thereby promoting public health and hygiene and environmental sustainability.

5.2.5 Malawi National HIV and AIDS Policy, 2003

The Malawi National HIV/AIDS policy was adopted by government in 2003. Its main goal is to prevent HIV and AIDS infections, to reduce vulnerability to HIV and AIDS, to improve the provision of treatment, care and support for people living with HIV and AIDS and to mitigate the socio-economic impact of HIV and AIDS on individuals, families, communities and the nation.

Chapter 7 of the Policy observes that in workplaces unfair discrimination against people living with HIV and AIDS has been perpetuated through practices such as pre-employment HIV and AIDS testing, dismissal for being HIV and AIDS positive and the denial of employee benefits if known to be infected. HIV and AIDS affects every workplace. Absenteeism and death impact on productivity, employee benefits, production costs and workplace morale.

The project will have the potential to cause labour influx in the project area which will likely cause spread of HIV and AIDS. As a way of implementing the Malawi National HIV and AIDS policy, the proponent will implement an HIV and AIDS workplace policy and prevention, treatment, care, support and impact mitigation programmes as one way of effectively reducing and managing the impact of HIV and AIDS in the work place.

5.2.6 Guidelines of Environmental Impact Assessment in Malawi, 1997

The Guidelines are a key tool in providing guidance on how the ESIA study should be carried out in Malawi. It includes a list of all prescribed projects for which ESIAs are required. The Guidelines provide further advice on the procedures to be followed in getting approval for the various projects. In particular, the developer will submit the report to the Environmental Affairs Department where the Technical Committee on the Environment will provide the necessary input to allow the National Committee on Environmental to make an informed decision on the submitted ESIA Reports.

5.2.7 National Land Resources Management Policy and Strategy, 2000

Malawi Government developed the National Land Resources Policy and Strategy to promote efficient diversified and sustainable use of land based resources both for agriculture and other sustainable socio-economic developments. This was because for a long time different development processes in the country have been accompanied by unprecedented infrastructure development. A considerable proportion of these development projects have been carried out without special coordination within the context of the policy thereby resulting into land use conflicts and unsustainable land use management practices.

The project at hand is a development project and will involve construction of new students' hostels for students at College of Medicine, Lilongwe campus to increase students' enrolment and improve students' academic performance hence all principles of the policy will be followed.

5.2.8 Gender Policy, 2008

Malawi Government appreciates that gender inequality is a significant constraint to socio-economic growth and poverty reduction. The policy specifies that Government has a responsibility to integrate gender into the development, design, implementation, and monitoring of different development programs.

According to this Policy, Government of Malawi is expected to implement a constitutional obligation of building a society where men, women, boys and girls equally and effectively participate in and benefit from different development processes. The project will ensure that wherever there are any employment opportunities, women will be given equal chances as men for employment. Deliberate effort will also be made to ensure that among the employees, 30% should be women.

5.3 Regulatory Framework

The section provides a review of key national legislation pertinent to development and operation of the project. The project proponent intends to develop and operate the project in line with all relevant national laws. Details of the legal frameworks considered are presented in the sections that follow.

5.3.1 The Constitution of the Republic of Malawi, 1995

The Constitution of the Republic of Malawi (1995) is the supreme law of the land. It contains, among other things, principles of national policy in Section 13. The section sets out a broad framework for sustainable environmental and social management at various levels in Malawi. Among other issues, the section provides for environmental and social issues under Principles of National Policy. Section 13 (d) of the Constitution provides that the state shall actively promote the welfare and development of the people of Malawi by progressively adopting and implementing policies and legislation aimed at managing the environment responsibly in order to:-

a) Prevent the degradation of the environment;
b) Provide a health living and working environment for the people of Malawi;
c) Accord full recognition to the rights of future generations by means of promoting environmental and social protection and sustainable development of natural resources;
d) Conserve and enhance the biological diversity of Malawi; and
e) Enhance the quality of life in rural communities with the ultimate aim of attaining sustainable development.

The Constitution further provides for a framework for the integration of environmental and social consideration into any development programs. The implication of this provision is that Government, its cooperating partners and the private sector have a responsibility of ensuring that development programs and projects are undertaken in an environmentally and socially responsible manner.

5.3.2 Environment Management Act, 1996

The Environment Management Act (1996) makes provision for the protection and management of the environment and the conservation and sustainable utilization of natural resources. Sections 24, 25 and 26 of the EMA provide the legal framework for managing the Environmental Impact Assessment (EIA) process. - Section 24 outlines activities that require an EIA before they can be implemented. A prescribed list of Projects for which EIA is mandatory is provided in Malawi's Guidelines for EIA, 1997. The Project is a prescribed Project under the Environment Management Act and therefore requires an ESIA study before it can be implemented.

Section 26 (3) of the EMA provides that "a licensing authority shall not issue any licence under any written law with respect to a project for which an environmental and social impact assessment is required under EMA unless the Director has certified in writing that the project has been approved by the Minister under EMA or that an environmental and social impact assessment is not required under EMA." In this way, the developer for the project will have to obtain an ESIA Certificate first before construction activities of the project are undertaken.

5.3.3 Land Act 2016

The Land Act, 2016, which repealed the Land Act of 1965, is the principal legislation dealing with land tenure, land use and land transfer. The Commissioner of Lands is responsible for the administration of the Act. Section 7 of the Act recognizes two categories of land namely; public land and private land. Public land is defined as land as held in trust for the people of Malawi and managed by Government, a local government authority and a Traditional Authority. Private land is defined as all land which is owned, held or occupied under a freehold title, leasehold title or as a customary estate or which is registered as private land under the Registered Land Act. The Act recognizes that every person has a natural dependency on land and that it is therefore important that Government provides for secure and equitable access to land as a multipurpose resource and an economic assert by defining issues of security of tenure.

The Land Act outlines some procedures to be followed for land acquisition by individuals or Government including issuance of formal notices to persons with existing land interests to payment of compensation however most provisions relating to acquisition of land are in the Land Acquisition Act as amended.

The project will not require any land take from the general public. As a result, issues of compensation and resettlement will not arise.

5.3.4 The Lands Acquisition Act No. 9 of 2017

The Lands Acquisition Act No. 9 of 2017 has amended some provisions of the Lands Acquisition Act, the main one being that the Amendment Act now provides for the acquisition and compensation of land in the citation.

Section 3 of the Act read with the Amendment Act empowers the Minister responsible for lands whenever he is of the opinion that it is desirable or expedient in the interests of Malawi, to acquire land for public utility, either compulsorily or by agreement, and pay compensation as may be agreed or determined under the Act.

Sections 5-7 of the Act provide for the issuing of notices upon the persons who are possessed of an interest in the land. According to section 12 of the Amended Act when a notice to acquire land has been issued and published, the land shall revert to the Government as public land within 2 months of the publication of the notice.

Section 9 as amended provides for the payment of compensation. It provides that where any land is acquired by the Minister under this Act the Minister shall pay in respect thereof appropriate compensation agreed or determined in accordance with the provisions of this Act. The Amendment Act further provides that compensation shall be paid in one lump sum; therefore, the assumption is that compensation shall only be monetary.

Amended provisions relating to assessment of appropriate compensation provide that an assessment is to be done by an independent valuer appointed by the Minister, unless the parties

agree otherwise. The Amendment to the Act also provides information on the grounds on which compensation can be calculated which include; loss of occupational rights, loss of land, costs of professional advice and disturbances which are a natural and reasonable consequence of the disposition of land. The Amendment has inserted substantive provisions on matters to be taken into consideration in assessing compensation for alienated land under section 10A.

Section 11 of the Act deals with the effect of payment of the compensation and states that a person who has been paid compensation for land cannot make further claims in respect of the land. However, this does not prevent any subsequent proceedings against the person to whom the same was awarded by any person claiming to have a better right to the compensation or the right to a share thereof.

However, the project will not have any implications on the project considering that the project will not require any land take from the general public. As a result, issues of compensation and resettlement will not arise.

5.3.5 Customary Land Act 2016

The Customary Land Act No.19 of 2016 provides for the management and administration of traditional land. Customary land consists of land within the boundaries of a Traditional Land Management Area other than Government or reserved land, land designated as customary land under the Land Act of 2016, land, the boundaries of which have been demarcated as traditional land under any written law or administrative procedure in force at the time before the Act came into operation and land the boundaries of which have been agreed upon by a land committee claiming jurisdiction over that land.

A certificate is issued by the Commissioner of Lands for each Traditional Land Management Area in respect of which the boundaries to the area have been demarcated or agreed. Such certificate, issued in the name of the Traditional Authority, confers upon the land committees in that area the function of management of customary land and affirms the occupation and use of customary land by the persons in the Traditional Land Management Area in accordance with the customary law applicable to land in that area.

The Act established customary land committee in section 5 of the Act. These committees are supposed to be at Group Village Headman level and their main function is to manage customary land within its area of jurisdiction, on trust, as if the committee were a trustee of the land and the villagers were beneficiaries. The Act provides that the customary land committee may not allocate land or grant a customary estate without the prior approval of the relevant Traditional Authority.

The project will not require any land take from the general public. As a result, issues of compensation and resettlement will not arise.

5.3.6 Local Government Act, 1998

The Act, as read with Section 146 of the Constitution, provides the mandate to the city councils in planning, administration, and implementation of various development programs in their areas. It

further provides for environmental functions, which include urban management, local planning, local afforestation programs, control of soil erosion, and appropriate management of solid and liquid waste. Lilongwe City Council where the project will be implemented was consulted with respect to their mandate and how the project would comply with their planning requirements.

5.3.7 Public Health Act, 1948

The Public Health Act requires developers to provide sanitary and health facilities in work places to promote health and well-being of the primary occupants and to avoid harmful effects of waste on public health.

The Environmental and Social Management Plan recognizes the importance of practicing improved hygiene and use of improved sanitary facilities for sustainable livelihood. The developer will comply with the requirements of this Act by constructing sanitary facilities and waste disposal facilities and will ensure good hygiene practices, some of which have been mainstreamed in this Environmental and Social Management Plan (ESMP).

5.3.8 Occupational Safety, Health and Welfare Act, 1997

The Act regulates work conditions with respect to safety, health, and welfare of workers. During construction phase, there will be a number of workers working on the site using different types of machinery and facilities.

