Reg. 216 & CRM Review Issues Letter
ASHA Kenya Tenwek Hospital IEE & CRM (Construction), FY19

DCHA BEO NOTE: The BEO commends Tenwek Hospital for a very thoughtful environmental analysis for this important work in offering emergency medical treatment for those patients within and outside the region.

This Issues Letter is to inform Tenwek Hospital that the IEE has been approved with conditions by the DCHA BEO. The BEO identifies six issues that will require attention by the implementing partner.

Summary of Issues to be addressed, via A/COR direction, within four weeks of receipt of this Issues Letter (6):

1. Issue 1: The implementing partner must submit a Climate Risk Management screening of planned project activities. Required (CRM).

2. Issue 2: The implementing partner must specify adequate measures to ensure proper operation and maintenance of the center's incinerator. Required (IEE).

3. Issue 3: The implementing partners must provide more information on water quality assurance, including the latest water quality testing. Required (IEE).

4. Issue 4: The Implementing Partner is required to clarify its plans for handling liquid waste and effluent discharge and disposal. Required (IEE).

4. Issue 5: The Implementing Partner should specify how pest management will be addressed throughout the construction and operation of the Accident and Emergency Centre and additional DCHA BEO approval must be granted prior to any pesticide-related activities commence. Required (IEE).

5. Issue 6: The implementing partner must confirm that they will not plant non-invasive species. Required (IEE).

Detailed Explanation of Issues:

Issue 1: The environmental submission is without a Climate Risk Management (CRM) screening.
Discussion 1: We appreciate receiving the detailed EIA analysis. We note that climate risk management screening may not be a standard component of a NEMA EIA, however, it is a required component for an USAID-funded project. Please refer to the CRM Screening Guidance for ASHA Activities (CRM Screening Guidance). Additional USAID resources that may help inform your review include: Guide for Integrating Climate Change Adaptation in Infrastructure Planning and Design, Addressing Climate Change Impacts on Infrastructure, and USAID/ECOS Sector Environmental Guidelines. A complete CRM screening includes a CRM summary table, CRM narrative, and all interventions related to construction must be rated as High Climate Risk and must be reviewed, edited and certified by the ASHA-cleared Architecture and Engineering (A&E) Service Provider.

Required 1: The implementing partner must submit a Climate Risk Management screening of planned project activities.

Issue 2: More details on the operation and maintenance of the hospital’s incinerator is required.

Discussion 2: The DCHA BEO commends the implementing partner for detailing how they plan to manage biomedical waste using the incinerator. A WHO study on small-scale incineration notes risks related to small-scale, non-industrial waste incineration when improperly managed, especially in a hospital setting. These risks include: 1) spread of pathogens in incinerator ash via incomplete burning of waste, 2) emission of carcinogenic and toxic gases from the burning of PVC (polyvinyl chloride) plastics, 3) explosion of incinerated pressurized containers.

It is therefore important for the implementing partner to have both a solid technical capacity as well as adequate and sustained financial support to safely operate the incinerator. The implementing partner is therefore required to provide additional details on the disposal methods and equipment that will be used for the final elimination of biomedical waste streams, as well as measures to ensure the adequate operation and maintenance of the center’s incinerator. Is there a landfill available for the incineration ash? The implementing partner should ensure that there are properly designed ash pits, with limited access, that will not pollute groundwater. The implementing partner may refer to this guidance on adequate procurement, operation and maintenance of small-scale incinerators.

As of 2014 (for the ASHA award AID-ASHA-A-13-00011), Tenwek Hospital was using model number 250LA manufactured in 1998 by the S.A. Incinerator Company (Pty) Limited in South Africa, which is a dual-chamber pyrolytic incinerator. Has the incinerator been functioning reliably since the Hospital purchased it? Please specify how you ensure an adequate supply of fuel for proper frequency of use.
Required 2: The implementing partner must specify adequate measures to ensure proper operation and maintenance of the center’s incinerator.

Issue 3: It is important to ensure potable water quality assurance, especially for the sensitive populations this building will be serving.

Discussion 3: The IP should be clear on the water source for both construction and operations. As of 2014 (for the ASHA award AID-ASHA-A-13-00011), Tenwek Hospital had not needed any renovations since it was commissioned in 2003. When was the plant last renovated and are there any current maintenance issues? It was also noted that the hospital water supply is tested by the Water Resources Management Authority (Lake Victoria South Catchment Regional Office) in Kisumu, Kenya, semiannually.

The IP is requested to submit the most recent water quality test results from the well that supplies the hospital with potable water. Also to note, water quality should be tested on a quarterly basis (rather than semiannually), per USAID requirements. These water quality test results should test the following minimum parameters as required by the USAID AFR Water Quality Assurance Plan (WQAP) Guidance Note:

1. Arsenic
2. Fecal coliform
3. Fluoride
4. Nitrate
5. Electro-conductivity
6. Total Dissolved Solids
7. pH
8. Turbidity

The IP may refer to the USAID AFR Water Quality Assurance Plan (WQAP) Guidance Note and Template for guidance on how to develop a project-specific WQAP.

Required 3: The implementing partner must provide more information on water quality assurance, including the latest water quality testing.

Issue 4: It is important to ensure proper sanitation and wastewater disposal to limit negative impacts for the facility and surrounding area.
Discussion 4: The EIA noted that the proponent will direct hazardous wastes into the hospital sewerage system. Proper management of the effluent will ensure a clean environment for the residents of this area. The Implementing Partner should clarify the following:

- Please provide how you are following sanitation guidelines and mitigating impacts related to sanitation.
- Is the existing main hospital sewer treatment plant operating at full capacity now? Are there plans to expand and/or improve the plant to handle this proposed new use?
- Where is the final effluent discharged to?
- In order to ascertain that by expansion of the facility does not add to an existing problem, the IP should plan to provide monitoring records of the effluent finally discharged to the environment that is taken quarterly, as approved by NEMA.

The IP may review the USAID Sector Environmental Guidelines on Water Supply and Sanitation for additional guidance.

Required 4: The Implementing Partner is required to clarify its plans for handling liquid waste and effluent discharge and disposal.

Issue 5: The IEE does not include a discussion or explanation of how pest management will be addressed during the construction and operation of the Accident and Emergency Centre.

Discussion 5: The BEO appreciates the fact that the IP plans to contract a licensed solid waste collector to collect all solid waste during construction, to prevent the habitation of rodents, however, pest management is often a challenge both in construction zones and during the operation and maintenance of facilities. The IP is therefore requested to provide details on its pest management plans including control of termites, rodents, mosquitoes, cockroaches, etc. If necessary, the IP could also consider Integrated Pest Management and may review the USAID Sector Environmental Guidelines for additional guidance. Please note that all proposed projects involving the procurement or use, or both, of pesticides, require additional environmental review prior to commencing any pesticide-related activities (see the ASHA Global IEE FY20-24 for more details).

Required 5: The Implementing Partner should specify how pest management will be addressed throughout the construction and operation of the Accident and Emergency Centre and additional DCHA BEO approval must be granted prior to any pesticide-related activities commence.
Issue 6: The introduction of exotic invasive species can have important environmental impacts on the surrounding flora and fauna.

Discussion 6: The BEO commends the IP’s plans to plant shrubs and grass on the hospital grounds to prevent ecological deterioration and improve the aesthetic value of the site, and encourages the implementing partner to use native species in order to prevent potential invasion of surrounding flora by exotic species. If invasive species are planted, they can spread rapidly and have undesirable ecological events. Where no local alternatives are available, the BEO recommends the use of well-tested non-nuisance species approved by the Government of Kenya.

Required 6: The implementing partner must confirm that they will not plant non-invasive species.
INITIAL ENVIRONMENTAL EXAMINATION

ACTIVITY DATA

Activity Name: World Gospel Mission / Tenwek
Amendment (Y/N): N
Geographic Location(s) (Country/Region): Kenya / AFR
Implementation Start/End: October 1, 2018 – September 30, 2022
Solicitation/Contract/Award Number: AID-ASHA-A-17-00017
Implementing Partner(s): World Gospel Mission / Tenwek Hospital

ORGANIZATIONAL/ADMINISTRATIVE DATA

Implementing Operating Unit(s): DCHA/ASHA
Funding Operating Unit(s): DCHA/ASHA
Funding Account(s): Development Assistance (DA)
Funding Amount: $500,000
Amendment Funding Date: Amendment Funding Amount: N/A
Other Affected Unit(s): AFR
Lead BEO Bureau: DCHA
Prepared by: Salina Natnael
Date Prepared: March 11, 2020

ENVIRONMENTAL COMPLIANCE REVIEW DATA

Analysis Type: ☒ Initial Environmental Examination
☐ Amendment
Environmental Determination(s): ☒ Categorical Exclusion
☒ Negative Determination
☐ Positive Determination
☐ Deferral
Initial Environmental Examination Expiration Date: N/A
Additional Analyses/Reporting Required: N/A
Climate Risks Rating for Risks Identified: Low _____ Moderate _____ High _____
SUMMARY OF FINDINGS

PURPOSE AND SCOPE OF THE INITIAL ENVIRONMENTAL EXAMINATION
World Gospel Mission/Tenwek submission. Please see attached EIA document, submitted to Kenyan Government as part of local requirement. AOR recommends annexing a document addressing any gaps (if applicable) identified between the EIA and the Initial Environmental Examination.

ACTIVITY SUMMARY
PLEASE SEE ATTACHED EIA DOCUMENT.

ENVIRONMENTAL DETERMINATIONS
PLEASE SEE ATTACHED EIA DOCUMENT.

IMPLEMENTATION
In accordance with 22 CFR 216 and Agency policy, the conditions and requirements of this document become mandatory upon approval. This includes the relevant limitations, conditions and requirements in this document as stated in Sections 3, 4, and 5 of the IEE and any BEO Specified Conditions of Approval.
USAID APPROVAL OF INITIAL ENVIRONMENTAL EXAMINATION

ACTIVITY NAME: World Gospel Mission / Tenwek

Approval:

Anne Dix, ASHA Director

Clearance:

Tina L Balin
(affiliate)

Clearance: Wilkister Magani
Mission Environmental Officer (MEO)*

Clearance:
Regional Environmental Advisor (REA)*

Clearance:
Erika J. Clesceri
DCHA Climate Integration Lead (CIL)

Concurrence:
Erika J. Clesceri
DCHA Bureau Environmental Officer (BEO)

*Clearance recommended, but optional.
PROPOSED ALTERATION AND EXPANSION OF EXISTING MCH BLOCK AND CONVERSION INTO ACCIDENT AND EMERGENCY CENTRE (A&EC)

LOCATED ON PLOT LR. NO. KERICHO/SILIBWET/11751 IN TENWEK HOSPITAL, BOMET COUNTY

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT REPORT

View of current MCH block to be altered, expanded and converted into A&EC

GPS Coordinates: -0.744195, 35.359439

© SEPTEMBER 2019

EXPERT

DAYTON CONSULTANTS
Environmental Management Services
P.O. Box 59665-00100 Nairobi
Cell: 0724 235 152 & 0734 365 971
Mfangano Trade Centre
Mezzanine Floor (M2)
Email: daytonconsultants@gmail.com

PROPOONENT

TENWEK HOSPITAL
P.O Box 39 - 20400
BOMET, KENYA
Email: tenwek@tenwek.com

This Environmental Impact Assessment (EIA) Project Report is submitted to the National Environmental Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 2015 and the Environmental (Impact Assessment and Audit) Regulations, 2003
CERTIFICATION AND SUBMISSION OF THE REPORT

This Environmental Impact Assessment project report for the proposed Alteration and Expansion to Existing Tenwek Hospital Mother Child Health (MCH) Block and conversion into Accident and Emergency Centre (A&EC) on Plot LR No. Kericho/Silibwet/11751 in Bomet County (GPS Coordinates: 0°44'39.1"S and 35°21'34.0"E) was conducted and the report prepared by firm of registered NEMA experts in accordance with the requirements of the Environmental Impact (Assessment and Audit) Regulations, 2003. The firms’ registration details and signatures are as follows:

CONSULTANT

DAYTON CONSULTANTS
Environmental Management Services
P.O. Box 59665 -00100 Nairobi
Cell: +254 724 235 152
    +254 734 365 971
Mfangano Trade Centre
Mezzanine Floor (M2)
Email: daytonconsultants@gmail.com
Web: www.daytonconsultants.com
NEMA Registration Number: 6504

Signed: ___________________________ Date: ___________________________
Lucas Nyamila Lead Expert NEMA Reg. No. 2549

PROPONEENT

TENWEK HOSPITAL
P.O Box 39 - 20400
BOMET, KENYA

Name: ___________________________ Designation: ___________________________
Signature: ___________________________ Date: ___________________________
ACKNOWLEDGEMENT

We, DAYTON CONSULTANTS LTD, as the firm of NEMA registered experts would like to express our appreciation to the following individuals and organizations for their overwhelming support in the journey that led towards the successful completion of this project report.