Construction activities in general pose a number of occupational health and safety risks and probable risk to workers and the surrounding communities at large. Furthermore, increased movement of vehicles and equipment during construction can pose a risk of accidents to the surrounding communities as well as the construction workers.

The Act therefore places a duty of care on contractors throughout the project construction phase and similarly, the workers have a duty to take reasonable care for their own safety and health. The duty of ensuring safety, health, and welfare of workers is on the employer. However, every employee is required to take reasonable care for his/her own safety and that of other workers. The key provisions relevant to the project under discussion are as follows:

i) Section 13(1) places a duty on every employer to ensure the safety, health and welfare of all his employees at work;
ii) Section 51(1) mandates that manufacturers, importers and suppliers of hazardous substances used at workplaces shall provide sufficient information on such substances as well as the precautions to be taken; and
iii) Section 81 (7) stipulates that where the use of hazardous chemicals is likely to penetrate the skin and cause rash, skin contact with hazardous chemical shall be avoided and personal hygiene and the type of clothing worn shall be such as to enable rapid removal of any chemical from skin contact.

Considering that the construction phase of the project will require a lot of labour force and use of heavy machinery, the Occupational Safety, Health and Welfare Act is important in safeguarding

the health and welfare of all workers. The contractor will ensure that there is adequate protection for the workers who will be on site as required by the Act.

Section 66 of the Act defines the procedure to be followed in case of the occurrence of an accident which either can cause loss of life or disables a person from carrying out the normal duties at which he is employed. Furthermore, it stipulates measures that relate to work in confined spaces (section 55), matters relating to bulk storage of dangerous materials, matters dealing with noise (section 63) and general matters relating to health and safety.

This Environmental and Social Impact Assessment study has examined all aspects of occupational health, safety and welfare of all the persons involved in the project to determine compliance of the outlined sections of the law. In this effect the proponent will allow the Ministry of Labour to assess the facility and make determinations of the adequacy of the mitigation measures towards occupational safety of the workers.

5.3.9 Water Resources Act, 2013

Section 39 (1) of the Water Resources Act prohibits the abstraction and use of water unless authorized to do so under this Act. The Developer will therefore, in compliance with provisions of this Act, apply for water connection to the new facilities since there is already an existing network provided by the Lilongwe Water Board. Further, Part VIII, Section 89 (1) of the Act prohibits any person who owns, controls, occupies or uses land on which an activity or process is or was performed to pollute water resources and which, unless authorized under this Part, causes, has caused or is likely to cause pollution of a water resource, shall take all such measures as may be necessary to prevent any such pollution from occurring, continuing or recurring.

The Developer will therefore ensure that activities at the campus do not pollute the environment. Measures to minimize pollution of the water include proper disposal of domestic effluent from all the construction and operation stages.

5.3.10 Gender Equality Act, 2013

The Act was developed to ensure that men, women, boys and girls equally and effectively participate in and benefit from different development processes. The Act was put in place to assist to:

a) promote gender equality, equal integration, influence, empowerment, dignity and opportunities for men and women in all functions of society;
b) prohibit and provide redress for sex discrimination, harmful practices and sexual harassment; and
c) provide for public awareness on promotion of gender equality.

Considering that the project will employ a number of people both during construction and operation phases of the project, both the Developer and the Contractor will be expected to apply provisions of this Act. The project will ensure that wherever there are any employment opportunities, women will be given equal chances as men for employment.

5.3.11 National Construction Industry Act, 1996

The Act provides for the establishment of the National Construction Industry Council of Malawi (NCIC), for the promotion and development of the construction industry, registration of persons engaged in the construction industry in Malawi, co-ordination of training of persons engaged in the construction industry and general matters incidental thereto. The NCIC is responsible for regulating the construction industry in Malawi through among others: registering consultants and construction firms, standardizing quality control, codes of practice, procurement process; and legal contractual procedures in liaison with other organization. In accordance with the Act, the NCIC must be involved in identifying the contractors, ensuring that a quality contract is in place, resolving conflicts between contractor and client and ensuring that quality structures are developed.

5.4 Institutional Framework

The Environment Management Act and the EIA Guidelines provide for the administrative framework of the EIA process. The EIA process is managed by the Director of Environmental Affairs. The Director of Environmental Affairs works with other line Ministries/agencies and stakeholders.

Under section 26 of the Environment Management Act, a prescribed project cannot receive the required authorization to proceed from the relevant licensing authority unless the Director has issued a certificate that an EIA is not required or that he has approved the project on the basis of an EIA report. The Director is empowered under the Act to require changes to a project in order to reduce environmental impact and to reject a project, if, in his view, the project will cause significant and irreparable injury to the environment. A person not satisfied with the decision of the Director may appeal to the Environmental Appeals Tribunal.

The Director relies upon the advice of the Technical Committee on the Environment established under section 16 of the Environment Management Act in order to make his determination. Through this committee, member agencies are informed about projects being appraised; participate in reviews of project briefs, ESIA ToRs and ESIA reports; develop project approval terms and conditions; develop and monitor project auditing conditions; and recommends courses of action to the Director. The Director is not bound by the advice of the Committee to arrive at any action that may be considered necessary.

Institutional responsibilities for the co-ordination, planning, administration, management and control of development and environmental issues are fragmented among a number of agencies, ministries and organizations. The major institutions to be involved in this project shall include:

a) Environmental Affairs Department;
b) Ministry of Lands, Housing and Urban Development;
c) Lilongwe Water Board;
d) Ministry of Labour, Youth, Sports and Manpower Development;
e) Ministry of Natural Resources, Energy and Mining;

f) Ministry of Agriculture, Irrigation and Water Development;
g) Ministry of Local Government and Rural Development; and
h) Lilongwe City Council.

During the preparation of the Environmental and Social Management Plan, these major institutions and/or their documents were consulted for their technical advice, expert knowledge and concerns or future programs as related to the project.

5.6 Summary of approvals and licences which the proponent has to obtain

There are a number of statutory and regulatory approvals or licences that developer need to get in the courses of project implementation to ensure that the project is in line with sound environmental management practices and is in compliance with other relevant pieces of legislations. These have been summaries in Table 5.1 below:

TABLE 5. 1 LIST OF STATUTORY APPROVALS AND LICENCES REQUIRED

List of statutory approvals or licences to be obtained	Legal and regulatory framework	Responsible institution for processing approval or licence
Environmental Impact Assessment Certificate	Environment Management Act (1996)	Environmental Affairs Department
Planning Permission	The Physical Planning Act No 17 of 2016	Regional Physical Planning Office (Centre)
Approval to dispose of waste	Local Government Act (1998) Waste Management Licence	Lilongwe City Councils Environmental Affairs Department
Registration Certificate for generation of electricity on a heavy duty generator	Energy Regulatory Act No. 20 (2004)	MERA
Work Place Registration Certificate. To guide on procedures on workers' environmental health, safety during project implementation and operations.	Occupational Health, Safety and Welfare Act (Cap 55:01)	Ministry of Labour, Youth and Manpower Development
Consent to discharge effluent into public water	Water Resources Act (2013)	Water Resources Authority

Consent to supply portable water	Water Works Act (1995)	Lilongwe Water Board

CHAPTER 6 IMPACT IDENTIFICATION AND ASSESSMENT

6.1 Identification of potential impacts

Construction and operation of the students' hostels and the associated infrastructure at College of Medicine, Lilongwe Campus is expected to generate a range of impacts in the project area and beyond. The anticipated impacts will be on a range of biophysical and socio-economic aspects of the environment. Some of the impacts are expected to be positive while others may be negative.

The main purpose of this chapter is to identify the potential environmental and social impacts associated with the project from planning and design, construction, demobilization and operation and maintenance phases; assess their extent and significance; and propose mitigation measures for negative impacts and enhancement measures for positive impacts. The positive measures if properly enhanced will contribute towards social and economic development of the area and the country as a whole. Measures will be put in place to mitigate the negative impacts in order to prevent degradation of both the social and bio-physical environment in the project area. Specifically, the chapter is aimed at the following:

a) Predict the potential environmental and social impacts that will arise from implementation of the project;
b) Assess the possible extent /severity of the predicted impacts (both positive and negative);
c) Assess the significance of the predicted impacts; and
d) Recommend measures for mitigating the negative impacts and enhancing the positive impacts.

6.1.1 Methodology of impact identification

Impact identification was done by analyzing the project activities and determining their influence on the environmental and socio-economic baseline of the project area. The environmental characteristics of the project area include biophysical (topography, soils, climate, rainfall, water resources, flora and fauna) and social characteristics (demography, settlement, land administration and tenure, economic activities, infrastructures and services, water supply and sanitation, healthy and HIV and AIDS). Identification of potential impacts and physical assessment of the following environmental components likely to be impacted was also conducted:

a) physical /chemical;
b) biological /ecological;
c) social /cultural; and
d) economic /operational.

Based on the project activities, the approach followed included:

a) Analysis of topographical maps, in order to identify the main environmental and social components of topography, land use, existing industrial establishments, infrastructure and water resources;
b) Site investigations, focusing particularly on the areas of project influence especially the neighbouring designated institutions to identify critical environmental and social elements

to be affected including soils, physical developments, social infrastructure, water and sanitation, health, flora and fauna, soils and local economy;

c) Screening of the anticipated potential and significant impacts of the project, in accordance with the project stages of planning and design, construction, operation and maintenance and decommissioning; and
d) Assessment of environmental and social impacts in order to describe the positive and negative impacts, both direct and indirect as identified at each stage of the project cycle.