It is our duty to acknowledge with gratitude Mr. Joseph Maiyo- Manager Maintenance Department, Mr. Raymond Biegon- Tenwek Hospital Administrator, Dr. Janies Crognaile- project Champion and the entire Tenwek Tenwek Mission Hospital fraternity for making available the opportunity to undertake the exercise and assisting with the task of gathering data for the project report, they have a wide knowledge and expertise in the construction field hence the technical view expressed in this report is owed to them.

The final report is the result of a collaborative process which drew on the effort, knowledge, expertise and patience of Mercy Mutai and Mark Wambua. Others that have not been named here, their efforts are earnestly recognized.
## ACRONYMS AND ABBREVIATIONS

Table 1: Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOHSS</td>
<td>Directorate of Occupational Health and Safety Services</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Audits</td>
</tr>
<tr>
<td>EHS</td>
<td>Environment, Health and Safety</td>
</tr>
<tr>
<td>CDE</td>
<td>County Director of Environment</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMCA</td>
<td>Environmental Management and Coordination Act</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>SEM</td>
<td>Sustainable Environmental Management</td>
</tr>
<tr>
<td>KPLC</td>
<td>Kenya Power and Lighting Company</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environment Management Authority</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SWM</td>
<td>Solid Waste Management</td>
</tr>
<tr>
<td>BCG</td>
<td>Bomet County Government</td>
</tr>
<tr>
<td>dBA</td>
<td>decibels</td>
</tr>
<tr>
<td>MCH</td>
<td>Mother Child Health</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The proposed Alteration and Expansion to Existing Tenwek Hospital Mother Child Health (MCH) Block will be located on Plot LR. No. Kericho/Silibwet/11751 within Tenwek hospital in Bomet County (GPS Coordinates: 0°44'39.1"S and 35°21'34.0"E). The building is existing as Mother Child Health Centre (MCH) and is to be altered and modified to serve as an Accident and Emergency Centre (A&EC). It is a one storey building with a lower ground floor, thus it will have ground, first and lower ground floors. Neighbouring the proposed site are; casualty section, ambulance parking bay, administration offices, water fountain, public toilet, gate house, Tenwek shopping Centre, Ng’etich block, nurses quarters, Bethesda church/meeting room, waiting bay and theater and NHIF office.

By the time of assessment, the building was existing and operational. It is currently being used as Mother Child Health Centre but upon the proposed alteration and expansion, it will be converted into an Accident and Emergency Centre A&EC to offer a wide range of examination and treatment services to its patients.

An emergency department (ED), also known as an accident & emergency department (A&E), emergency room (ER), emergency ward (EW) or casualty department, is a medical treatment facility specializing in emergency medicine, the acute care of patients who present without prior appointment; either by their own means or by that of an ambulance. The emergency department is usually found in a hospital or other primary care center.

Due to the unplanned nature of patient attendance, the department must provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life-threatening and require immediate attention. In some countries, emergency departments have become important entry points for those without other means of access to medical care.

The emergency departments of most hospitals operate 24 hours a day, although staffing levels may be varied in an attempt to reflect patient volume.

Wellness evaluations at proposed Tenwek Accident and Emergency Centre (A&EC) will be designed to accommodate all emergency package needs through a focused professional process. The functions of the proposed department shall include but not limited to:

- Triaging of patients
- Provide emergency medical services to patients consulting and going to Emergency Department without prior appointment
- Treat unannounced patients-life threatening and routine
- Functions 24 hours, 7 days/365 days
- Cardiopulmonary resuscitative measures to patients with life threatening conditions
- Medical examination and assessment
- Medical treatment within the limits of the Emergency Department
- Referral to appropriate physicians for follow-up or definitive management after being seen in the emergency department
- Administration and feedback
- Public relations
- Relation with external hospitals
✓ Provide ambulance services
✓ Training and research
✓ Handling referrals from external facilities
✓ Management of patients’ surge
✓ Application of Plaster of Paris for fracture patients
✓ Issuance of drugs from the department pharmacy
✓ Sample collection and analysis in the lab

The Alteration, Expansion and reorganization to Existing to the current MCH building into A&EC will be done for easier service delivery. Each floor will be designed and partitioned as described as bellow:

Lower Ground floor
- Small conference hall
- Staff break/classroom
- Lockers rooms for male and female
- Storage room
- Fire escape route

Ground floor
- Resuscitation bay
- Family consultation room
- Registration and payments room
- Wheelchair holding space
- Ambulance drop off space
- Procedure room
- Nurse station (04no.)
- Decontamination room
- Isolation room
- Pharmacy store
- Paedetrician observation room
- Nurse office
- Observation bays (02no.)
- Doctors office
- Changing room
- Control room
- X-ray imaging room
- Toilets
- Covered walkways
- Drop off entry
- Fire escape route
- Covered walk way
- The reception for outpatient center
- Customer service and merchandise store
- Credit office

First floor (offices)
- Examination room
- Medical superintendent room
- Open plan offices (02no.)
- Refreshment room
- Large conference hall
- Waiting/Breakout room
Other Civil External Works
Other works will also include; civil external works to the forecourt and the MCH building connectivity i.e.

**Forecourt**
- New pedestrian gate and entrance canopy
- New gate house
- Boundary wall rehabilitation

**MCH building connectivity**
- covered walk way to the building
- An outdoor ramp

The Environmental Impact Assessment Project Report of the proposed project is prepared in accordance with section 58 of the Environmental Management and Coordination act (EMCA) No.8 of amendment 2015 and Environmental (impact assessment and Audit) Regulations (2003) that requires that all enterprises and project must undergo an Environmental Impact Assessment. The purpose is to predict all possible positive and negative impacts that the project may have on both human and natural environment and suggest mitigation measures for the significant negative impacts before the project is implemented.

The main objective of the EIA project is to provide information on the nature and extent of potential environmental impacts arising from the construction and operation of the proposed Alteration and Expansion to Existing Tenwek hospital MCH block into an Accident and Emergency Centre development (hereinafter referred to as “the Project”) and related activities taking place concurrently and to contribute to decisions on the overall environmental acceptability of the project after the implementation of environmental mitigation measures.
The methodologies used to conduct this EIA project were a) Questionnaires b) Interviews c) Focus Group Discussions d) Field observations e) Still digital photography f) Desktop research.

The public participation comments, copy of the Title deed for the plot and a map of the site layout have been annexed at the back of this report.


The scope of the study was to describe the project, document all the baseline information, address both the positive and negative impacts and develop mitigation measures for negative impacts including designing environmental management plan for the project.

The following are areas of concern as well as positive impacts that have been discussed at depth in the report and their mitigation measures outlined. a) Medical wastes b) solid and liquid waste generation c) Noise nuisance d) Employment e) dust emissions and air pollution f) occupational, health and safety concerns g) National economic benefits h) energy use i) improved medical service delivery j) Soil erosion k) Fire hazards and accidents.

The NEMA Guidelines on EIA require that assessments of options available for a project are important considerations at the project planning stage. The environmental implications of each option should be considered before commitments are made.

The assessment should identify technical, economic and environmental reasons for selecting a preferred option. The alternatives to the proposed project should feasibly attain most of the basic project objectives but would avoid or substantially reduce any of the significant negative effects of the proposed project. The analysis of the alternatives summarized here is explained in details in the report. The following alternatives were identified: No project alternative, different site and the proposed Development Alternative.
# TABLE OF CONTENTS

CERTIFICATION AND SUBMISSION OF THE REPORT ...................................................... ii  
ACKNOWLEDGEMENT ................................................................................................... iii  
ACRONYMS AND ABBREVIATIONS .............................................................................. iv  
EXECUTIVE SUMMARY .............................................................................................. v  
LIST OF TABLES ........................................................................................................... xi  
LIST OF FIGURES ......................................................................................................... xi  
LIST OF PLATES ........................................................................................................... xii  

## CHAPTER ONE

1.0 INTRODUCTION ........................................................................................................ 1  
1.1 Background and location of the Project ................................................................. 1  
1.2 Objectives of the project ....................................................................................... 1  
1.3 The Project report Legal Context Requirement ................................................... 2  

## CHAPTER TWO

2.0 BASELINE INFORMATION .................................................................................... 3  
2.1 Geographical Location ........................................................................................ 3  
2.2 Tenwek hospital location .................................................................................... 4  
2.3 Bomet County ..................................................................................................... 5  
2.4 Human Population, Distribution and Settlement ................................................. 7  
2.5 Socio-Economic Services and Infrastructure ...................................................... 7  
2.5.1 Water ............................................................................................................ 7  
2.5.2 Energy ......................................................................................................... 7  
2.5.3 Sanitation .................................................................................................... 8  
2.6 Soils and Land Use ............................................................................................. 8  
2.7 Agriculture, Livestock and Fisheries ................................................................. 8  
2.8 Pollution and Waste Management ..................................................................... 8  
2.9 Water Sources .................................................................................................... 9  
2.9.1 Main Catchments ....................................................................................... 9  
2.9.2 Drainage ....................................................................................................... 9  
2.9.3 Aesthetic and Visual intrusion .................................................................... 9  
2.9.4 Noise Levels ............................................................................................. 9  
2.9.5 Ambient Air Quality .................................................................................. 9  

## CHAPTER THREE

3.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK .......................... 10  
3.1 Environment Management and Co-ordination Act, EMCA amendment 2015 .... 10  
3.2 The Water Act, Cap 372 .................................................................................... 11  
3.3 County Government Act 2012 ......................................................................... 12  
3.4 The Occupational Safety and Health Act, 2007 (No. 15 of 2007) .................... 12  
3.5 The Science and Technology Act, Cap 250 ...................................................... 14  
3.6 The Public Health Act, Cap 242 ....................................................................... 15  
3.7 The Physical Planning Act, Cap 286 .................................................................. 15  
3.8 The Land Planning Act (Cap. 303) .................................................................. 16  
3.9 The Building Code 2000 .................................................................................. 16  
3.10 The Penal Code (Cap. 63) .............................................................................. 16  
3.11 The Environmental Management and co-ordination (water quality) regulation 2006 ........................................................................................................ 16  
3.13 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 .............................................. 18  

## CHAPTER FOUR

4.0 PROJECT ACTIVITIES, OUTPUT AND DESIGN .................................................. 20  
4.1 Project cycle ....................................................................................................... 20  
4.1.0 Conflict Resolution ................................................................................... 20  
4.1.1 Planning and Design .................................................................................. 20  
4.1.2 Project Output and design .......................................................................... 21  
4.1.3 Site (Project) Activities during the Construction Phase ............................. 23  
4.1.4 Construction Activities ............................................................................. 24  
4.1.5 Operation .................................................................................................... 25  
4.2 Project Alternatives ........................................................................................... 26  
4.3 DECOMMISSIONING PHASE ............................................................................. 27
CHAPTER EIGHT

7.0 POSSIBLE ENVIRONMENTAL IMPACTS, THEIR MITIGATION MEASURES

7.1 DEFINITION & CLASSIFICATION OF ENVIRONMENTAL IMPACTS

7.2 Impact significance

7.2.1 Construction Phase Negative Impact

7.2.2 Construction Phase Positive Impact

7.2.3 Operation Phase Negative Impacts

7.2.4 Operation Phase positive Impacts

7.2.5 Decommissioning phase negative impacts

7.2.6 Decommissioning phase positive impacts

7.3 MITIGATION MEASURES

7.3.0 Mitigation measures for impacts in the construction phase

7.3.1 Controlling soil erosion

7.3.2 Management of Construction Waste

7.3.3 Control of Construction works noise

7.3.4 Control of Dust Emissions

7.3.5 Managing Spillage of Hazardous Materials

7.3.6 Containing Fire outbreak

7.3.7 Control of Traffic

7.3.8 Management of water demand

7.3.9 Management of terrestrial habitat & biodiversity

7.3.10 Management of sewage

7.3.11 Control of gaseous emissions

7.3.12 Workers Health & Safety

7.4 Mitigation measures at operational phase impacts

7.4.1 Reducing pressure on infrastructure

7.4.2 Proper solid waste management

7.4.3 Control of traffic flow

7.4.4 Management of Fire Incidents

7.4.5 Effluent disposal

7.5. Mitigation measures for impacts in the decommissioning phase

7.5.1 Proper solid waste management

7.5.2 Control of dust emission

7.5.3 Minimization of noise and vibration

7.6 Environmental Audit and Monitoring

CHAPTER NINE

8.0 ENVIRONMENTAL MANAGEMENT PLAN

8.1 Demolition and Construction Phase EMP

8.2 Operational Phase EMP

8.3 Medical and Hazardous Waste Management Plan during operation phase

8.4 Decommissioning Phase

CHAPTER NINE

9.0 GENERAL CONCLUSION AND RECOMMENDATIONS

REFERENCES

PHOTO LOG
Environmental Impact Assessment Project Report

LIST OF TABLES

Table 1: Acronyms and abbreviations........................................................................................................ iv
Table 2: Population Density Projections by Divisions (1999 – 2010)................................................................. 7
Table 3: Maximum Permissible Noise Levels for Constructions Sites (Measurement taken within the facility) - second schedule........................................................................................................ 19
Table 4: Maximum Permissible Noise Levels as per the First Schedule of the Regulation................................. 19
Table 5: Environmental Management Plan during demolition and construction phase.......................... 44
Table 6: Environmental Management Plan for the operation phase .............................................................. 48
Table 7: Medical and Hazardous Waste Management Plan...................................................................................... 49
Table 8: Environmental Management Plan for the decommissioning phase ......... 52

LIST OF FIGURES

Figure 1: Proposed project site location (Courtesy of Google map)................................................................. 3
Figure 2: Tenwek hospital location (Courtesy of Google map)......................................................................... 5

LIST OF PLATES

Plate 1: Front view of the MCH block to be altered and expanded into Accident and Emergency Centre ............................................................... 56
Plate 2: Current entrance ramp to the MCH block......................................................................................... 56
Plate 3: Adjacent Casualty block and water fountain to be removed.............................................................. 56
Plate 4: Abutting visitors toilet to be demolished to pave way for proposed expansion.......................... 56
Plate 5: Adjacent Casualty block and water fountain to be removed.............................................................. 56
Plate 6: Current MCH runoff drainage to be reconstructed........................................................................ 56
Plate 7: Improper ventilation in the current building leading to lights being switched on during the day .......................................................................................................................... 57
Plate 8: Congestion at the waiting bay within the current MCH block leading to use of the corridors by patients.......................................................................................................................... 57
Plate 9: Good waste management practice (color coding of waste bins) at the MCH block .................. 57
Plate 10: Overcrowding at the waiting bay.................................................................................................... 57
Plate 11: Main hospital entrance gate to be redesigned and expanded for increased traffic .............. 57
Plate 12: Adjacent building on the southern side of the MCH block......................................................... 57

Proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block on Plot LR, No. Kericho/Silibwet/11751
CHAPTER ONE

1.0 INTRODUCTION

1.1 Background and location of the Project

An emergency department (ED), also known as an accident & emergency department (A&E), emergency room (ER), emergency ward (EW) or casualty department, is a medical treatment facility specializing in emergency medicine, the acute care of patients who present without prior appointment; either by their own means or by that of an ambulance. The emergency department is usually found in a hospital or other primary care center.

Due to the unplanned nature of patient attendance, the department must provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life-threatening and require immediate attention. In some countries, emergency departments have become important entry points for those without other means of access to medical care.

The emergency departments of most hospitals operate 24 hours a day, although staffing levels may be varied in an attempt to reflect patient volume.

The proposed Alteration and Expansion to Existing Tenwek Hospital Mother Child Health (MCH) Block will be located on Plot LR. No. Kericho/Silibwet/11751 within Tenwek hospital in Bomet County (GPS Coordinates: 0°44′39.1″S and 35°21′34.0″E). The building is existing as Mother Child Health Centre (MCH) and is to be altered and modified to serve as an Accident and Emergency Centre (A&EC). It is a one storey building with a lower ground floor, thus it will have ground, first and lower ground floors. Neighbouring the proposed site are; casualty section, ambulance parking bay, administration offices, water fountain, public toilet, gate house, Tenwek shopping Centre, Ng’etich block, nurses quarters, Bethesda church/meeting room, waiting bay and theater and NHIF office.

By the time of assessment, the building was existing and operational. It is currently being used as Mother Child Health Centre but upon the proposed alteration and expansion, it will be converted into an Accident and Emergency Centre A&EC to offer a wide range of examination and treatment services to its patients.

1.2 Objectives of the project.

A&EC will be a busy department which will receives and attend to emergencies on a 24 hour basis. Majority of whom will be trauma patients. In line with Article 43 of the Constitution of Kenya, Tenwek hospital will provide emergency medical treatment to all patients brought to the facility as emergencies. It will also handle referrals from within and outside the region, responds to national disasters and mass casualty incidences that happen within and outside the region.

The proposed project is being developed with the following main objectives:
a. To provide ultra-modern Accident and Emergency Centre that is secure, comfortable and meets
the required competitive standards.
b. Provide employment to many Kenyans who are jobless especially during the construction and its
operation phase.
c. Improve and promote both small scale and large scale business within the location through
supplies of materials like cement, steel bars among others.
d. Promotion of transportation business through supplies of sand, building stones, ballast, articles.
e. Help in promoting the government through payment of tax and other revenues to Kenya
revenue authority (KRA)
f. Promotion of secondary employment or indirect employment like medical staffs, watchmen,
compound caretakers e. t. c.
g. Adherence to government vision 2030 where all Kenyans will be provided with proper and
adequate medical services.

1.3 The Project report Legal Context Requirement
The Environmental Management and Coordination Act (EMCA) of 2015 provides for the legal
framework for the management of the Kenyan environment. According to section 58 of the Act (EMCA)
No. 8 of 2015, second schedule 9 (i) and the environmental (Impact Assessment and Audit) Regulations,
2003, all new enterprises and ongoing projects must undergo Environmental Impact Assessment (EIA).
The EIA study report is submitted to the National Environment Management Authority (NEMA) in the
prescribed form, and accompanied by the prescribed fees.

Under the EMCA, all proposed projects according to the Second Schedule will undergo an
Environmental Impact Assessment (EIA) while projects already in place will undertake annual
Environmental Audits (EA). This Act came into force on 14th January 2000. It aims at coordinating
environmental protection activities in the country. In its preamble, the Act states that every person in
Kenya has a right to a clean and healthy environment.

The National Environmental Management Authority (NEMA) approval document on the proposed
project undertaking will enable the proponent to carry out the proposed Alteration and Expansion to
Existing Tenwek Hospital MCH Block and further converting it into Accident and Emergency Centre.
CHAPTER TWO

2.0 BASELINE INFORMATION

2.1 Geographical Location

The current Mother Child Health (MCH) Block to be altered and expanded is located within Tenwek hospital on Plot LR. No. Kericho/Silibwet/11751 in Bomet County (GPS Coordinates: 0°44’39.1"S and 35°21’34.0”E). Neighbouring the proposed site are; casualty section, ambulance parking yard, administration offices, water fountain, public toilet, gate house, Tenwek shopping Centre, Ng’etich block, nurses quarters, Bethesda church/meeting room, waiting bay and theater and NHIF office.

Figure 1: Proposed project site location (Courtesy of Google map)
2.2 Tenwek hospital location

Tenwek hospital is located 240 Kilometers (150 miles) from Nairobi in the Bomet County. The hospital itself is located approximately 7 km NE from the town of Bomet.

Tenwek is situated in the Western highlands at 6,800 feet, the climate is very moderate and pleasant. September-May is the driest and hottest season; June-August is more moderate and cooler in the
evenings. Temperatures average between 51 F and 70 F in the cool season and between 52 F and 79 F degrees in the warm season. There are two rainy seasons: November-December and March-June. The average rainfall at Tenwek is 55 inches.

Figure 2: Tenwek hospital location (Courtesy of Google map)

2.3 Bomet County

Tenwek hospital is in Bomet County which is one of the 47 Counties in Kenya. It covers an area of 1,450Km². It was created in 1992 out of the former larger Kericho District. It lies between latitudes 0°38' and 1° 03' south of the Equator and longitudes 35° 01' and 35° 33' east. The County is bordered by Bureti to the north, Nyamira to the west, Transmara to the southwest and Narok County to the south and southeast. It has 6 administrative divisions, 38 locations and 133 sub-locations, 3 constituencies.
Environmental Impact Assessment Project Report

Proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block on Plot LR No. Kericho/Silibwet/11751

(Chepalungu, Bomet, and Sotik), and 2 local authorities (Bomet County and Municipal Countys). It has a population of 440,842, a density of 304 persons per Km2 (2005 estimates), and 70,769 households with an average farm holding of 5 acres. (Population Census (1999), District Development Plan (2002 – 2008))

The County’s altitude ranges from 1,689m to 2,328m above sea level, while rainfall ranges between 1,000mm to 1,400mm per annum. Temperatures are in the range of 10°C to 27°C, with a mean monthly temperature of 18°C. The coldest months are July and August with monthly temperatures of 17.6°C and 19.8°C respectively. It has Agro - Ecological zones from UH to UM. Arable land is approximately 1204 Km² (83% of the district), while gazetted forest occupies 50 Km².

The major part of the County is characterized by undulating topography that gives way to flatter terrain in the south. The overall slope of the land is towards the south. Consequently, drainage is in that direction. The district receives rainfall throughout the year with the long rains occurring from March to May and the short rains from August to October.

Source: Bomet District Environment Action Plan 2009-2013
2.4 Human Population, Distribution and Settlement

Formal and up-coming informal settlements are concentrated around the urban centers. The dominant housing typology is the traditional semi-permanent housing, with or without corrugated iron sheets roofing especially outside the trading centers. Within the urban centers, permanent housing typology dominates.

Table 2: Population Density Projections by Divisions (1999 – 2010)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bomet Central</td>
<td>359</td>
<td>388</td>
<td>409</td>
<td>430</td>
<td>453</td>
</tr>
<tr>
<td>Lonisa</td>
<td>294</td>
<td>317</td>
<td>334</td>
<td>352</td>
<td>371</td>
</tr>
<tr>
<td>Sigor</td>
<td>210</td>
<td>227</td>
<td>239</td>
<td>252</td>
<td>265</td>
</tr>
<tr>
<td>Siongirai</td>
<td>246</td>
<td>265</td>
<td>280</td>
<td>295</td>
<td>310</td>
</tr>
<tr>
<td>Matarakwa</td>
<td>191</td>
<td>207</td>
<td>218</td>
<td>229</td>
<td>242</td>
</tr>
<tr>
<td>Ndanai</td>
<td>232</td>
<td>251</td>
<td>264</td>
<td>278</td>
<td>293</td>
</tr>
</tbody>
</table>


2.5 Socio-Economic Services and Infrastructure

2.5.1 Water

The region has several permanent rivers. These are, Amalo River, which flows along the southern boundary of the County, Nyangores River, which flows from Southwestern Mau Forest, and proceeds southwards through Tenwek, Bomet town and joins Amalo River to form Mara River, and Kipsonoi River, which flows along the District’s boundary with Bureti. It eventually flows into Lake Victoria. Kiptiget/Tebenik River flows along the northern boundary of the County. Sisei and Kagawet Rivers are seasonal. There is no available record of the streams (either seasonal or permanent) in the district. There are several protected springs. They include, Kiproroget, Uswet, and Kimolwet. Masaibei and Menet springs are in the process of being protected. There are also rehabilitated Dams and water pans. These are, Kapsaiyelel, Ngocho, Birirbei, Cheboin, Nyambugo, and Kapcheruse. The ones in the process of being de-silted include, Oldarakwa, Kugunoi, and Kagawet.