The methodology adopted for impact identification mainly considered the environmental and social impacts at various phases of the project and the activities to be undertaken at each phase. The following phases were considered:

a) **Planning Phase** – Activities during planning and design phase include land surveying; preparation of a master plan; preparation of detailed lay out plans; preparation of building designs, tender process, obtaining approvals under the Town and Country Planning Act and the Bye-Laws and obtaining all the approvals necessary for the construction and operation of the students' hostels. It is expected that the environmental and social management measures, which will be proposed for the project will be incorporated into the designs of the project.

b) **Construction Phase** – For this phase, the main activities are land clearing; landscaping; grading; excavation; compacting; trenching; construction of service infrastructure such as access roads, construction of storage facilities and an office facility; backfilling with compaction consolidation; levelling and earth marking; transportation of building materials; and construction of the students hostels infrastructures and other related buildings. Other infrastructure such as drainages and utility reticulation shall also be constructed.

c) **Demobilization Phase -** The term demobilization is used to describe the range of actions necessary to remove or make safe components of a project, and to restore the area occupied by the project to other beneficial uses once construction activities are over. Decommissioning of the students' hostels is not included in this ESIA at this stage. However, a Decommissioning Plan is to be prepared two years prior to decommissioning the students' hostels should that need arise. The main activities to be undertaken during demobilization phase are:
    i) Demobilization of Contractors workforce;
    ii) Demobilization of construction equipment;
    iii) Revegetating areas that were cleared by the Contractor around the project impact area;
    iv) Removal of construction waste from project site; and
    v) Rehabilitation of borrow pits created during construction of access roads and project buildings and other associated infrastructure.

d) **Operation Phase** – During operation phase, the students' hostels will be used for hostels for undergraduate and postgraduate students. When in full operation, it is expected that the project will achieve an output of at least 150 bed spaces for on campus students broken down as 100 bed spaces for undergraduate students, 30 bed spaces for Master of Science Students, and 20 bed spaces for PhD students. The different categories of students will be accommodated in different students' hostels. The impacts were identified by considering project activities including inputs and outputs in the various project phases outlined above and how these would affect various components of the bio-physical and social economic environment. The steps undertaken were:

a) Assessment of baseline conditions

The purpose of assessing baseline conditions was to understand the existing situation as this is the basis for determining changes that may occur as a result of the project.

b) Assessment of project inputs associated with the project

Project inputs were examined to determine the potential changes and impacts that would be created through the application of project inputs.

c) Assessment of project activities that will be undertaken

Project activities were examined to identify the impacts that the activities would bring on the environment.

d) Assessment of project outputs associated with the project

Project outputs were examined to determine the potential changes and impacts that would happen as a result of the outputs.

e) Determination of environmental impacts

Based on the above steps, the environmental impacts of the project were identified.

6.2 Impact evaluation and Scoring Matrix

After identifying the positive and negative environmental and social impacts the project will have on the bio-physical and social economic environment, further analysis was conducted to determine the extent and significance of the impacts. The aspects that were considered were magnitude, significance, probability of occurrence and duration of impacts which have been properly explained.

6.2.1 Magnitude

Magnitude is a measure of the general degree, extensiveness, or scale of impacts. The magnitude was scored at four levels i.e. household level, local level, regional level and national level.

6.2.2 Significance

This is a measure of the importance of a particular action on the environmental factor in the specific instance under consideration. This was scored using values ranging from +3 to - 3 with a score of 1 representing a low/minimal impact, 2 moderate impact and 3 representing a high impact. Negative impacts were assigned a minus (-) sign and positive impacts are given a plus (+) sign.

6.2.3 Probability of occurrence

Provides an estimate of the probability of an impact occurring before mitigation is applied. The impacts were considered as:

a) Possible (impact may occur but it is not probable);
b) Probable (the impact is very likely to occur); and
c) Definite (impact is unavoidable).

6.2.4 Duration

Refers to the period of time over which an impact may occur, from once-off to continuous for the life of the project. Duration of impacts was considered as 1 for a low/ minimal impact and the score of 5 for a high impact. Each impact is given a score from 1 to 5 against each of the four attributes. The scores for each impact are added to give a total score for the four attributes, indicating the overall severity of the impact. A high score (5) represents a high impact and a low score (1) represents a low impact. Negative impacts are assigned a minus sign and positive impacts are given a plus sign. Table 6.1 shows the scoring scale used for evaluation of the impacts. The four rows allow evaluation of impacts in terms of the magnitude, significance, probability and duration. The columns outline the scoring scale; with a score of 1 for a low/ minimal impact and the score of 5 for a high impact. Each impact is given a score from 1 to 5 against each of the four attributes. The scores for each impact are added to give a total score for the four attributes, indicating the overall severity of the impact. A high score (5) represents a high impact and a low score (1) represents a low impact. Negative impacts are assigned a minus sign and positive impacts are given a plus sign. For purposes of this analysis an impact matrix was prepared and is provided in Table 6.1.

TABLE 6. 1 IMPACT SCORING MATRIX WITH SIGNIFICANCE LEVELS

Impact		Spatial extent of the impacts	Significance of the impact	Probability of occurrence of the impact	Duration of the impact	Total Score
IMPACTS DURING PLANNING AND DESIGN						
POSITIVE IMPACTS						
1	Creation of employment	1	1	3	1	6
IMPACTS DURING CONSTRUCTION						
POSITIVE IMPACTS						

Impact		Spatial extent of the impacts	Significance of the impact	Probability of occurrence of the impact	Duration of the impact	Total Score
1	Creation of employment	5	5	5	3	18
2	Creation of a market for local construction materials	3	4	5	2	14
3	Promotion of small scale businesses	3	3	3	2	11
NEGATIVE IMPACTS						
1	Air Pollution	-3	-3	-3	-2	-11
2	Noise	-1	-2	-2	-3	-8
3	Soil erosion	-2	-3	-3	-3	-11
4	Soil contamination	-1	-2	-2	-3	-8
5	Increase in accident/ incidences	-1	-3	-2	-3	-9
6	Increase in the spread of HIV and AIDS and other sexually transmitted diseases	-1	-4	-5	-3	-14
7	Increase in Criminal Acts	-1	-3	-3	-3	-10
8	Poor waste management	-1	-3	-3	-2	-9
9	Poor sanitation	-2	-3	-4	-2	-11
10	Land and river bank degradation	-2	-3	-4	-5	-14
IMPACTS DURING DEMOBILIZATION						
POSITIVE IMPACTS						
1	Reduced noise levels	1	2	2	3	8
NEGATIVE IMPACTS						
1	Loss of employment	5	5	5	3	18
2	Poor waste management	1	3	3	2	9
3	Loss of business opportunities	3	4	5	2	14
IMPACTS DURING OPERATION AND MAINTENANCE						
POSITIVE IMPACT						
1	Provision of modern and adequate and affordable student hostels facilities at College of Medicine	5	5	5	4	19

Impact		Spatial extent of the impacts	Significance of the impact	Probability of occurrence of the impact	Duration of the impact	Total Score
2	Increase in performance of students academically as most students will leave close to the campus and easily access college facilities	5	5	5	5	20
3	Improvement of the infrastructure	4	4	5	3	16
4	Improve security in the area	5	4	4	3	16
5	Creation of employment	5	4	5	3	17
6	Increase in economic activities in the project area	3	3	3	3	12
7	Increase in government revenue through taxes	4	5	4	5	18
NEGATIVE IMPACTS						
1	Increase in the spread of HIV and AIDS and other sexually transmitted diseases	-1	-4	-5	-3	-14
2	Increase in Criminal Acts	-1	-3	-3	-3	-10
3	Poor waste management	-1	-3	-3	-2	-9
4	Poor sanitation	-2	-3	-4	-2	-11

Negative impacts with a high total score as presented in Table 6.2 are considered severe and should be accorded serious attention by the developer.

6.3 Description of environmental impacts and their management measures

6.3.1 Impacts from Design and Planning Phase

Positive Impacts

a) Creation of Employment:

The planning and design phase provided employment to consultants for the preparation of location plan, detailed layout plan site plan and building plans for students' students' hostels and ancillary

buildings. Another team was engaged to carry out an Environmental and Social Impact Assessment.

Enhancement Measures
The project developer employed local consultants who carried out some of the works during the planning and design phase.

6.3.2 Impacts from Construction Phase

Activities that will be carried out during this phase will include, land clearing, platform preparations, digging foundations, construction of buildings, and drainage works. There will also be lots of construction vehicles that will be bringing construction materials on the site.

Positive Impacts

a) Creation of Employment

Construction activities for the students' hostels and ancillary structures will include: land clearing and levelling using excavators and graders, construction of students' hostels, car park, and drainage systems. A total of 100 people will be employed during this phase.

Enhancement Measures:

i) Employing more people as much as possible from communities surrounding the project area; and
ii) Giving women equal employment opportunities as men.

b) Increase in market for local construction materials

The construction of students' hostels and ancillary facilities will entail the purchase of construction related materials such as cement, sand, quarry, timber iron sheets. This will create an opportunity for traders to sale their products.

Enhancement Measure:

i) Purchasing materials from local suppliers; and
ii) Hiring trucks to transport construction materials like sand, quarry and cement to the project site.

c) Increase in business activities within the project area

The presence of construction workers at the project site will create an opportunity for small scale business men and women to sale food stuffs, refreshments and to open barbershops and grocery shops.

Enhancement Measure: Designating an area as a market close to the project site.

Negative Impacts

a) Air pollution

Dust particles will be emitted into the atmosphere through clearing of the land, levelling and platform preparation for the construction of buildings.

Mitigation Measures

i) Applying water regularly to civil works and earth roads to suppress dust; and
ii) Controlling the speed of construction vehicles to reduce generation of dust.

b) Noise Pollution

Operation of heavy construction machineries and vehicle movements would generate a lot of noise which could be a nuisance to workers and people staying close to the project site. Noise can create stress and can be a hazard within the project site since it can make it difficult for workers to communicate or hear warning signs.

Mitigation Measures

i) Fitting construction vehicles with silencers to reduce the noise;
ii) Servicing machinery so that they can be in good condition at all times; and
iii) Providing ear protection materials for the workers in noisy areas.

c) Soil erosion

The soil will be exposed once the vegetation has been cleared resulting in soil erosion. The other sources include top soil stripping during land preparation and construction works.

Mitigation Measures

i) Carrying out construction works during the dry season from May to November;
ii) Creating drainage channels to direct storm water movement;
iii) Creating stone pitching where soils have been excavated; and
iv) Clearing only those places where buildings will be constructed

d) Soil Contamination from oil and fuel spills

Construction works will involve use of heavy machines such as graders, tractors, tippers and vehicles. Oil and fuel spills from these machines could contaminate soils within the project site.

Mitigation Measures

i) Construction vehicles should be in good condition to avoid fuel leaks; and
ii) Servicing areas for vehicles should have impermeable surfaces and be bunded to contain the spills.

e) Increase in accident/incidences

The road that will be used by vehicles bringing construction materials is also used by other road users. People crossing the roads may be hit by such vehicles. Workers handling heavy equipment and machinery may get hurt.