According to a baseline survey of the Mara River Basin, on average, households in Bomet get their water at a distance of 4KM. During the wet season, 70.8% of households spend less than one hour to get water, as compared to 47.9% during the dry season. 1.1% of households spend three to four hours to get water during the wet season compared to 7.4% during the dry season. Only a small proportion of households (0.3%) spend more than five hours during the dry season to get water.

2.5.2 Energy

The primary source of energy in the County is firewood, and charcoal. Combined, they provide energy to 75% of the population. Kerosene, gas, and biogas, provide energy to 23% of the population. Solar, and electricity, provide energy to less than 3% of the population in the County. Given the tendency of overlap, firewood and charcoal, could be a source of energy to an even bigger percentage of the
population. Wind power has not been exploited as a source of energy in the county. At the same time the potential for hydro electric power generation and geothermal sources of power has not been explored.

2.5.3 Sanitation

Only about 3% of the households in the county have access to piped water. Two per cent have access to portable water. The number of households with roofed catchment stands at 750 out of a total of 70,769 households. This is just about 1% of all the households in the county.

The county has 3 (three) permanent rivers, 1,040 wells, 30 protected springs, 2 Boreholes, 60 Dams/Water pans, and 200 ponds. The number of V.I.P. Latrines is 200. The average distance to the nearest portable water point is 4km. There are no markets or urban centers with sewerage facilities in Bomet.

2.6 Soils and Land Use

This Chapter provides information on the types, extent, status, and trends of soils and land use. Land is the basic natural resource. It forms the basis for the country’s socioeconomic development. It supports agriculture, livestock, forests and wildlife. With increasing population, poverty levels and demand for the resources, instances of over-exploitation and degradation of the natural resources are now common across the country. This chapter therefore seeks to outline the major goods and services derived from soils/land in the county, and establish their utilization patterns.

The topography of the Bomet County exhibits a general undulating to rolling topography in the upper zones in the north and north eastern parts that give way to flatter terrain in the south. The soil in the north/northeastern parts range from high to moderately fertile. Those in the southern tip range from low to very low in fertility. Those in the central part of the county and the south western tip range from moderately/high to variable in their fertility.

2.7 Agriculture, Livestock and Fisheries

Agriculture and Livestock are the main sources of livelihoods for rural populations. The three broad agricultural production systems are crop cultivation, livestock rearing, and fisheries. Each of the production system has the potential to significantly affect human and environmental health. This chapter seeks to identify specific activities under each system, status and trends, institutional arrangements, key environmental issues and interventions.

2.8 Pollution and Waste Management

The main pollution sources from agricultural activities in the County are soil erosion and residual fertilizers and other farm chemicals. The residual chemicals from the farms and other agro-industries are eventually washed down into streams and rivers. Soil erosion on farms, either due to water or wind, leads to water pollution and siltation of the dams and water pans. Air pollution as a result of dust
blown into the air from exposed/bare farms and other open spaces is also common. This wind and water erosion could be greatly reduced through intensified reforestation efforts.

2.9 Water Sources
The main water sources in the County are; river, piped water, protected springs, unprotected springs, open wells, protected wells, roof catchment, dams and earth pans, and boreholes.

2.9.1 Main Catchments
The main catchment for the three permanent rivers is the Mau Natural Forest Complex that lies administratively in Narok County. As elsewhere in this plan, the indiscriminate deforestation of the Mau Forest Complex is considered to be the main cause of wide river flow fluctuations in these three rivers.

2.9.2 Drainage
The main drainage area is the Lake Victoria Basin. The Mara River drainage basin, which lies within the Lake Victoria South drainage area, is the dominant drainage area in the County. It forms part of the wider Lake Victoria Basin.

2.9.3 Aesthetic and Visual intrusion
The site being an area already developed, the development will not have a significant effect on the view as it will conform to the current developments

2.9.4 Noise Levels
The project site does not have any existing sources of high noise levels except for small sound from boiler house and nearby Tenwek shopping centre.

2.9.5 Ambient Air Quality
Air quality has not been interfered with as there are no industrial activities undertaken in the area. The site and the surrounding area have good air quality except for dust which would arise from the sides of the access dilapidated roads and nearby footpaths during the dry seasons.
CHAPTER THREE

3.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

3.1 Environment Management and Co-ordination Act, EMCA amendment 2015

The Environmental Management and Coordination Act (EMCA) of 2015 provides for the legal framework for the management of the Kenyan environment. Under the EMCA, all proposed projects that are likely to have significant impact on the environment according to the Second Schedule will undergo an Environmental Impact Assessment (EIA) while projects already in place will undertake annual Environmental Audits (EA). This Act came into force on 14th January 2000. It aims at coordinating environmental protection activities in the country. In its preamble, the Act states that every person in Kenya has a right to a clean and healthy environment. According to section 58 of the Act (EMCA) No. 8 of 2015, second schedule 9 (i), and the environmental (Impact Assessment and Audit) Regulations, 2003, all new enterprises and projects must undergo Environmental Impact Assessment (EIA). The EIA study report is submitted to the National Environment Management Authority (NEMA) in the prescribed form, and accompanied by the prescribed fees.

It is in line with this provision that the proponent appointed EIA experts to undertake an environmental Impact Assessment and prepare a project report in respect of the proposed development. This addresses the requirement as the project activities are likely to have negative environmental impacts. This will ensure the Proponent observes continuous improvement on environmental, health and safety management and takes appropriate measures to mitigate any adverse impacts to the environment and the surrounding communities that the project may have during its implementation and operation.

Part VII, Section 68 of the same Act requires operators of projects or undertakings to carry out environmental audits in order to determine level of compliance with statements made during the EIA. The audit report should be submitted to NEMA. The proponent shall submit an Environmental Audit report in the first year of occupancy to confirm the efficacy and adequacy of the Environmental Management Plan.

Section 87 sub-Section 1 states that no person shall discharge or dispose of any wastes, either generated within or outside Kenya, in such a manner as to cause pollution to: environment or ill health to any person, while Section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste shall apply to the NEMA for a license.
Sections 90 through 100 outline more regulations on management of hazardous substances including oils, chemicals and pesticides.

The proponent will have to ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as solid waste management plans, sewer system maintenance and landscaping are implemented, as per the design drawings and maintained throughout the project cycle.

3.2 The Water Act, Cap 372

Section 82, subsection 1 provides that applications for permits for the same purpose or for different purposes shall receive consideration in accordance with the circumstances of each use.

The Ministry of water is vested with the duty to conserve and regulate the use of natural water resources (estuaries, surface, ground water and marine). The Act prohibits the release of wastewater without a permit and also spells out penalties for pollution of water. The Ministry through the district water board regulates the use of water and the drilling of boreholes.

Part II Section 18 of this Act provides for national monitoring and information systems for water resources. In addition, sub-Section 3 allows the Water Resources Management authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require be kept by a site operator and the information thereof furnished to the authority. Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 sub-Section 1 allows the licensee to construct and maintain drains, sewers and sewer works for intercepting, treating or disposing of any foul water arising or flowing on land for preventing pollution of water sources within his/her jurisdiction.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, the rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including payment of rates for the discharge as may be provided under Section 77 of the same Act.

Section 94 of the Act makes it an offence to throw or convey cause or permit to be own or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or wholesome matter or thing into or near to water resource in such a manner as to cause, or be likely to cause pollution of the water resource.

The project Proponent will be required to ensure that all construction waste are collected and dumped at approved sites to prevent potential for contaminating surface and underground water sources. All hazardous materials will need to be stored in a store with concrete floor. In addition, maintenance of fuel powered equipment and/or vehicles should be done off-site.
There is no water body in or around the project site, however, underground water cannot be ruled out and therefore this EIA proposes waste water disposal mechanism will observe this provision when disposing off waste water to the existing sewerline to ensure that it does not infiltrate into underground water resulting to pollution. Compliance with the act will be ascertained by control audit which will be done in the subsequent years.

3.3 County Government Act 2012

The County Government Act of 2012, which has been adapted to the Constitution’s State and County structure in relation to devolution, declares the County Integrated Plan to be central to the County’s administration and prohibits any public spending outside of the plan. The Act clarifies that the County Integrated Plan to be broken down into the economic plan, physical plan, social environmental plan and spatial plan. Also, the Act states that the County Plan commands,

- County integrated development plan
- County Sectoral plans
- County spatial plan
- Cities and urban areas plans as stipulated by Urban Areas and Cities Act

The act also stipulates that the County Government will be responsible for functions stipulated in article 186 and assigned in the Fourth Schedule of the Constitution which includes control of air pollution, noise pollution, other public nuisances and outdoor advertising.

The Proponent will ensure the project will be compliant with County Government Act 2012 by controlling all forms of solid and liquid wastes that are the major forms of pollution. Additionally an Environmental and Social Management/monitoring plan has been provided in this report with measures for mitigating potential environmental pollution anticipated from the development of the project.

3.4 The Occupational Safety and Health Act, 2007 (No. 15 of 2007)

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

The key areas addressed by the Act include:

- General duties including duties of occupiers, self employed persons and employees.
- Enforcement of the act including powers of an occupational safety and health officer.
- Registration of workplaces.
- Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences.
- Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver.
Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas.

Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials

Welfare general provisions including supply of drinking water, washing facilities, and first aid.

Under section 6 of this act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7). He is also required to establish a safety and health committee at the workplace in a situation where the number of employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health Advisor (Section 11). In addition, any accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace needs to be reported to the occupational safety and health officer of the respective area by an employer or self-employed person (section 21).

According to section 44, potential occupiers or users of any premises as work places are required to apply for registration to the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (section 47).

To ensure machinery safety, every hoist or lift - section 63 and/or all chains, ropes and lifting tackles - section 64 (ld), shall be thoroughly examined at least once in every period of six months by a person approved by the Director of Occupational Health and Safety Services. Similarly, every steam boiler - section 67 (8) and/or steam receiver section 68 (4) and all their fittings and/or attachments shall be thoroughly examined by an approved person at least once in every period of twelve months whereas every air receiver shall be thoroughly cleaned and examined at least once in every period of twenty four months or after any extensive repairs - section 69 (5). According to section 71 (3), every refrigeration plant capable of being entered by an employee also needs to be examined, tested and certified at least once in every period of twelve, months by an approved person.

In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are manufactured, used, handled or stored-section 78 (5). In addition, necessary precautions for dealing with fire incidents should be implemented including provision of means for
extinguishing fire and means for escape, in case of fire, for the persons employed in any workplace or workroom - section 81. As far as disaster preparedness and emergency response program is concerned, section 82 (1) makes it a mandatory requirement for every occupier of a workplace to design evacuation procedures to be used during any emergency situation and to have them tested at regular intervals.

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees.

The employers' positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water - section 91 and a first aid box or cupboard of the prescribed standard - section 95 at suitable point (s) conveniently accessible to all employees.

Other precautionary measures include: issuance of a permit to work to any employee, likely to be exposed to hazardous work processes or hazardous working environment, including such work processes as the maintenance and repair of boilers, dock work, confined spaces, and the maintenance of machinery and equipment, electrical energy installations, indicating the necessary precautions to be taken - section 96 (1); provision and maintenance for the use of employees, adequate, effective and suitable protective clothing including suitable gloves, footwear, goggle and head coverings in any workplace where employees are likely to be exposed to wet, injurious or offensive substance section 101 (1).

During project implementation and operations, workers will be involved. This act makes provisions for safety, health and welfare of persons upon which provision of their protection will be based. This will protect them against hazards to health and safety arising out of or in connection with their activities at work especially during the construction phase. This Act therefore safeguards workers welfare during the project phases by ensuring capacity building on Health and safety of workers at work place. In summary, this act will be used a guideline to ensure health and safety of workers is guaranteed. The proponent will ensure that the contractor includes in the contract document adequate measures to promote safety and health of workers during all phases of the proposed project.