Mitigation Measure:

i) Introducing humps on the road to help reduce the speed of the vehicles;
ii) Erecting warning signs showing that there is heavy machinery and construction vehicles using that road for people to be alert;
iii) Providing workers with protective clothing;
iv) Following health and safety regulations;
v) Training workers in the proper use and handling of heavy equipment and machinery; and
vi) Maintaining a first aid kit at the project site.

f) Increase in the spread of HIV and AIDS and other sexually transmitted diseases

The project will bring migrant workers, traders as well as local workers with more money from the wages and sales in the project area. This can promote unacceptable unions that will contribute to the increase in the spread of HIV and AIDS and other sexually transmitted diseases in the project area.

Mitigation Measures

i) Sensitizing local people and workers on the dangers of unacceptable unions;
ii) Encouraging girls to go to school to avoid early marriages;
iii) Distributing condoms to both men and women working at the site;
iv) Providing women with loans for small scale businesses so that they can be self-sufficient; and
v) Develop an HIV and AIDS workplace policy.

g) Increase in criminal Acts

The influx of people to the project area may attract people with bad intentions who can create havoc within the project surrounding areas. There may also be conflicts between the migrant workers and the locals that may culminate into violent acts.

Mitigation Measures

i) Employ people from the surrounding areas to reduce number of migrant workers;
ii) Sensitizing the community members on the ownership of the project;
iii) Introduce community policing in conjunction with Sanctuary Police station; and

h) Poor waste management

Construction rubble, scrap metal, used oils and domestic wastes will be produced and accumulate within the project site.

Mitigation Measures:

i) Provision of dust bins or rubbish pits for the wastes produced;
ii) Segregation of wastes by providing different bins for each type of waste;
iii) Identification of a dumping site within the project area for various types of wastes; and
iv) Disposing of wastes at Area 38 designated dumpsite regularly.

i) Poor sanitation

Construction workers may be relieving themselves in the bushes or nearby gardens which is very unhygienic if not provided with proper sanitary facilities. They may also be drinking from poor water sources in the absence of potable water. This may contribute to the spread of communicable diseases like cholera and bilharzia in the project area.

Mitigation Measures:

i) Provision of pit latrines for workers and drivers on the construction site;
ii) Provision of potable water within the site; and
iii) Sensitization of workers on the importance of good hygiene practices.

j) Land and river bank degradation

The prospect of a ready market for sand and quarry stone may promote unauthorized quarry and sand mining by local artisans. This may contribute to the degradation of land and river banks being the source of these resources.

Mitigation Measures:

i) Buying sand and quarry from registered local artisans;
ii) Carrying out sensitization of local artisans on good mining practices;
iii) Designating places for sand and quarry mining; and
iv) Assisting communities with afforestation programs for river banks.

k) Traffic Density

The project will come along with increased (vehicle) traffic along the connecting routes especially during construction phase.

Mitigation measures

i) Notify the motorists about the project once implementation is started. It is important that warning/ informative signs (bill boards) be erected at the site. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
ii) The traffic along the connecting roads should be controlled especially during construction phase and mostly when trucks are turning into the site, say when delivering of materials.
iii) Employ traffic marshals to control traffic along the adjacent roads and in and out of the site.

iv) Rehabilitate the access road leading to the property. In case the major road is damaged by the heavy trucks and machinery, the proponent should embark on repair after completion of construction phase.

6.3.3 Impacts during demobilization

There will be need to demolish the temporary structures that will be used for storage and pit latrines for the construction workers. The construction rubble and construction wastes will have to be cleared from the site in readiness for the operation phase of the project.

Positive impacts

a) Reduced noise levels

The heavy machinery and the 100 construction workers will leave the site thereby reducing the amount of noise from the project site.

Enhancement measures: The contractor and the developer should ensure that all working and damaged construction equipment is removed from the site

Negative impacts

a) Loss of employment

All construction workers will be laid off once construction works are completed. This will mean loss of income and source of livelihood for 100 workers.

Mitigation measures:

i) The construction workers should be made aware of the duration for the construction phase so that they can make other plans in time;
ii) Educating the labour force on the need to save part of their income; and
iii) Paying severance benefits to all laid off workers according to the provisions of the labour laws.

b) Poor management of Construction wastes

The construction rubble and wastes that will be generated from demolition of construction works and temporary houses for skeleton construction workers will have to be removed from the site. Rehabilitation works will be carried out on the site upon completing the construction works.

Mitigation measures

i) Disposing of construction wastes at the dumping sites that will be identified in liaison with Lilongwe City Council during construction phase;
ii) Scrap metals will have to be sold or disposed of at a dump site that will be designated specifically for such wastes; and
iii) Trees and grass should be planted in bare areas of the project site as a way of restoring the area.

c) Loss of business opportunities

Local traders selling construction materials will lose their source of income and livelihood. The small scale business men and women selling foodstuffs, and fruits to construction workers will also lose their source of income.

Mitigation measures:

i) Informing local traders of the project duration in time;
ii) Out sourcing some services for non-core activities for the college; and
iii) Paying for all materials that were obtained on loan in time.

6.3.4 Impacts from Operation Phase

The main activity during the operation phase will be the hostels of students at the college.

Positive Impacts

a) Provision of modern and adequate and affordable student hostels facilities at College of Medicine

The students' students' hostels will provide modern, adequate and affordable hostels facilities to the enrolled students which will also be near the learning facilities.

Enhancement Measure:

i) Sourcing funds for maintenance so that the students' hostels should be in good condition and be in operation for a long time; and
ii) Providing equal enrolment opportunities for male and female students.

b) Increase in performance of students academically as most students will leave close to the campus and easily access college facilities

Due to the close proximity of the students' hostels to the learning facilities, there will be an increase in performance of students academically. The travel time will be used for learning and reading

Enhancement Measure: Sourcing funds for maintenance so that the students' hostels should be in good condition and be in operation for a long time

c) Improve security in the area

Security will improve in the area due to the coming in of the project.

Enhancement Measures

i) The project site should be enclosed using suitable walls to beef-up security and to control movement within the site;
ii) There should be guard houses at the gate. Security guards should always monitor the gate of the facility to keep away the intruders and to control movement within the site;

iii) Contractor should provide adequate security during the construction period when there are no works on the site; and
iv) The guards stationed at the gates should document movements in and out of the site/property.

d) Creation of employment

A total of 50 people will be employed in various sections during the operation of the students' students' hostels. There will be employment opportunities for both skilled and unskilled labourers during the operation phase.

Enhancement Measures:

i) Employing more people from the communities surrounding the project area and other areas within the country for both unskilled and skilled jobs; and
ii) Giving equal employment opportunities for both men and women.

e) Improved access to social services by the local community

The operation phase of the project will facilitate introduction of electricity, potable water and access to an improved road network. The community can have access to these facilities and improve their living standards.

Enhancement measures: Providing extra social services that can be accessed by the communities.

d) Increase in economic activities

The operation of the students' hostels will provide local traders to sale food stuffs like fruits, sugarcane, groundnuts, fresh, cooked and roasted maize, and vegetables to students and workers. There will also be an opportunity to supply food stuffs for student meals.

Enhancement Measures

i) Sourcing funds for operation and maintenance cost for the students' hostels to be in operation for a long time;
ii) Outsourcing non-core functions; and
iii) Traders from the project area to be given the opportunity to supply food stuffs for student meals.

e) Increase in revenue by government through taxes

Employees and the people supplying goods and services at the project site will be paying taxes that will be remitted to MRA.

Enhancement Measure: Remitting taxes to MRA from wages and service provisions in time

Negative Impacts

a) Increase in the spread of HIV and AIDS and other sexually transmitted diseases

Interaction among male and female students as well as workers may result in unacceptable unions that may increase the spread of HIV and AIDS and sexually transmitted diseases.

Mitigation Measures:

i) Carry out sensitization meetings for students, workers and local communities from time to time;
ii) Empowering the community through outsourcing of non-core activities;
iii) Develop an HIV and AIDS workplace policy; and
iv) Distribution of condoms and Education, information and communication materials on HIV and AIDS to students and workers.

b) Increase in criminal acts

The students' hostels may attract thieves trying to steal student property. These may also end up stealing from the surrounding communities. Conflicts may arise between students and the surrounding communities that may culminate into violent acts.

Mitigation Measures:

i) Sensitize the communities and students on how they can live in harmony;
ii) Introduce community policing in conjunction with Sanctuary Police station;
iii) Sensitizing the community on the ownership of the students' students' hostels; and
iv) Request for a police unit within the project area.

c) Poor solid waste management

There will be a total of 150 students and 50 workers when the college is operating at full capacity. These will generate a lot of trash in form of paper, used bottles, and domestic waste.

Mitigation Measures:

i) Provision of dust bins or rubbish pits for the wastes produced;
ii) Segregation of wastes by providing different bins for each type of waste;
iii) Maintaining the dumping site that will be identified during construction;
iv) Collecting and disposing of wastes at Area 38 designated dumpsite regularly; and
v) Used chemicals should be disposed in consultation with EAD.

d) Liquid Waste

Effluent/sewage resulting from areas such as sanitary facilities and kitchen is of significant concern with respect to the environment. It should never come into contact with the surrounding i.e. water, soil, air etc. to avoid disease outbreak such as cholera, diarrhoea. It should always drain effectively into the sewerage systems via well designed (closed) and laid pipe networks. For this particular project, the proponent will construct a septic tank.

Mitigation measures

i) Connecting to the Lilongwe City Council sewer line that is close proximity to the project area;
ii) The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it should have the capacity to consistently handle the loads even during peak volumes;
iii) All drain pipes passing under building, driveway or parking should be of heavy-duty PVC pipe tube encased in concrete surround. All manholes on drive ways and parking areas should have heavy-duty covers set and double sealed airtight; as approved by specialists;
iv) Sanitary facilities should be kept clean always, through regular washing/cleaning;
v) Frequent monitoring of the internal drainage system; and
vi) Blockages and damages should be fixed expeditiously.

e) Poor sanitation

The students and members of staff will be using water borne toilets and some ground laborers may continue using the pit latrines that were meant for the construction workers. Poor management of liquid wastes and sewerage disposal systems may result in poor sanitation and contribute to pollution of the air at the site.

Mitigation Measures:

i) Provision of adequate toilets for students and members of staff;
ii) Connecting to the Lilongwe City Council sewer line that is close proximity to the project area; Regular Inspection and maintenance of the septic tank network;
iii) Use of improved pit latrines for easy maintenance;
iv) Provision of potable water within the site; and
v) Sensitization of students and members of staff on the importance of good hygiene practices.

f) Surface drainage

The drainage of the general site comes in handy to enhance effective flow of the much-anticipated surface run-off emanating from the roof catchments and other impermeable areas within the site. The subject plot lies on gentle slope; during operation phase there is a risk of flooding on the lower part of the plot since a large section will be covered by hardscape.

Mitigation measures

i) Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface.
ii) Semi permeable materials should be used for construction of pavements.
iii) After completion of construction, the proponent should embark on comprehensive landscaping to increase softscape cover on the plot.

g) Fire

Fire outbreaks are common in Malawi and they are usually subject to detrimental effects to the environment. Fire causes both economic and social drawbacks. It is therefore important to consider the issue of fire.

Mitigation measures

i) Hire competent and properly authorized electrical contractor to do the wiring and other electrical works.
ii) Install fire alarm system for entire project
iii) Install smoke detectors in kitchens.
iv) Installation of firefighting equipment following country Fire requirements.
v) Conduct regular firefighting drills within the site.
vi) Develop and adapt an (fire) emergency response plan for the project during and occupation stage.
vii) Ensure that all firefighting equipment are regularly maintained and serviced.
viii) Provide fire hazard signs such as "No Smoking sign", Direction to exit in case of any fire incidence and emergency numbers.

h) Increased energy demand

There will be increased use of energy operation phase (electricity used by the occupants of the housing project). Energy conservation is thus fundamental. Energy conservation involves optimum use of petroleum products (diesel and gasoline), electrical appliances (equipment), lighting systems and other electric machinery as used for different purposes. It also includes use of renewable energy sources.

Mitigation measures

i) Put off all lights immediately when not in use or are not needed.
ii) Use energy conserving electric lamps for general lighting.
iii) Make use of alternative source of energy such as solar power. Solar panels proposed in the project should be fully utilized and timely repaired in case of damage.

i) Increased Water demand

Water is an integral material for construction hence during this phase, a high amount of water will be required. During the occupation phase, the demand for water will also be high; mostly for domestic use. Lack of adequate water during occupation phase may result to dirty surfaces exposing the residents to disease. The subject plot will be served by the conventional water supply system.

Mitigation measures

i) Install water conserving taps that turn-off automatically when water is not in use.
ii) Encourage water reuse/recycling during occupation phases.

iii) Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc
iv) Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. Keep/Leave the Tap Closed etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management

CHAPTER 7 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS

7.1 Environmental and Social Management Plan

An Environmental and Social Management Plan (ESMP) outlines how the environmental impacts of a project are going to be managed, enhanced, minimized and mitigated. The ESMP is also an environmental management tool that is used to monitor implementation of environmental management measures.

This EMSP outlines environmental impacts and their management measures, assigns implementation responsibilities to stakeholders within a given time frame and estimates costs of implementing the measures. The ESMP for the construction, operation and decommissioning phases of Students' students' hostels is provided in Table 7.1.

TABLE 7. 1 PROPOSED ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
IMPACTS FROM PLANNING AND DESIGN PHASE				
POSITIVE IMPACTS				
1	Creation of employment	Employment of local consultants	• Old Mutual • Ministry of Labour	N/A
IMPACTS DURING CONSTRUCTION PHASE OF THE PROJECT				
POSITIVE IMPACTS				
1	Creation of employment	• Employing unskilled labours as much as possible from the project area • Giving women equal employment opportunities as men.	• Client/ Project manager • Ministry of Labour	N/A
2	Increase in market for local construction materials	• Purchasing materials from as many local suppliers. • Hiring trucks to transport construction materials like sand, quarry and cement to the project site.	Contractor Project manager	NA
3	Increase in business activities within the project area	• Designating an area as a market within the project site	Contractor	NA
NEGATIVE IMPACTS				

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
1	Air pollution	• Applying water regularly to civil works and earth roads to suppress dust • Controlling the speed of construction vehicles to reduce generation of dust.	Contractor/EDO	1,000,000
2	Noise Pollution	• Fitting construction vehicles with silencers to reduce the noise • Servicing machinery so that they can be in good condition at all times • Providing ear protection materials for the workers in noisy areas	Contractor	850,000
3	Soil erosion	• Carrying out construction works out from May - September • Clearing only those places where buildings will be constructed • Creating drainage channels to direct storm water movement • Creating stone pitching where soils have been excavated	Contractor/EDO	850,000
4	Soil Contamination	• Construction vehicles should be in good condition to avoid fuel leaks • Servicing areas for vehicles should have impermeable surfaces and should be bunded	Contractor Project Manager	
5	Increase in accident incidences	• Introducing humps on the road to help reduce the speed of the vehicles • Erecting warning signs showing that there is heavy machinery and	Contractor Project Manager	700,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		construction vehicles using that road for people to be alert • Providing workers with protective clothing • Training workers in the proper use and handling of heavy equipment and machinery • Maintaining a first aid kit at the project site • Following health and safety regulations		
6	Increase in HIV and AIDS and other diseases	• Sensitizing surrounding communities and workers on the dangers of unacceptable unions • Develop an HIV and AIDS workplace policy; • Distribute condoms to both women and men working at the site	Contractor Local leaders Min. of Education	1,000,000
7	Increase in criminal Acts	• Employ people from the surrounding areas to reduce number of migrant workers • Introduce community policing in conjunction with Sanctuary Police station •	Developer	1,500,000 N/A
8	Poor waste management	• Provision of dust bins or rubbish pits for the wastes produced • Segregation of wastes by providing different bins for each type of waste	Contractor EDO	1,350,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Identification of a dumping site within the project area for various types of wastes • Disposing of wastes at the designated places regularly		
9	Poor sanitation	• Provision of pit latrines for workers and drivers on the construction site • Provision of potable water within the site • Sensitization of workers on the importance of good hygiene practices.	Contractor Project Manager	Included in project cost
10	Degradation of land and river banks	• Buying sand and quarry from registered local artisans •	Old Mutual, Mines, Local communities	1,250,000
11	Traffic Density	• Notify the motorists about the project once implementation is started. • Put in place warning/ informative signs (bill boards) at the site. The signs should be positioned in a way to be easily viewed by the public and mostly motorists. • The traffic along the connecting roads should be controlled especially during construction phase and mostly when trucks are turning into the site, say when delivering of materials.	Contractor	950,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Employ traffic marshals to control traffic along the adjacent roads and in and out of the site. • Rehabilitate the access road leading to the property. In case the major road is damaged by the heavy trucks and machinery, the proponent should embark on repair after completion of construction phase.		
	IMPACTS FROM DEMOBILIZATION PHASE			
	POSITIVE IMPACTS			
1	Reduced noise levels	• Removing all working and damaged construction machinery and equipment	Contractor Project Manager	N/A
	NEGATIVE IMPACTS			
1	Loss of employment	• Informing workers of project duration when employing them • Educating the labour force on the need to save part of their wages • Paying severance benefits to all laid off workers according to the provisions of the labour laws.	Contractor Project manager Min. of Labour	Part of project costs
2	Poor waste management	• Disposing of construction wastes at the dumping sites that will be identified during construction phase. • Scrap metals will have to be sold or disposed at a dumping site that will be designated specifically for such wastes.	Contractor Project manager EDO Min. Of Education	1,000,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Trees and grass should be planted in bare areas of the project site as a way of restoring the area.		
3	Loss of business opportunities	• Informing local traders of the project duration in time • Paying for all materials that were obtained on loan in time • Incorporate TEVET training in the project; • Outsourcing some services for non-core activities for the college	Contractor Project Manager	N/A
IMPACTS FROM OPERATION AND PHASE				
POSITIVE IMPACTS				
1	Provision of modern and adequate and affordable student hostels facilities at College of Medicine	• Sourcing funds for maintenance so that the students' hostels should be in good condition and be in operation for a long time; and • Providing equal enrolment opportunities for male and female students.	Old Mutual	5,000,000.00
2	Increase in performance of students academically as most students will leave close to the campus and easily access college facilities	• Sourcing funds for maintenance so that the students' hostels should be in good condition and be in operation for a long time	Old Mutual College of Medicine	2,500,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
3	Improve security in the area	• Guard houses in place at the gate. Security guards should always monitor the gate of the facility to keep away the intruders and to control movement within the site. • The guards stationed at the gates should document movements in and out of the site/property.	Old Mutual	3,500,000.00
4	Creation of employment	• Employing more people from the communities surrounding the project area and other areas within the country for both unskilled and skilled jobs • giving equal employment opportunities for both men and women	Old Mutual Ministry of Labour	N/A
5	Improved access to social services by the local community	• Providing extra social services that can be accessed by the communities.	Old Mutual	N/A
6	Increase in economic activities	• Sourcing funds for operation and maintenance cost for the students' students' hostels to be in operation for a long time. • Traders from the project area to be given the opportunity to supply food stuffs for student meals. • Outsourcing non-core functions	Old Mutual	N/A
7	Increase in revenue by government through taxes	• Remitting taxes to MRA from wages and service contracts in time	Old Mutual	N/A