3.5 The Science and Technology Act, Cap 250
Section 4 of the act provides for a council whose functions include;
To ensure the application of the results of scientific activities to the development of agriculture, industry and social welfare in Kenya.

To advise the Government on the scientific and technological requirements for the conservation of the natural and social environment in Kenya.

The contractor will employ technologies that take into consideration the conservation of the natural and social environmental in Kenya. It will also ensure that all technologies that are used are geared toward sustainable development and embrace recovery, recycling and reuse.

3.6 The Public Health. Act (Cap. 242)

Section 115 of the Act states that no person/institution shall cause nuisance or, addition liable to be injurious or dangerous to human health. Section 116 require local Authorities to take lawful, necessary and reasonably practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.

Such nuisance or conditions are defined under Section 118 waste pipes, sewers, drains refuse pits in such a state, situated or constructed as in the opinion of the medical leer of health to be offensive or injurious to health. Any noxious matter or waste water, discharged from any premises into a public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also termed as a nuisance. Other nuisances are accumulation of materials or refuse which in opinion of the medical officer of health is likely to harbour rats or other vermin.

The proponent will be required to abide by these provisions throughout the project cycle.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act.

The proponent will be required to contract a licensed solid waste collector to collect all solid waste from the site to an approved dumping site. Sewage from the site will be discharged into the sewer line.

3.7 The Physical Planning Act, Cap 286

The Local Authorities are empowered under Section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same Section, therefore, allows for prohibition or controls the use and development of land and buildings in the interest of proper and orderly development of an area.

Section 30 states that any person who carries out development without permission will be required to restore the land to its original condition. It also states that NO other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local authority.
Finally, Section 36 states that if in connection with a development application, local authority is of the opinion that the proposed development activity will have injurious impact on the environment; the applicant shall be required to submit together with the application an environmental impact assessment (EIA) report. EMCA, 2015 echoes the same by requiring that such an EIA is approved by the National Environmental management Authority (NEMA) and should be followed by annual environmental audits. The proponent has complied with this provision by appointing EIA/Audit experts prepare and submit this Environmental Impact Assessment project report to National Environmental management Authority (NEMA).

3.8 The Land Planning Act (Cap. 303)
Section 9 of the subsidiary legislation (The development and use of land regulations 161) under this Act requires that before the local authorities submit any development plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans.
Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce potential conflict between the interests of the authorities and those of landowners in respect of settlement, social and economic activities

3.9 The Building Code 2000
Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers. The code also prohibits construction of structures or buildings on sewer lines.
*For this development a sewer system exists for effluent disposal.*

3.10 The Penal Code (Cap. 63)
Section 191 of the Penal Code states, that any person or institution that voluntarily corrupts or foils water of public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way commit an offence.
The *Proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impacts.*

3.11 The Environmental Management and coordinating (water quality) regulation 2006
The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, river’s, streams, springs, wells and other water sources).
It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

The proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water sources especially R. Nyagores few meters away are implemented throughout the project cycle.


The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- domestic waste
- industrial waste,
- hazardous and toxic waste
- pesticides and toxic substances
- biomedical wastes and radioactive waste

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

- Improvement of production process through-
- Conserving raw materials and energy
- Eliminating the use of toxic raw materials and waste
- Reducing toxic emissions and wastes
- Monitoring the product cycle from beginning to end by-
- Identifying and eliminating potential negative impacts of the product
- Enabling the recovery and re-use of the product where possible, and
The Proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal.

Regulation 14 (1) requires every trade or industrial undertaking to install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment.

Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Regulation 18 requires all generators of hazardous waste to ensure that every container or package for storing such waste is fixed with a label containing the following information:

- The identity of the hazardous waste
- The name and address of the generator of waste
- The net contents
- The normal storage stability and methods of storage
- The name and percentage of weight of active ingredients and names and percentages of weights of other ingredients or half-life of radioactive material
- Warning or caution statements which may include any of the following as appropriate:
  - the words "WARNING" or "CAUTION"
  - the word "POISON" (marked indelibly in red on a contrasting background; and
  - the words "DANGER! KEEP AWAY / NO ENTRY FOR UNAUTHORIZED PERSONS" and
  - a pictogram of a skull and crossbones

Regulation 19 (1) requires every person who generates toxic or hazardous waste to treat or cause to be treated such hazardous waste.

**During the construction phase of the project, the Proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound environmental management of waste.**

3.13 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

The regulations seek to control noise and vibration pollution generated from various sources. Regulation 13 prohibits any person from carrying out construction activities at night, if such activities are likely to generate noise above the levels set under second schedule of these regulations. Regulation 14(3) requires that any person carrying out construction, demolition, mining or quarrying work shall ensure...
that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.

Regulation 15 requires that any person intending to carry out construction, demolition, mining or quarrying work shall carry out an EIA. During the Environmental Impact Assessment studies the regulations requires that natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying shall be identified. Secondly, the EIA shall determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts; and, finally to incorporate the needed abatement measures in the plans and specifications.

Table 3: Maximum Permissible Noise Levels for Constructions Sites (Measurement taken within the facility) - second schedule.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Maximum Noise Level Permitted (Leq) in dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>i. Health facilities, educational institutions, homes for disabled etc.</td>
<td>60</td>
</tr>
<tr>
<td>ii. Residential</td>
<td>60</td>
</tr>
<tr>
<td>iii. Areas other than those prescribed in (i) and (ii)</td>
<td>75</td>
</tr>
</tbody>
</table>

The noise regulations in the country clearly state that any person who contravenes their provisions commits an offence. The provisions are as per the following table

Table 4: Maximum Permissible Noise Levels as per the First Schedule of the Regulation

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sound Level Limits dB(A) (Leq, 14 h)</th>
<th>Noise Rating Level (NR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>A.</td>
<td>Silent Zone</td>
<td>40</td>
</tr>
<tr>
<td>B.</td>
<td>Places of worship</td>
<td>40</td>
</tr>
<tr>
<td>C.</td>
<td>Residential: Indoor</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Outdoor</td>
<td>50</td>
</tr>
<tr>
<td>D.</td>
<td>Mixed residential (with commercial some and Places of entertainment)</td>
<td>55</td>
</tr>
<tr>
<td>E.</td>
<td>Commercial</td>
<td>60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Frame</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>6.01 a.m. – 8.00 p.m. (Leq, 14 h)</td>
</tr>
<tr>
<td>Night</td>
<td>8.01 p.m. – 6.00 a.m. (Leq, 10h)</td>
</tr>
</tbody>
</table>
CHAPTER FOUR

4.0 PROJECT ACTIVITIES, OUTPUT AND DESIGN

4.1 Project cycle

In order to predict impacts for this project on the human and natural environment, it is important to describe its various phases and the activities to be carried out in each phase. These have been described below.

4.1.0 Conflict Resolution

All environmental resources, more so land and water are characterized by conflicts and controversies. Most of these conflicts emanate from disagreements where two or more land/water users are interested in the same limited resource.

One of the key objectives of carrying out an EIA process is to resolve existing, anticipated as well as unforeseen conflicts. There are filled questionnaires by various stakeholders attached at the back of this report. To the best of the EIA experts, no conflicts are expected to arise owing to the fact that this is just an alteration and expansion of the already an existing building and within the hospital land.

4.1.1 Planning and Design

This stage involves technical site survey and technical drawings design for the project. Technical designs for the proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block into an Accident and Emergency Centre are attached at the back of the report.

Project design consideration

The design considerations incorporate aspects of modern architecture, the current local government building policy guidelines and the latest standards developed by Kenya Bureau of standard.

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

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.

Sanitary Accommodation: The number of toilets and wash hand basins has been selected according to guidelines in BS 6465.

Plumbing and drainage Sewage: to be drained into a sewerline and water supply and reticulation to be done using galvanized steel piping to BS 1387 and or PPRC piping.

Sustainable resource use: The design of the development incorporates landscaped gardens which will be planted with suitable species of shrubs and grass to prevent ecological deterioration and improve aesthetic value of the site. Landscaping will therefore be done upon project completion.

Solid waste management: The proponent will be required to contract a waste handler or assign his workers for proper waste disposal during construction period.
Human body wastes: The hospital has a modern type of incinerator to be used in incinerating of human body wastes and other related hazardous wastes generated during facility operations.

Fire protection: The design of the proposed development incorporates firefighting equipment to be installed in different locations within the building.

4.1.2 Project Output and design

The technology to be used in the alteration and expansion to existing Tenwek Hospital MCH block and conversion into an Accident and Emergency Centre will be based on international standards, which have been customized by various housing complexes in Kenya.

Each floor will be designed and partitioned as described as bellow:

✓ Triaging of patients
✓ Provide emergency medical services to patients consulting and going to Emergency Department without prior appointment
✓ Treat unannounced patients-life threatening and routine
✓ Functions 24 hours, 7 days/365 days
✓ Cardiopulmonary resuscitative measures to patients with life threatening conditions
✓ Medical examination and assessment
✓ Medical treatment within the limits of the Emergency Department
✓ Referral to appropriate physicians for follow-up or definitive management after being seen in the emergency department
✓ Administration and feedback
✓ Public relations
✓ Relation with external hospitals
✓ Provide ambulance services
✓ Training and research
✓ Handling referrals from external facilities
✓ Management of patients’ surge
✓ Application of Plaster of Paris for fracture patients
✓ Issuance of drugs from the department pharmacy
✓ Sample collection and analysis in the lab

The Alteration, Expansion and reorganization to Existing to the current MCH building into A&EC will be done for easier service delivery. Each floor will be designed and partitioned as described as bellow:

Lower Ground floor
✓ Small conference hall
✓ Staff break/ classroom
✓ Lockers rooms for male and female
✓ Storage room
✓ Fire escape route

Ground floor
✓ Resuscitation bay
✓ Family consultation room
✓ Registration and payments room
✓ Wheelchair holding space
Environmental Impact Assessment Project Report

- Ambulance drop off space
- Procedure room
- Nurse station (04no.)
- Decontamination room
- Isolation room
- Pharmacy store
- Paediatrician observation room
- Nurse office
- Observation bays (02no.)
- Doctors office
- Changing room
- Control room
- X-ray imaging room
- Toilets
- Covered walkways
- Drop off entry
- Fire escape route
- Covered walkway
- The reception for outpatient center
- Customer service and merchandise store
- Credit office

First floor (offices)
- Examination room
- Medical superintendent room
- Open plan offices (02no.)
- Refreshment room
- Large conference hall
- Waiting/ Breakout room
- CEO office
- CEO- PA office
- Archives
- HR office
- HR storage room
- Toilets- Ladies and Gents
- Waiting area
- Reception area
- Call Centre
- Media/ communication
- Coffee pause
- Small conference room
- Nurse in charge room
- Receptionist/ assistant nurse room
- ICT Department
- Finance Department

Other Civil External Works

Other works will also include; civil external works to the forecourt and the MCH building connectivity i.e.

Forecourt
New pedestrian gate and entrance canopy

New gate house

Boundary wall rehabilitation

**MCH building connectivity**

- covered walk way to the building
- An outdoor ramp

(Also refer to the attached plan for detailed description)

### 4.1.3 Site (Project) Activities during the Construction Phase

**Staff Amenities:**

**Site Office**

The site is surrounded by various built houses, the proponent will assign one room to the contractor to serve as site office and store during the construction phase.

**Toilets**

The office to be assigned to the contractor shall have toilets in it to serve the construction crew.

**Material Storage and Handling**

All materials to be used shall conform to the Kenya Bureau of Standards requirements for quality or equal and approved.

**Non-Hazardous Materials**

The store for non-hazardous materials will be accommodated within the site office.

**Hazardous Materials**

Hazardous materials likely to be stored at the site shall include paints, oil, grease and fuel. The store for these materials shall have concrete walling and iron sheet roof and a waterproof concrete floor to contain spills. Storage and handling of all Hazardous chemicals shall be in accordance with manufacturer’s instructions as outlined on the material safety data sheets.

**Bulk Construction Materials**

The bulk materials likely to be stored on site include: sand, ballast, stones, cement, quarry chips and timber. Sand, ballast, stones and quarry chips will be sourced from within Bomet County approved material site. Building rods, cement and other appliances will be sourced from hardware in Bomet and Kericho. To avoid material accumulation with potential for impeding site activities, inducing safety hazards and creating a nuisance in the neighbourhood, the main contractor intends to have materials delivered to the site in small quantities.

Timber will be used mainly for roofing, formwork, ceiling, joinery and other carpentry needs. Most joinery works will be fixed at a workshop located outside the site before being delivered ready for
installation. Formwork timber will be fixed at the site. Consideration will be given to the working area and material storage requirements to ensure there is no conflict with the movement of the workers.

### 4.1.4 Construction Activities

The construction phase will be accomplished through the following stages:

**Fencing**

The whole project site will be enclosed with 3 metre high corrugated iron sheets. This will help to control access to the site for purposes of security and safety. The fence will also serve to reduce the amount of dust and other solid waste with potential of getting into and out of the site especially during the windy and rainy season.

**Site preparation**

Clearance of the site for construction works will be controlled to minimize the extent of ecological deterioration. The site currently has a building that is currently used as a Mother Child Health block; hence it will partly be demolished to pave way for the proposed alteration, expansion and conversion into A&EC. However, the proponent is intending to landscape the area and bring in some grasses and flowers after construction works.

**Excavation**

Excavation of top soil in expansion areas and existing previous building demolition materials to pave way for the alterations will be carried out using hand tools and machines. Most of this waste materials will be used to backfill potholes in highways upon authorization by the County Government. The other wastes will be utilized in general leveling of the compound.

**Backfilling of the Excavated Area:**

This will be carried out using murram and quarry chips which will be compacted in layers to achieve firm bases for the additional buildings extensions, driveways and parking.

**Reinforcing the foundation**

The foundation will be reinforced using stone, concrete, steel or wood, basement, crawl space, pilings and slab on grade. The process will generate some noise, smoke and dust especially from the cement. However, workers will be sensitized on the use of personal protective equipment and management of air pollution from construction machinery.

**Framing**

This will involve framing the exterior and interior walls and then raising the roof trusses and stairs. Wall sheathing will be attached to enclose the partitions and roof sheathing over the trusses.

**Doors and windows**
All external door openings for the proposed Accident and Emergency Centre block shall be fixed with steel doors. Grills will be used to reinforce them. Window openings shall be closed with steel aluminum casement and with ordinary 4mm thick glass.

**Plumbing system**

The internal water supply will be one of cold and warm water system. Since the supply is under pressure, the whole water supply system will be designed to be leak proof and provide with valves to control the flow of water. To ensure reliable water supply, the proposed development will be connected to the main water storage tank and the main supply line.

**Electrical installation**

The building already has a three phase supply electrical connection and the connection will be extended to the newly altered and expanded sections of the building. The installation will also cater for lighting, appliances, heating and cooling system. The installation will also cater for television and alarm system. All installations shall be to Kenya power and lighting Company specification. The proponent has promised to install energy saving bulbs to conserve energy and also explore the possibility of using solar energy for water heating and power back up systems for convenient.

**Finishing**

- **Floors** – The floors shall be finished in ceramic tiles or terrazzo.
- **Walls** - The walls will be finished by plastering and painting to give them a good finish.
- **Ceilings** - The ceiling suffix to the roof will be made of a lime plaster render on the reinforced concrete slab; the ceiling on the upper flow will be done using hard boards with painting or PVCs
- **Landscaping** - The site will be landscape with flowers and grass. The top soil will also be treated with organic manure to encourage faster and improved plant growth.
- **Emergency appliances** - Safety devices like fire extinguishers and sand buckets will be put in central place. The proponent with consultation will map out and mark a fire assembly point. The proponent has also agreed to be in charge of emergencies and will have contacts with the fire department and other agencies for fast response. Areas will be, marked accordingly e.g. power rooms and slippery floors.

The proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block and conversion into Accident and Emergency Centre will commence after issuance of Environmental Impact Assessment license by NEMA.

The contractor shall be held solely and entirely responsible for the completion and the safety of the works and shall indemnify the proponent against all claims that may arise as a result of carrying out the works.

**4.1.5 Operation**

This is the stage where the proponent will start offering the proposed project services to the public.
4.2 Project Alternatives

The following alternative projects to the proposed Accident and Emergency Centre development at the site were considered and their advantages and disadvantages outlined.

a) No Project Alternative

This alternative would mean that the project does not proceed.

Advantages

- Current plot condition and the existing MCH block would remain the same with current Mother child health services offered.
- The natural ecosystem will remain undisturbed.
- Air pollution from dust as a result of the construction process will not occur.
- There would be no noise pollution resulting from workers, demolition and machine operations.
- There wouldn’t be soil compaction as a result of heavy machinery use.
- There will be a reduction of soil erosion due to less loosening of soil on the surface.
- There would be no soil or water contamination from the alien materials that will be introduced in the system.

Disadvantages

- Tenwek hospital will not realize its dream to establish its accident and emergency department and offer same services to the community.
- There will be no creation of employment.
- There will be no secondary development as a result of the project.
- The expected income to the proponent and the economy will not be realized.
- The value of land might improve but some parts will remain underutilized.
- There will be stagnant development among the local community.
- The general public will continue experiencing hardships in access to adequate and prompt quality accident and emergency medical services within Tenwek hospital and its environs.

b) Different site selection

The project can be sited in a different area of a lower status.

Advantages

- The cost of land would be lower
- The maintenance costs would be less

Disadvantages

- The issue of insecurity may arise.
- Less income would be realized due to the low status of the area.
• Extreme strain on the already overstretched facilities experienced in the low status area.
• The project might need to be developed from a scratch (current one is alteration and expansion of existing block)

c) The proposed Development Alternative
Under the proposed development alternative, the proponent would be issued with an EIA license for the proposed project. In issuing the license, NEMA would approve the proposed development provided all environmental measures are complied with during the construction period and occupational and decommissioning phases.
This alternative consists of the applicant’s acceptance of approval conditions provided by NEMA in light of the provisions of Environmental Management and Co-ordination Act 2015, to ensure environmentally sustainable developments are complied with.
The anticipated insignificant environmental impacts resulting from construction and operation of the project as proposed would occur.

4.3 DECOMISSIONING PHASE
Decommissioning is a general term for a formal process to remove something from active status. It brings to closure, or terminates the useful life of business operations in a certain building. The owner or licensee normally decides when the facility is to permanently cease operations. The following shall be done before and during decommissioning;
The management shall come up with a decommissioning plan that addresses:
• Facility description and history
• Project scope and objectives
• Characterization data summary
• Specific decommissioning methods
• Health and safety plans
• Risk assessment
• Site release criteria
• Waste generation estimates and waste disposal procedures
• When a decommissioning plan is developed, it will be based on
• Adequately protecting public and occupational safety and health
• Potential environmental and ecological impacts
• Compliance with statutory, contractual and regulatory requirements
• Effective project management, including selection among viable alternatives based on risk, cost and desired facility end state
• Human capital management, consistent with future site utilization plans
• Show that a proposed decommissioning project plan can be conducted safely.
• Show that at completion the facility will comply with regulatory requirements
• Prepare formal documentation of the decommissioning of the facility
• Adhere to the occupational, health and safety regulations while conducting the decommissioning
• Evaluate potential for re-use and recovery of material and equipment
• Consider hazardous waste minimization and appropriate disposal
• Release all staffs and other workers after giving them one month notice

NB: The product of this project will have a long life span of more than fifty years. By having this consideration in my mind, the proponent will adequately invest the construction and finishing processes by ensuring appropriate technology and materials of high quality and durability are used to increase the proposed project life span. The decommissioning will therefore take many more decades.
5.0 METHODOLOGY

5.1 Data collection

A formal data collection process was necessary as it ensured that data gathered was both defined and accurate and that subsequent decisions based on arguments embodied in the findings will be valid. The process provides both a baseline from which to measure from and in certain cases a target on what to improve.

The following methodology was used:

- **Pre collection activity** – Desktop research i.e. field trip logistics, agreed goals to be achieved, target data to be collected, definitions used, methods

- **Collection – data collection** – Field visits, questionnaires, interviews, still digital photography.

- **Presentation of findings** – Sorting of the data collected, analysis and/or presentation in the form of a comprehensive project report.

a) **Questionnaires**

Questionnaires were administered to the neighbours and Tenwek staffs to get their views on the proposed project. The respondents were asked to sign on the form for proof of participation.

b) **Interviews**

Interviews were carried out in an attempt to get more information regarding the project. This involved interviewing the area residents and some immediate neighbours who gave an in-depth description of their perception of the proposed project.

c) **Field Observations**

Field observations formed an integral part of the study as the experts gathered considerable information through observations. This involved site visits and recording the situation on the ground. Observations were also used as a tool for verifying the facts that were gathered through interviews and questionnaires.

d) **Still digital photography**

Still digital photographs were taken as evidence of compliance or non compliance. Photography is a very useful tool in data collection. It represents a good picture on the ground as it was at the time of visit.
CHAPTER SIX

6.0 PUBLIC PARTICIPATION

6.1 Sources of Information

One of the key information sources used during the Environmental Impact Assessment exercise was public participation exercise. Positive and negative views of the project site neighbours were sought on 5th of September 2019. The exercise was conducted by a team of experienced registered environmental experts via administration of pre-designed questionnaires and by interviewing neighbours surrounding the proposed project site.

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

6.2 Issues raised

6.2.1 Improved Medical Accident and Emergency treatment

Most people perceive the proposed project as a God sent initiative that will initiate prompt treatment to the accident and emergency cases within the hospital. Wellness evaluations at proposed Tenwek Accident and Emergency Centre (A&EC) will be designed to accommodate all emergency package needs through a focused professional process.

6.2.2 Increased business market

Those with businesses within the area supported the construction of the proposed Accident and Emergency Centre project. According to them, the number of people to promote small surrounding businesses will increase right from the construction workers to the seek treatment from the facility once complete.

6.2.3 Improved Security

The local residents were optimistic that the establishment of the project will lead to improved security situation in this area as security will be provided around the premises through 24-hour guard patrols, strategically located security lights and maybe strong perimeter fence.

6.2.4 Employment Opportunities

The persons interviewed were positive that during construction, the project has and will continue to create numerous employment opportunities for the local residents most of whom are currently jobless.

6.2.5 Dust emissions

The people expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of excavation works and transportation of building materials. The proponent will ensure that dust levels at the site are minimized through sprinkling water
in areas being excavated and along the tracks used by the transport trucks within the site. Additional mitigation measures presented within the EMP will be fully implemented to minimize the impacts of dust generation.

6.2.6 Hospital Wastes:
Neighboring premises owners raised concerned over the effectiveness of hospital wastes disposal especially the hazardous hospital wastes. The proponent will ensures proper disposal of these wastes to the hospital incinerator and liquid wastes will be directed into the hospital Sewerage System.

6.2.7 Noise
Noise will be controlled by the proponent by observing the recommended noise standards by the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
CHAPTER SEVEN

7.0 POSSIBLE ENVIRONMENTAL IMPACTS, THEIR MITIGATION MEASURES

7.1 DEFINITION & CLASSIFICATION OF ENVIRONMENTAL IMPACTS

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect. Impacts are termed cumulative when they add incrementally to existing impacts.

In the case of the proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block into Accident and Emergency Centre, potential environmental impacts would arise during the construction and the operations phases of the project and at both stages positive and negative impacts would occur.

7.2 Impact significance

The purpose of an EIA is to identify the significant impacts related to the project or activity under consideration and then to determine the appropriate means to avoid or mitigate those which are negative, and if possible, enhance any positive effects resulting from the project.

Significant impacts are defined, not necessarily in order of importance, as being those which:

- Are subject to legislative control;
- Relate to protected areas or to historically and culturally important areas;
- Are of public concern and importance;
- Are determined as such by technically competent specialists;
- Trigger subsequent secondary impacts;
- Elevate the risk to life threatening circumstances; and
- Affect sensitive environmental factors and parameters.