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
NEGATIVE IMPACTS				
1	Poor solid waste management	• Provision of dust bins or rubbish pits for the wastes produced • Segregation of wastes by providing different bins for each type of waste • Maintaining the dumping site that will be identified during construction • Collecting and disposing of wastes at Area 38 designated dumpsite regularly • Used chemicals should be disposed in consultation with EAD	Old Mutual EAD	500,000.00
2	Poor Sanitation	• Provision of adequate toilets for students and workers • Construction of double chambered septic tanks for disposal of liquid wastes • Regular Inspection and maintenance of the septic tank network	Old Mutual	1,350,000 Part of project cost
3	Increase in HIV/AIDS and other sexually transmitted diseases	• Carry out sensitization meetings for students, workers and local communities from time to time. • Develop an HIV/AIDS workplace policy; • Distribution of condoms and Education, Information and Communication materials on HIV and AIDS to workers	Old Mutual Lilongwe DHO	750,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
4	Increase in criminal acts	• Sensitize the communities and students on how they can live in harmony • Introduce community policing in conjunction with Sanctuary Police station • Sensitizing the community on the ownership of the college	Old Mutual Sanctuary Police	1,000,000
5	Liquid Waste	• Construction of the double chamber septic tank. • The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it should have the capacity to consistently handle the loads even during peak volumes. • All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in concrete surround. All manholes on drive ways and parking areas should have heavy-duty covers set and double sealed airtight; as approved by specialists. • Sanitary facilities should be kept clean always, through regular washing/cleaning. • Frequent monitoring of the internal drainage system.	Old Mutual	8,500,00.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Blockages and damages should be fixed expeditiously		
6	Surface Drainage	• Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface. • Semi permeable materials should be used for construction of pavements. • After completion of construction, the proponent should embark on comprehensive landscaping to increase softscape cover on the plot.	Old Mutual	4,500,000.00
7	Fire	• Hire competent and properly authorized electrical contractor to do the wiring and other electrical works. • Install fire alarm system for entire project • Install smoke detectors in kitchens. • Installation of firefighting equipment following country Fire requirements. • Conduct regular firefighting drills within the site. • Develop and adapt an (fire) emergency response plan for the project during and occupation stage.	Old Mutual	3,000,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Ensure that all firefighting equipment are regularly maintained and serviced. • Provide fire hazard signs such as "No Smoking sign", Direction to exit in case of any fire incidence and emergency numbers.		
8	Increase in Energy Demand	• Put off all lights immediately when not in use or are not needed. • Use energy conserving electric lamps for general lighting. • Make use of alternative source of energy such as solar power. Solar panels proposed in the project should be fully utilized and timely repaired in case of damage.	Old Mutual	6,500,000.00
9	Increase in water demand	• Install water conserving taps that turn-off automatically when water is not in use. • Encourage water reuse/recycling during occupation phases. • Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc	Old Mutual	2,000,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Mk)
		• Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. Keep/Leave the Tap Closed etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management		

7.2 Environmental and Social Monitoring Plan

The monitoring plan is vital because it is used as check if the mitigation measures prescribed in the management plan are being implemented. It provides parameters to be monitored, indicators to be used for monitoring, means of verification that mitigation/enhancement measures were implemented, frequency of monitoring and assigns responsibility for monitoring.

To ensure that the environmental and social management plan for the students' hostels is implemented, an environmental and social monitoring plan has been prepared as outlined in Table 7.2. Stakeholders that have been assigned a responsibility in the monitoring plan need to budget for fuel and subsistence allowances for their officers for them to carry out the inspection. This urges the developer to implement the management plans so that the implementation of their project does not contribute to environmental degradation in the project area or impinge on the welfare of employees, students and local communities.

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TABLE 7. 2 PROPOSED ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
	IMPACTS FROM PLANNING AND DESIGN PHASE						
	POSITIVE IMPACTS						
1	Creation of employment	Employment of local consultants	No. of local consultants employed	Employment records	Once, on commencement of assignment	Min of Education Ministry of Labour	N/A
	IMPACTS DURING CONSTRUCTION PHASE OF THE PROJECT						
	POSITIVE IMPACTS						
1	Creation of employment	• Employing unskilled labours as much as possible from the project area • Giving women equal employment opportunities as men.	Number of local people employed Number of women employed	Records	quarterly	Client/ Project manager Ministry of Labour	500,000
2	Increase in market for local	• Designating a place for the local market close to the site	No. of local people supplying materials	interviews	quarterly	Contractor Project manager	500,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
	construction materials	• Purchasing materials from as many local suppliers. • Piling trucks to transport construction materials like sand, quarry and cement to the project site.	Number of local transporters ferrying material				
3	Increase in business activities within the project area	• Designating an area as a market within the project site	Number of local people selling goods at the project site	interviews	quarterly	Contractor	1,000,000
	NEGATIVE IMPACTS						
1	Air pollution	i) Applying water regularly to civil works and earth roads to suppress dust; ii) Controlling the speed of construction vehicles to reduce generation of dust.	No. of times water is applied per No of vehicles over speeding	record	quarterly during construction	Contractor/EDO	500,000
2	Noise	iii) Fitting construction vehicles with silencers to reduce the noise	No. of vehicles fitted with silencers	inspections	quarterly	Contractor Ministry of Labour	750,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		iv) Servicing machinery so that they can be in good condition at all times v) Providing ear protection materials for the workers in noisy areas	Machines in good condition No. of workers using PPEs				
3	Soil erosion	• Carrying out construction works out from May – September • Creating drainage channels to direct storm water movement • Creating stone pitching where soils have been excavated • Clearing only those places where buildings will be constructed	Construction period No. of trees within the site	inspections	Once on commencement	Contractor/ EAD	500,000
4	Soil Contamination	• Construction vehicles should be in good condition to avoid fuel leaks • Servicing areas for vehicles should have impermeable surfaces	No. of vehicles serviced	Records	quarterly	Contractor Project Manager EAD	1,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
5	Increase in accident incidences	• Introducing humps on the road to help reduce the speed of the vehicles • Erecting warning signs showing that there is heavy machinery and construction vehicles using that road for people to be alert • Following health and safety regulations • Providing workers with protective clothing • Training workers in the proper use and handling of heavy equipment and machinery • Maintaining a first aid kit at the project site	No. of humps on the local road No. of warning signs erected No. of people using PPEs No. of people trained Presence of a first aid kit	inspections	Once on commencement quarterly	Contractor Project Manager EAD Ministry of Labour	1,000,000
6	Increase in HIV and AIDS and other diseases	• Sensitizing local people and workers at the site on the dangers of unacceptable unions • Distribute condoms to both men and women	No. of sensitization meetings	Records	quarterly	Contractor Local leaders Min. of Education DEHO	1,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Develop an HIV/AIDS workplace policy;	No of school drop outs No. of women carrying out businesses HIV policy in place			District AIDS Coordinator	
7	Increase in criminal Acts.	• Employ people from the surrounding areas to reduce number of migrant workers • Introduce community policing in conjunction with Sanctuary Police station •	No of criminal incidences No. of local people employed Community policing in place	Police records Records	Quarterly Once on commencement	Developer	1,000,000
8	Poor waste management	• Provision of dust bins or rubbish pits for the wastes produced • Segregation of wastes by providing different bins for each type of waste	Dust bins for each type of waste in place	Inspections	Quarterly	Contractor EDO Lilongwe City Council DEHO	1,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Identification of a dumping site within the project area for various types of wastes • Disposing of wastes at the designated places regularly	Dumping site identified No. of times rubbish is removed		Once on commencement quarterly		
9	Poor sanitation	• Provision of pit latrines for workers on the construction site • Provision of potable water within the site • Sensitization of workers on the importance of good hygiene practices.	Pit latrines in place Potable water in place No. of sensitization meetings	Inspections records	Once during commencement quarterly	Contractor Project Manager Lilongwe City Council DEHO	1,250,000
10	Degradation of land and river banks	• Buying sand and quarry from registered local artisans • Carrying out sensitization of local artisans on good mining practices	No. of local registered local artisans supplying materials No. of meetings	records	quarterly	Min. of education, Mines, Local communities	1,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Designating places for sand and quarry mining • Assisting communities with afforestation programs for river banks •	No of official mining sites No. of afforestation programs				
	IMPACTS FROM DECOMMISSIONING PHASE						
	POSITIVE IMPACTS						
1	Reduced noise levels	• Removing all working and damaged construction machinery and equipment	All equipment removed	inspections	Once upon decommissioning	Contractor Project Manager EDO	1,250,000
	NEGATIVE IMPACTS						
1	Loss of employment	• Informing workers of project duration when employing them • Educating the labour force on the need to save part of their wages	Severance benefits	records	Once on decommissioning	Contractor Project manager Min. of Labour	50,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Paying severance benefits to all laid off workers according to the provisions of the labour laws.					
2	Poor waste management	• Disposing of construction wastes at the dumping sites that will be identified during construction phase. • Scrap metals will have to be sold or disposed at a dumping site that will be designated specifically for such wastes. •	Site clear of construction wastes and scrap metal	inspections	Once	Contractor Project manager EDO Min. of Education	500,000
3	Presence of bare areas	• Trees and grass should be planted in bare areas of the project site as a way of restoring the area.	Well landscaped premises	Trees in place	Quarterly	College Principal DFO	750,000
3	Loss of business opportunities	• Informing local traders of the project duration in time	Materials paid for	records	Once	Contractor Project Manager	850,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Paying for all materials that were obtained on loan in time • Incorporate TEVET training in the project • Outsourcing some services for noncore activities for the college					
	IMPACTS FROM OPERATION PHASE						
	POSITIVE IMPACTS						
1	Creation of employment	• Employing more people from the communities surrounding the project area and other areas within the country for both unskilled and skilled jobs • giving equal employment opportunities for both men and women	No. of people local people employed No. of women employed	records	Annually	Developer/Ministry of Labour	750,000
2	Improved access to social	• Providing extra social services that can be	Presence of social services	Inspection	Once on	Min. of Education	500,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
	services by the local community	accessed by the communities.				Local communities	
3	Increase in economic activities	• Sourcing funds for operation and maintenance cost for the students' hostels to be in operation for a long time. • Outsourcing non-core functions • Traders from the project area to be given the opportunity to supply food stuffs for student meals.	No. of traders supplying goods to the college	Records	Quarterly	Min. of Education	N/A
4	Increase in revenue by government through taxes	• Remitting taxes to MRA from wages and service contracts in time	Remittances to MRA	Records	Annually	Min. of Education MRA	N/A
	NEGATIVE IMPACTS						
1	Poor waste management	• Provision of dust bins or rubbish pits for the wastes produced	No. of dust bins	Inspections	Quarterly	Principal EAD	1,500,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Segregation of wastes by providing different bins for each type of waste • Maintaining the dumping site that will be identified during construction • Collecting and disposing of wastes at the designated places regularly • Used chemicals should be disposed in consultation with EAD	Presence of dumping site Frequency of waste disposal Presence of hazardous waste disposal site	 Records inspections	Once quarterly		
2	Poor Sanitation	• Provision of adequate toilets for students and members of staff • Construction of double chambered septic tanks for disposal of liquid wastes • Regular Inspection and maintenance of the septic tank network	No of toilets Presence of septic tank in good condition	Inspections	Once during operation Quarterly	Min. of education DEHO EAD Lilongwe City Council	1,000,000
3	Increase in HIV and	• Carry out sensitization meetings for students,	No of meetings	Records	Quarterly	Local Communities	750,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
	AIDS and other sexually transmitted diseases	teachers support staff and local communities from time to time. • Develop an HIV and AIDS workplace policy; • Distribution of condoms and information materials on HIV and AIDS to workers	Policy in place No. of condoms distributed			Principal DEHO District AIDS Coordinator	
4	Increase in criminal acts	• Sensitize the communities and students on how they can live in harmony • Sensitizing the community members on the ownership of the college • Introduce community policing in conjunction with Area 3 Police station • Request for a police unit within the project area.	No. of criminal incidences Community policing in place Police unit in place	Police records inspections	Quarterly Once during operation	Min of Education Area 3 Police	1,000,000
5	Surface Drainage	• Rain water harvesting gutters and storage tanks should be installed to	Presence of rain harvesting gutters and storage tanks	Inspection	Bi-annual	EAD	750,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		reduce the amount of rainfall reaching the surface. • Semi permeable materials should be used for construction of pavements. • After completion of construction, the proponent should embark on comprehensive landscaping to increase softscape cover on the plot.	Presence of trees and vegetation				
6	Fire	• Hire competent and properly authorized electrical contractor to do the wiring and other electrical works. • Install fire alarm system for entire project • Install smoke detectors in kitchens.	Records of authorized electrician Presence of fire alarm Presence of fire fighting equipment and	Inspection	Monthly	Ministry of Labour MERA	2,500,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Installation of firefighting equipment following Country Fire requirements. • Conduct regular firefighting drills within the site. • Develop and adapt an (fire) emergency response plan for the project during and occupation stage. • Ensure that all firefighting equipment are regularly maintained and serviced. • Provide fire hazard signs such as "No Smoking sign", Direction to exit in case of any fire incidence and emergency numbers.	records of servicing Presence of fire hazard signs Presence of fire exit signs				
7	Increase in Energy Demand	• Put off all lights immediately when not in use or are not needed.	Presence of energy conserving electric lamps	Inspection	Quarterly	Energy Department	950,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		• Use energy conserving electric lamps for general lighting. • Make use of alternative source of energy such as solar power. Solar panels proposed in the project should be fully utilized and timely repaired in case of damage.	Availability and condition of solar panels				
8	Increase in water demand	• Install water conserving taps that turn-off automatically when water is not in use. • Encourage water reuse/recycling during occupation phases. • Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance	Presence of water conserving taps Presence of gutters on roofs Presence of notices on water serving means	Inspection	Bi-annual	LWB	1,000,000.00

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Monitoring Indicator	Means of Verification	Frequency of monitoring	Responsible Authority	Costs (Mk)
		collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc • Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. Keep/Leave the Tap Closed etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management					

CHAPTER 8: CONCLUSION AND RECOMMENDATIONS

8.1 CONCLUSION

From the environmental assessment conducted for the project, it is clear that the project potentially has some significant negative impacts which relate to the surrounding environment. The impacts relate to issues pertaining to risk of pollution of the environment in case of improper solid and liquid waste disposal; traffic congestion and general nuisance during construction. Sanitation is also a challenge that has to be appropriately considered with adequate safety measures in case of bursting of sewage pipes which may pollute the immediate environment.

It should be noted, however, that despite the above potential impacts, it is possible with adequate design and implementation measures advanced in this report to mitigate the environmental effects and reduce them to acceptable levels. It is recommended that strict monitoring measures will be instituted both from an engineering and environmental point considering the sensitivity of the site. This will ensure that the project adheres to acceptable practices and standards.

The project will assist to create modern and adequate hostel facilities at College of Medicine, Lilongwe campus, which will assist to increase students' enrolment and enhance their academic performance.

8.2 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS

8.2.1 Summary of key positive impacts

A summary of the key positive impacts identified in the ESIA study are indicated below:

a) Provision of modern and adequate and affordable student hostels facilities at College of Medicine, Lilongwe campus;
b) Increased enrolment of medical University Students;
c) Reduced demand for rented out-of-campus accommodation
d) Increase in performance of students academically as most students will leave close to the campus and easily access college facilities
e) Creation of Employment;
f) Increase in market for local construction materials;
g) Increase in business activities within the project area;
h) Improve security in the area;
i) Increase in economic activities;
j) Increase in revenue by government through taxes; and
k) Improved aesthetic value.

8.2.2 Summary of key negative impacts

The following is a summary of the main negative impacts and recommended measures to minimize or eliminated the impacts:

a) Loss of vegetation and animal habitats due to site clearing;
b) Dust generation;
c) Soil erosion and sedimentation;
d) Generation of waste;

e) Increased Noise Levels;
f) Pollution of the environment from engine oils and pollution;
g) Creation of borrow pits from quarrying of construction materials
h) Visual Intrusion;
i) Disruption of existing services;
j) Occupational safety and health risks;
k) Risk of Increased incidences of Sexually Transmitted Infections (STIs) and HIV and AIDS.

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. The structures will be built to the required planning/architectural/structural standards of the National Construction Industrial Council (NCIC). During project implementation and occupation, sustainable environmental management will be ensured; avoiding inadequate use of natural resources, conserving nature sensitively and guarantees a respectful and fair treatment of all people working on the project, general public at the vicinity and inhabitants of the project.

In relation to the proposed mitigation measures that will be incorporated during construction and operational/occupation phases; the development's input to the society; the project is considered beneficial and important. It is our considerable opinion that the proposed development is a timely venture that will subscribe to the government housing policy and investment call. It is thus our recommendation that the project be allowed to go ahead with the implementation provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close adherence and implementation of the recommended Environmental and Social Management and Monitoring Plans (ESMPs).

8.3 OVERALL RECOMMENDATION

It is the consultant's view that the project be allowed to proceed on condition that the measures proposed in this ESIA Report and in particular in the ESMP are fully implemented. Recommendations for the prevention and mitigation of adverse impacts are as follows:

a) All solid waste materials and debris resulting from construction activities must be disposed off at Waste management dumping site in Area 38;
b) Construction activities must be undertaken only during the day i.e. between 7:30 am – 6:00 pm to minimize disturbance to the general public within the proximity of the site/project;
c) Traffic along the access/connecting roads should be controlled during construction and especially when heavy trucks are turning in and out of the site to ensure that no accidents are caused by the site's activities;
d) During construction all loose soils must be compacted to prevent any erosion by wind or water. Other appropriate soil erosion control measures can be adapted. Any stockpiles of earth should be enclosed, covered or sprinkled with water during dry or windy conditions to minimize generation of dust particles into the air;
e) Once earthworks have been done, restoration of the worked areas should be carried out immediately by backfilling, landscaping/ levelling and planting of low grass (in open areas), flowers and suitable tree species;

f) Ensure proper water usage during construction and occupational phases. Contractor can import water using bowsers and tankers with the approval of relevant water authority. Provide water saving valves and install rainwater harvesting systems (gutters, down pipes and storage facilities);
g) Drains will be properly designed, installed and regularly maintained to prevent storm water (run-off) from accumulating within the site and spreading to the neighbourhood. These must effectively drain the storm from the premise in to the existing public drainage system along the road;
h) Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of rubbing metal bodies. Maintenance should be conducted in a designated area and in a manner not to interfere with the environment;
i) Heavy construction activities should be limited (or avoided) during the rainy season to minimize the chances of soil degradation (soil erosion);
j) Maintenance activities must be carried out in service bay to reduce chances of oils or grease or other maintenance materials, from coming into contact with environment (water or soil). Waste water from such areas must be refrained from coming into contact with soil mass or water bodies as it contains oil/grease spills;
k) Used and new oils must be handled and stored appropriately to avoid oil leaks and spills on the site;
l) Sewerage system must be properly designed within the site /house and effectively connected to the existing sewer line. Design specifications must be followed during installation. Standard cleanliness of sanitary and waste disposal facilities at construction site must be maintained;
m) Workers must be provided with complete protective and safety gear. They must have working boots, complete overalls, helmets, gloves, earmuffs, nose-masks, goggles etc.
n) Fully equipped first aid kit must be provided within the site. Workers should get food that is hygienically prepared; the source of such food must be legalized or closely controlled;
o) The contractor must provide adequate security during the construction period and especially during the night when there are no construction activities;
p) A complete firefighting system must be provided after completion of the project. The equipment is clearly provided in the design plan, and in the report. This must be installed or provided at strategic points; and
q) Diligence on the part of the contractor and proper supervision by the Supervising Foreman during construction and the property manager during operation.

REFERENCES

1. Government of Malawi (1997), **Guidelines of Environmental Impact Assessment in Malawi,** Ministry of Natural Resources, Energy and Mining;
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4. Government of Malawi (1998), **Local Government Act,** Ministry of Local Government, Lilongwe;
5. Government of Malawi (2000), **National Land Resources Management Policy and Strategy,** Ministry of Agriculture, Irrigation and Water Development;
6. Government of Malawi (2002), **Malawi National Land Policy**, Ministry of Lands, Housing and Urban Development;
7. Government of Malawi (2003), **Malawi National HIV/AIDS Policy,** Ministry of Health;
8. Government of Malawi (2004), **National Environment Policy**, Ministry of Natural Resources, Energy and Mining;
9. Government of Malawi (2005), **National Water Policy,** Ministry of Agriculture, Irrigation and Water Development;
10. Government of Malawi (2007), **Forestry Act,** Ministry of Natural Resources, Energy and Mining;
11. Government of Malawi (2013), **Gender Equality Act,** Ministry of Gender, Children, Disability and Social Welfare;
12. Government of Malawi (2013), **Water Resources Act,** Ministry of Agriculture, Irrigation and Water Development;
13. Government of Malawi (2016), **Customary Lands Act,** Ministry of Lands, Housing and Urban Development;
14. Government of Malawi (2016), **Land Act,** Ministry of Lands, Housing and Urban Development;
15. Government of Malawi (2016), **National Forestry Policy,** Ministry of Natural Resources, Energy and Mining;
16. Government of Malawi (2016), **Physical Planning Act,** Ministry of Lands, Housing and Urban Development;
17. Government of Malawi (2016), **The Constitution of the Republic of Malawi,** Office of President and Cabinet;
18. Government of Malawi (2017), **Forestry (Amendment) Act,** Ministry of Natural Resources, Energy and Mining;
19. Government of Malawi (2017), **Land Survey Act,** Ministry of Lands, Housing and Urban Development;
20. Government of Malawi (2017), **Lands Acquisition (Amendment) Act,** Ministry of Lands, Housing and Urban Development;
21. Government of Malawi (2017), **Local Government (Amendment) Act,** Ministry of Local Government, Lilongwe;
22. Government of Malawi (2017), **Registered Land (Amendment) Act,** Ministry of Lands, Housing and Urban Development;
23. **National Statistical Office, 2008**. Population and Household Survey.