7.2.1 Construction Phase Negative Impact

7.2.1.1 Soil erosion - land degradation

Site preparation, demolitions, clearance and excavations using heavy construction equipment usually expose soils in the affected areas and leave them vulnerable to erosion by heavy rainfall and surface run-off. Improper location of stockpiles of sand, gravel, cement, etc., at the construction site could also cause fine materials to be washed into the drainage system during heavy rainfall events. This would not only represent a waste of materials but would also contribute blockage of drainage systems.

7.2.1.2 Accumulation of solid waste at the site

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

7.2.1.3 Construction works noise - auditory nuisance
Although not expected to create a significant negative impact, the use of vehicular activities and heavy equipment during construction and building works will inevitably generate noise, which may create a nuisance for nearby residents, particularly the immediate neighbours. Albeit annoying, this negative impact will be short-term (limited to the construction phase). Noise beyond some level is itself a nuisance and need to be avoided. Such noise emissions should be minimized as much as possible from the source point through appropriate measures.

7.2.1.4 Dust Emission - air quality degradation
During the renovations/construction phase air quality is expected to decline as a result of an increase in levels of fugitive dust from excavation works, the stockpiled earth materials, dusty roads and concrete mixing. Respirable particulates are a public health hazard and may otherwise create considerable nuisances to the public. This is expected to be a short term, reversible impact lasting only for the duration of the construction activity.

7.2.1.5 Spillage of hazardous materials
All sorts of motorized equipment, from generators to trucks, requiring fuel, lubrication and maintenance will be used at the project site. Many will also be fitted with lead batteries. Spillage of hazardous materials on the ground surface has a potential of contaminating underground water.

7.2.1.6 Fire outbreak - environmental disaster
Some intensive dry processes will be conducted on site. Such a process may result to a fire outbreak within the project site especially if flammable materials such as locomotive fuel will be stored on site. Minor welding works will be carried out on site so as to repair broken down machines or vehicles and this increases the chances of fire outbreak.

7.2.1.7 Construction works induced traffic - traffic congestion
Activities related to demolitions and construction works will undoubtedly induce uncharacteristic levels of additional vehicular traffic in Tenwek hospital access roads. Related issues of vehicle congestion and reckless driving by truck drivers delivering construction materials to the site will be sources of annoyance, if not accidents, to locals during the construction phase.
7.2.1.8 Construction works water demand - Increased pressure on existing supply
A considerable amount of fresh water will be required during the construction works, especially for use by construction workers (washing), for cement mixing and for wetting of the site to control dust. This may place some amount of strain on water supply and may exacerbate current shortage of water supply in the country. Though this might be minimal due to reliable water supply from nearby R. Nyangores.

7.2.1.9 Gaseous emissions
The various materials required for construction and building (e.g. sand, ballast, aggregate, steel, blocks, lumber, asphalt, cement, etc.) will be obtained from sources within and elsewhere and transported to the site. Transportation of these materials, characteristically in over-laden trucks, usually results to gaseous emissions. Other construction equipment including excavators, bull dozers and concrete mixers have also a potential of resulting to air pollution. Emission of gaseous pollutants into the atmosphere represents indirect, short-term, reversible, negative impacts on public health and safety.

7.2.1.10 Disposal of sewage
Lack of or inadequate provision of toilets for use by construction workers can lead to ad hoc defecation in secluded areas or structures on the site, thus creating unsanitary conditions and sources of fly infestation. This can threaten the health of neighbours and workers themselves. Indiscriminate sewage disposal can also result to contamination of underground water resources.

7.2.1.11 Workers accidents and hazards during construction
During the construction of these Accident and Emergency Centre project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of handling hazardous waste. Because of intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries.

7.2.1.12 Extraction and use of building materials
Building materials such as hard core, ballast, cement, rough stone and sand required for the construction of the Accident and Emergency Centre project, will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as river banks and land. Since substantial amount of these materials will be required for construction of the buildings, the availability and sustainability of such resources at the extraction sites will be negatively affected as they are not renewable in short term. In addition, the sites may be significantly affected in several ways including landscape change, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.
7.2.2 Construction Phase Positive Impact

7.2.2.1 Employment - socio-economic benefit
Several positive impacts are expected from the development of the project. These include the generation of employment for skilled and unskilled labour in the short to medium term.

7.2.2.2 Improving growth of the economy
Through the use of locally available materials during the construction phase of the project including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.2.3 Operation Phase Negative Impacts

7.2.3.1 Increased pressure on infrastructure
The proposed Accident and Emergency Centre development will definitely lead to increased pressure on existing infrastructure such as roads, piped water and other utilities like electricity.

7.2.3.2 Increased generation of solid waste
The quantities of solid waste to be generated by the medical facility operation services are expected to be significant. Such waste will include foodstuffs, empty plastic containers, cartons, waste papers, plastic bags, etc. Improper management of solid waste will result to aesthetic degradation and breeding of disease vectors.

7.2.3.3 Increased traffic flow - Increased accidents
The number of vehicles within the area is likely to increase and this may lead to congestion and road accidents within Tenwek hospital access roads.

7.2.3.3 Effluent Disposal
A project of such magnitude is expected to generate huge amounts of effluent to the environment. Proper management of the effluent will ensure a clean environment for the residents of this area. The proponent is suggesting the use existing incinenerator and existing sewer line system in the hospital.

7.2.4 Operation Phase positive Impacts

7.2.4.1 Increase in housing stock
Currently the demand for quality emergency medical services in Bomet and its environs by far outstrips the supply. One of the positive aspects of project is that it will contribute to provision of accessible emergency medical services.
7.2.4.2 Employment opportunities
Employment opportunities are one of the long term impacts of the proposed project. Potential beneficiaries will include medical staffs, security guards, waste transporters, cleaners and gardeners.

7.2.4.3 Improving growth of the economy
The proponent of the Accident and Emergency Centre development will be required to pay revenue to the Kenya revenue authority (K.R.A) hence contributing positively to the growth of the Kenyan economy.

7.2.4.4 Optimal use of land
By converting the current MCH block to Accident and Emergency Centre on the plot, the hospital would have utilized it optimally.

7.2.5 Decommissioning phase negative impacts
During the decommissioning phase, another comprehensive EIA study based on the intended new use of the site will be conducted.

7.2.5.1 Noise and Vibration - Audible nuisances
The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing of the proposed project.

7.2.5.2 Solid Waste Generation
Demolition of the parts of MCH block to be altered and expanded and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. There is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of ground and surface water quality.

7.2.5.3 Dust emission
Large quantities of dust will be generated during demolition works. This will impact negatively on the demolition staff as well as the neighbouring premises, staffs, businesses and offices.

7.2.6 Decommissioning phase positive impacts

7.2.6.1 Employment opportunities
For demolition to take place properly and in good time, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.
7.3 MITIGATION MEASURES

7.3.0 Mitigation measures for impacts in the construction phase

7.3.1 Controlling soil erosion

- Stage site clearance works so as to minimize the area of exposed soil at any given time.
- Re-cover exposed soils with grass and other ground cover as soon as possible.
- Monitor areas of exposed soil during periods of heavy rainfall throughout the construction phase of the project to ensure that any incidents of erosion are quickly controlled.
- Levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil
- Building of physical barriers to prevent mass movement where necessary.
- The stockpiling of construction materials should be properly controlled and managed. Fine-grained materials (sand, marl, etc.) should be stockpiled away from any surface drainage channels and features.
- Low bumps should be placed around the piles of sand and marl and/or tarpaulin used to cover open piles of these materials to prevent them from being washed away when it rains heavily.
- Safe storage areas should be identified and retaining structures put in place prior to the arrival
- Materials to be delivered on site in installments.

7.3.2 Management of Construction Waste

- A site waste management plan should be prepared by the contractor prior to commencement of construction activities. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring.
- Preparation and implementation of the plan must be made the responsibility of the building contractor with the system being monitored independently.
- Special attention should be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction.
- Any vegetation and combustible waste must not be burned on the site.
- Reusable inorganic waste (e.g. excavated sand/soils) should be stockpiled away from drainage features and used for in filling where necessary and/or possible.
- Unusable construction waste, such as damaged pipes, formwork and other construction material, must be disposed of at an approved dumpsite.
- Provide solid waste receptacles and storage containers, particularly for the disposal of plastic bags, boxes, so as not to block drainage system and to prevent littering of the site.
• Make arrangements for the daily collection of litter from the site and appoint a licensed solid waste transporter to collect and transport it for dumping at approved site.

7.3.3 Control of Construction works noise
• Restrict noisy construction activities to normal working hours (8am - 5pm).
• Inform local residents beforehand, via notices and advisories, of pending noisy periods and solicit their tolerance well before the commencement of piling works.
• Workers operating equipment that generate noise should be equipped with noise protection gear including ear muffs and plugs. Workers operating equipment generating noise levels greater than 80 dBA continuously for 8 hours or more should use earmuffs whereas those experiencing prolonged noise levels of 70 - 80 dBA should wear earplugs.
• Limit pick up trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
• All construction equipment should be regularly inspected and serviced

7.3.4 Control of Dust Emissions
The main contractor will be required to train workers on appropriate methods for minimizing dust emission during construction phase. Proposed methods for minimizing dust emission include;
• Covering of all haulage vehicles carrying sand, aggregate and cement
• Stockpiles of fine materials (e.g. sand and ballast) should be wetted or covered with tarpaulin during windy conditions.
• Access roads and exposed ground must be wetted in a manner and at a frequency that effectively keeps down the dust.
• Workers in dusty areas on the site should be issued with dust masks during dry and windy conditions
• Providing appropriate enclosure for the concrete mixer and
• Use of dust nets at high levels of the building

7.3.5 Managing Spillage of Hazardous Materials
Spillage of hazardous materials shall be managed by implementing the following measures;
• Refueling and maintenance of large vehicles will not take place at the construction site
• All hazardous materials to be stored in appropriately bonded containers and placed on concrete floor
• Maintaining spill response kits at the site office
• Prepare and display on site spill response procedures and
• Training of workers on spill response and management

7.3.6 Containing Fire outbreak

Fire incidents shall be managed by implementing the following measures;

• Provide adequate number of appropriate fire fighting equipment and Post 'No smoking signs' where flammable materials will be stored

• Organize for inspection and maintenance of fire equipment at least once in a period of six months

• Train staff on the use of the available fire fighting equipment

• At least one person trained on handling fire fighting techniques should be available throughout the construction phase of the project.

• Develop and post at the site, fire emergency and evacuation procedures

• Maintain on site telephone contacts for fire brigade, G4S fire brigade and St. Johns ambulance service provider

7.3.7 Control of Traffic

• Issue notices/advisories of pending traffic inconveniences and solicit tolerance by local residents before the commencement of construction works.

• As far as possible, transport of construction materials should be scheduled for off-peak traffic hours. This will reduce the risk of traffic congestion and of road accidents on the roads leading to the site.

• Appropriate traffic warning signs, informing road users of a construction site entrance ahead and instructing them to reduce speed, should be placed along the main road in the vicinity of the entrance to the site during the construction period.

• Flagmen should be employed to control traffic and assist construction vehicles as they enter and exit the project site.

• Train drivers on road safety

• Maintain on site a record of incidents and accidents

7.3.8 Management of water demand

The proposed development will increase water demand throughout the construction phase. Increase in water demand can be minimized by;

• Providing adequate water storage reservoirs at the construction site to meet project needs during periods of high demand externally and refill

• Engaging water supply tankers in case of total supply failure.
• Implementing appropriate water conservation measures

7.3.9 Management of terrestrial habitat & biodiversity
Biodiversity at the proposed site shall be managed by retaining and restoring as much of the original vegetation, including grass, as is practical on the site. This would be achieved by:

• Set a replanting and landscaping programme that focuses on increasing "green area"
• Ensure proper demarcation of the project area to be affected by the construction works. This will be aimed at ensuring that any disturbance to flora is restricted to the actual project area and avoid spill over effects on the neighbouring areas.
• In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works.

7.3.10 Management of sewage
• Providing adequate sanitary facilities for workers with appropriate sanitary arrangement to prevent runoff.
• Sensitize workers on the rationale of using the sanitary facilities.