ANNEXES

ANNEX 1 Terms of reference for the ESIS for construction of Students' hostels at College of Medicine, Lilongwe campus

1. Provide a full description of the scope of the project with respect to the:
    (a) Name of the proponent;
    (b) The postal and physical address;
    (c) The spatial location of the site for the project,
    (d) The estimated cost of the project, the size of land for the project site,
    (e) The number of people to work on the area including water reticulation,
    (f) Waste disposal and access roads.

2. Examine the existing physical and socio-economical conditions of the proposed area by identifying and analyzing:
    (a) Geology and soil conditions of the area;
    (b) Site topography and drainage systems (water courses);
    (c) The scope of vegetative resources of the site;
    (d) The scope of fauna within the area;
    (e) Existing human land uses (e.g. cultivation by local people) and developments within and surrounding area
    (f) Suitability of the site for the proposed project.

3. Provide a site-specific map of the area (Scale 1:50,000) showing the proposed project site and (1:10,000) showing existing establishments in the proposed area and surrounding areas. A site plan for the project should also be provided.

4. Describe the major activities to be undertaken in the construction and operation of the infrastructure and facilities for the proposed project. Identify the main construction and operation activities of the project.

4 State any alternatives considered for the project.

5. Identify the potential short and long-term environmental impacts associated with the proposed project, focusing on both the positive and negative effects as well as effects to the biophysical, social, economic and cultural components of the environment. The potential impacts must include those related to:
    (a) Project planning;
    (b) Project construction;
    (c) Project operation; and
    (d) Project decommissioning.

6. Prescribe appropriate measures /strategies to eliminate, reduce, reverse or mitigate the identified negative impacts/effects identified in 5 including the measures to enhance the positive effects.

7. Propose an environmental management and monitoring plan for the project. The EMP should be in tabular form, which should specify the predicted impacts, mitigation measures/enhancement measures, schedule of these measures, costs to undertake these measures, and responsible persons and institutions. The Environmental Monitoring Plan should outline all the main indicators to be used for monitoring the impacts and also the frequency of monitoring.

8. Undertake public consultation to ensure that all interested and affected stakeholders are involved in the EIA process and incorporate their views into the EIA report.

9. Outline government objectives and the policy/legal framework on the environmental impact assessment - as a justification for preparation of environmental impact assessment for a project. Provide a proper citation within the study report of all the reference materials including all relevant Malawi Government Policies and laws in the case of the implementation of the proposed project (e.g. Environmental Management Act, Mines and Minerals Act, National Land Policy and Water Resources Act)

ANNEX 2 Stakeholders consulted and issues raised

Name	Position	Organization	Comment	Action taken
College of Medicine, Lilongwe Campus				
M. Malewa	Vice Principal	CoM	The Project is a very important one as it will assist to provide the much-needed additional bed spaces for the students	The ESIA report has outlined the benefits of the project
Ida Chapuma	Administrator and Liaison Officer	CoM (LL)	The Project will assist to facelift College of Medicine, Lilongwe Campus as the proposed hostels will have modern structures	The report has included details of the structures and how the Contractor should adhere to details of the architect designs
Howard Kamphinda	Stores Clerk Officer	CoM (LL)	The project will assist to improve students' performance in their academic work as the students will not be traveling longer distances to access the University facilities	The ESIA report has outlined the benefits of the project
Pacharo Chirwa	Security Officer	CoM (LL)	The project will enhance students' safety and safety of their assets as they will all be accommodated on the campus	The ESIA report has outlined the benefits of the project
Client, Old Mutual Investment Group				
Mphatso Kasalika	Head of Alternative Investment	Old Mutual	Old Mutual will continue to work with all the relevant authorities to ensure that the project is implemented as planned	Preparation of the ESIA report itself is an indication of how committed the Client is to follow all the prescribed laws and regulations when implementing this project

Linda Kumsinda	Project Coordinator	Old Mutual	Old Mutual is doing everything possible to ensure that the project is implemented in an environmentally and socially acceptable manner	Preparation of the ESIA report itself is an indication of how committed the Client is to follow all the prescribed laws and regulations when implementing this project
Brenda Mwale	Investment Manager	Old Mutual	Old Mutual will continue to work with all the relevant authorities to ensure that the project is implemented as planned. Once the plans and designs are ready Old Mutual will work hand in hand with the City Council to have the plans and designs approved	Preparation of the ESIA report itself is an indication of how committed the Client is to follow all the prescribed laws and regulations when implementing this project
Architect				
Justin Mushan	Architect	MOD	The designs of the hostels and the associated infrastructure are developed together with the developer. This will ensure that the developer's desires are incorporated into the designs.	The report has recommended that the Contractor should adhere to details of the architect designs
Patrick Calise	Architect	MOD	The designs of the hostels and the associated infrastructure are developed together with the developer. This will ensure that the developer's desires are	the Contractor should adhere to details of the architect designs

			incorporated into the designs.	
Other stakeholders relevant to the project				
T. Mbale – Luka	Director	Environmental Affairs Department	The project is a good initiative. It will assist to make available modern and adequate hostels facilities at College of Medicine, Lilongwe Campus of LUANAR. However, the developer should ensure that the necessary laws and policies pertaining to environment and natural resources management are adhered to when implementing the project. EAD will be monitoring implementation of the project activities time and again during construction phase to ensure that the project activities comply with environmental laws of the land. Construction activities will not be allowed to commence until the ESIA report is approved	The ESIA report has recommended that implementation of the project should follow all the environmental laws and regulations
Mr. Charles Kachingwe	Water Quality and Environmental Manager	Lilongwe Water Board	LWB will be able to supply sufficient water and water of good quality to meet the new water requirements of the college. However, the	The report has included details of how College of Medicine, Lilongwe campus will enhance water availability for the project

			developer will be expected to use river water and not piped water for all the construction activities.	
H. Nyangulu	Commissioner of Labour	Ministry of Labour, Vocation Training and Manpower Development	The Contractor should as much as possible employ Malawians in his workforce. The Contractor will further be required to introduce and enforce a site specific Occupation Health and Safety policy to ensure that no occupational accidents happen at work place	The report has stipulated all the recommendations which will assist to take care of all the Occupation Health and Safety Concerns which may arise as a result of the project
Mr. Timothy Mwale	Land and Property Valuation officer	Ministry of Lands, Housing and Urban Development	The development will take place within College of Medicine, Lilongwe Campus and the land already belong to College of Medicine, Lilongwe campus hence issues of compensation and resettlement will not occur	The report has not included issues of compensation and resettlement.
Mr A.D. Kwanjana	Dep. Director for Cleansing Services	Lilongwe City Council	The project will generate both solid and liquid waste hence the project will be required to put in place good measures to manage these wastes	The report has made recommendations as to how both solid and liquid wastes should be managed
Dr. Dafter Khembo.	Monitoring and Evaluation Specialist	NCHE	Availability of adequate and modern Hostels will assist to increase enrolment in these institutions of	The report has included different benefits that the project will generate

			higher learning and assist to improve academic performance of students as all the students will be accommodated within the campus where access to university facilities will be easy. The project is very much required	

ANNEX 3 Designations and qualifications of the experts

The following personnel list was responsible for the conducting of EIA study for the project:

4.1 Lyson Kampira: (MSc. Environmental Science, Bachelor of Education Science (Hons)) Mr. Kampira is an experienced Environmental and Social Impact Assessment expert and will be the Team Leader for the Assignment. He is a seasoned Environmental and Social Impact Assessment expert with More than 10 years of practical experience in ESIA studies and environmental management in General. He has successfully conducted a number of ESIA. In all, he has successfully conducted and led more than 20 ESIA studies and has prepared more than 20 ESIA reports and Environmental and Social Management Plans for different developmental projects ranging from irrigation, road infrastructure, hydropower generation, mining, industrial development, infrastructure developments and water and sanitation which have been approved by the Environmental Affairs Department.

4.2 Jonas Mwatseteza: PhD, MSc, Bed (Hons) and Bed (Sc): An Environment and Analytical Chemist. He has conducted a number of EA studies and prepared a number of EIA reports for different development projects. Has more than 6 years of practical experience in conducting EIA studies and preparation of EIA reports. He has successfully done **more than 10 similar assignments**. The expert was involved in conducting stakeholder consultations, environment review and assessment, report writing.

4.3 Martna Chimzimu: (Bachelor of Arts in Social Science) - Majoring in Sociology with minors Political Science & Administrative Studies

Ms. Chimzimu is a seasoned Social Development Expert with wide experience in Environment and Natural Resources Management, Climate Change, Gender and HIV and AIDS management. She has more than 5 years' experience in conducting socio-economic surveys and preparation of social impact assessment and mitigation plans. She has vast experience in public consultation.

4.4 Stanley Phiri (B.Sc. in Irrigation Engineering)

Mr. Phiri is a Water Resources Expert. He specialized in Hydrology; and Water Resources. Mr. Phiri has wide professional experience in the water sector; irrigation, water supply, disaster risk management, environment and climate change management and related water disciplines of water, sanitation and hygiene. This includes water resources policy reforms for complex water demands for urban and rural water supply, Sustainable Environmental Management of Water Schemes, Designing of Water Infrastructures and Rural Development, Surface and Groundwater Hydrology, Catchment Analysis and Management, Hydrological Modelling and Water Management, Rural Water Supply and Construction Management.