7.3.11 Control of gaseous emissions
• Gaseous emissions will be managed by
  • Proper engine tune up
  • Regular inspection and maintenance of construction equipment
  • Reduce machines and vehicles idling time
  • Avoid burning of solid waste at the site

7.3.12 Workers Health & Safety
• Engaging only those workers that are trained to operate specific machines and equipment.
• Proper signs on site to warn workers of safety requirements as regards machines with moving parts and other equipment at site.
• Provide a First Aid box and have a trained person to handle site emergencies and incidences.
• Display in the site telephone numbers of ambulances or provide a site vehicle to specifically transport the injured to hospital (during renovations and construction).
• Provide fire-fighting mechanism at site. Display emergency call numbers that can be used in case of a site fire.
• Provide safe scaffoldings and railings at heights.
- Provide washing (enclosed bathroom) and toilet facilities at site with both drinking and washing water. The number of workers engaged determines the number of the toilets and bathrooms provided.
- Providing safety helmets, safety masks (welders), safety shoes (loaders), uniforms and hand gloves to the workers.
- Using well-maintained equipment by qualified personnel.

7.4 Mitigation measures at operational phase impacts

7.4.1 Reducing pressure on infrastructure

Relevant authorities such as the Kenya Power and Lighting other utility providers have been informed of the capacity of expansion and are aware of the necessary requirements concerning the project. However, the proponent will install water-conserving automatic taps and toilets, as well as energy saving electrical fittings to optimise use of public resources. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by a licensed plumber. In addition, both the staffs and casuals will be sensitized to use conserve energy and water. It will be important for the proponent to monitor water and energy use during the operation phase of project and to set targets for their efficient use.

7.4.2 Proper solid waste management

The staffs will be responsible for proper management of solid waste generated from various operation sections during operation phase. In this regard, they are required to contract a private waste handler who is licensed by NEMA for waste disposal.

7.4.3 Control of traffic flow

The proponent will be required to implement the following measures in order to control flow of traffic during operational phase.

- Appropriate traffic warning signs instructing occupants and visitors to reduce speed, should be placed at the vicinity of the entrance to the site
- Security guards should be instructed to control traffic to the site and assist vehicles as they enter and exit the project site.
- Security guards should maintain a record of incidents and accidents at the site
- Contacts of emergency service providers including St. Johns ambulance, breakdown vehicle and traffic police, should be displayed at the main entrance area

7.4.4 Management of Fire Incidents

Fire incidents shall be managed by implementing the following measures;
• Install fire fighting equipment prior to operation of the proposed accident and emergency centre
• Ensure fire fighting equipment are inspected and serviced at least once in a period of one year
• Identify and mark conspicuously an emergency assembling point
• Conduct an annual fire audit for the A&EC

7.4.5 Effluent disposal
Effluent from the proposed Accident and Emergency Centre development will be disposed into existing Tenwek hospital sewerage system.

7.5. Mitigation measures for impacts in the decommissioning phase

7.5.1 Proper solid waste management
• A site waste management plan should be prepared by the contractor prior to commencement of demolition activities. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring.
• Any vegetation and combustible waste must not be burnt on the site.
• Demolition debris should be stock piled at a safe place
• Reusable materials like doors, windows and timber should be sold to licensed scrap dealers
• Provide solid waste receptacles and storage containers, particularly for the disposal of plastic bags, boxes, so as not to block drainage system and to prevent littering of the site.
• Make arrangements for the daily collection of litter and demolition debris from the site by a licensed solid waste transporter for dumping at approved site.

7.5.2 Control of dust emission
High levels of dust concentration resulting from demolition or dismantling works will be minimized by implementing the following measures;
• Covering of all haulage vehicles carrying debris for dumping at approved sites
• Stockpiles of fine materials should be wetted or covered with tarpaulin during windy conditions.
• Access roads and exposed ground must be wetted in a manner and at a frequency that effectively keeps down the dust
• Workers should be issued with proper protective equipment.
• Proper hording (fencing with three-meter-high galvanized corrugated iron sheets) of the site prior to demolition

7.5.3 Minimization of noise and vibration
Significant impacts on the acoustic environment will be mitigated as described below;
- Restrict demolition activities to normal working hours (8am - 5pm).
- Inform local residents beforehand, via notices and advisories, of pending noisy periods and solicit their tolerance well before the commencement of demolition works.
- Workers operating equipment that generate noise should be equipped with noise protection gear including ear muffs and plugs. Workers operating equipment generating noise levels greater than 80 dBA continuously for 8 hours or more should use earmuffs whereas those experiencing prolonged noise levels of 70 - 80 dBA should wear earplugs.
- Limit pick up trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- All demolition equipment should be regularly inspected and service

### 7.6 Environmental Audit and Monitoring

Environmental Auditing will be done yearly and reports presented to NEMA for review.
CHAPTER EIGHT

8.0 ENVIRONMENTAL MANAGEMENT PLAN

8.1 Demolition and Construction Phase EMP

Table 5: Environmental Management Plan during demolition and construction phase

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Aprox. Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minimize extraction site impacts and ensure efficient use of raw materials in construction</td>
<td>1. Source building materials from local suppliers who use environmentally friendly processes in their operations.</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td>High Demand of Raw material</td>
<td>2. Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td>3. Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Standard best practice</td>
<td></td>
</tr>
<tr>
<td>4. Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Nil-Standard best practice</td>
<td></td>
</tr>
<tr>
<td>2. Reduce storm-water, runoff and soil erosion</td>
<td>1. Surface runoff and roof water shall be harvested and stored in reservoirs for reuse.</td>
<td>The Civil Engineer, Mechanical Engineer and Proponent</td>
<td>2 months</td>
<td>300,000</td>
</tr>
<tr>
<td>Increased storm water, runoff and soil erosion</td>
<td>2. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.</td>
<td>The Civil Engineer, Mechanical Engineer and Proponent</td>
<td>1 month</td>
<td></td>
</tr>
<tr>
<td>Increased solid waste generation</td>
<td>2. Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials.</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Ensure that demolition and construction materials left over at the end of construction will be used in other projects rather than being disposed of.</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td>4.</td>
<td>Ensure that damaged or wasted construction or demolition materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>150,000</td>
</tr>
<tr>
<td>5.</td>
<td>Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or home owners.</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>Nil</td>
</tr>
<tr>
<td>6.</td>
<td>Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td>7.</td>
<td>Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>50,000</td>
</tr>
<tr>
<td>8.</td>
<td>Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Nil-Standard best practice</td>
</tr>
</tbody>
</table>

### 4. Reduce dust emissions

<table>
<thead>
<tr>
<th>Dust emission</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ensure strict enforcement of on-site speed limit regulations</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
</tr>
<tr>
<td>2.</td>
<td>Avoid excavation works in extremely dry weathers</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
</tr>
<tr>
<td>3.</td>
<td>Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
</tr>
<tr>
<td>4.</td>
<td>Personal Protective equipment to be worn</td>
<td>Proponent</td>
<td>Throughout construction period</td>
</tr>
<tr>
<td>5.</td>
<td>Construction materials on site to be covered to prevent to be blown off by wind</td>
<td>Contractor</td>
<td>Throughout construction period</td>
</tr>
</tbody>
</table>

### 5. Minimization of exhaust emissions

<table>
<thead>
<tr>
<th>Exhaust emission</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vehicle idling time shall be minimized</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction period</td>
</tr>
<tr>
<td>2.</td>
<td>Alternatively fueled construction equipment shall be used where feasible</td>
<td>Proponent &amp; Contractor</td>
<td>Throughout construction</td>
</tr>
</tbody>
</table>
**Environmental Impact Assessment Project Report**

**Proposed Alteration and Expansion to Existing Tenwek Hospital MCH Block on Plot LR, No. Kericho/Silibwet/11751**

<table>
<thead>
<tr>
<th>Equipment shall be properly tuned and maintained</th>
<th>period</th>
<th>best practice</th>
</tr>
</thead>
</table>

3. **Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points**

Proponent & Contractor | Throughout construction period | Nil-Standard best practice

| **6. Minimization of Noise and Vibration** |
|-----------------------------|---------------------------------|-----------------|
| **Noise and vibration**    | 1. Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. | Proponent & Contractor | Throughout construction period | Nil-Standard best practice |
|                           | 2. Sensitize construction drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, residential areas and schools or when within the hospital. | Proponent & Contractor | Throughout construction period | Nil-Standard best practice |
|                           | 3. Ensure that construction machinery are kept in good condition to reduce noise generation | Proponent & Contractor | Throughout construction period | Nil-Standard best practice |
|                           | 4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. | Proponent & Contractor | Throughout construction period | Nil-Standard best practice |
|                           | 5. The noisy demolition and construction works will entirely be planned to be during day time when most of the neighbors will be at work. | Proponent & all site foreman | Throughout construction period | Nil-Standard best practice |

| **7. Minimization of Energy Consumption** |
|-----------------------------------------|---------------------------------|-----------------|
| **Increased energy consumption**       | 1. Ensure electrical equipment, appliances and lights are switched off when not being used | Proponent & Contractor | Throughout construction period | Nil-Standard best practice |
|                                        | 2. Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy | Proponent & Contractor | Throughout construction period | 300,000 |

| **8. Minimize water consumption and ensure more efficient and safe water use** |
|-----------------------------------------------|-----------------|-----------------|
| **High Water Demand**                         | 1. Promptly detect and repair of water pipe and tank leaks | Proponent | Continuous | 20,000/month  |
|                                              | 2. Ensure taps are not running when not in use | Proponent | Continuous | Nil-Standard best practice |
|                                              | 3. Install a discharge meter at water outlets to determine and monitor total water usage | Proponent | One-off | 30,000 |
|                                              | 4. Proper recycling of water from other uses for sprinkling dusty pavements | Contractor | Continuous | Nil |

<p>| <strong>9. Minimize occupational health and safety risks</strong> |</p>
<table>
<thead>
<tr>
<th>Health and safety impacts</th>
<th>Proponent &amp; Contractor</th>
<th>One-off</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Protective Gear (PPG)</td>
<td>Proponent &amp; Contractor</td>
<td>Once off</td>
<td>500,000</td>
</tr>
<tr>
<td>First Aid</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>150,000</td>
</tr>
<tr>
<td>Fire protection</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>200,000</td>
</tr>
<tr>
<td>Health and safety impacts</td>
<td>Proponent</td>
<td>Continuous</td>
<td>Nil-Standard best practice</td>
</tr>
<tr>
<td>Personal Protective Gear (PPG)</td>
<td>Proponent</td>
<td>Continuous</td>
<td>Varies</td>
</tr>
<tr>
<td>Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the project site.</td>
<td>Proponent</td>
<td>Continuous</td>
<td>Varies</td>
</tr>
<tr>
<td>Construction of a security wall around the project area</td>
<td>Contractor</td>
<td>On commencement</td>
<td>Within project cost</td>
</tr>
<tr>
<td>Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc should be made available and construction personnel must be trained to use the equipment</td>
<td>Proponent &amp; Contractor</td>
<td>Once off</td>
<td>500,000</td>
</tr>
<tr>
<td>• Implement all necessary measures to ensure health and safety of workers and the general public during operation of the A&amp;EC project as stipulated in OSHA, 2007</td>
<td>Proponent</td>
<td>Continuous</td>
<td>Varies</td>
</tr>
<tr>
<td>• Well stocked first aid box which is easily available and accessible should be provided within the premises</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>50,000</td>
</tr>
<tr>
<td>• Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>150,000</td>
</tr>
<tr>
<td>• Firefighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas within the project site.</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>200,000</td>
</tr>
<tr>
<td>• Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained</td>
<td>Proponent &amp; Contractor</td>
<td>Every 3 months</td>
<td>70,000</td>
</tr>
<tr>
<td>• Fire escape routes and assembly point to be marked</td>
<td>Proponent &amp; Contractor</td>
<td>Continuous</td>
<td>50,000</td>
</tr>
<tr>
<td>• Signs such as “NO SMOKING” must be prominently displayed within the premises, especially in parts where inflammable materials are stored</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>5,000</td>
</tr>
</tbody>
</table>
8.2 Operational Phase EMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of the proposed Accident and Emergency Centre project are outlined below.

Table 6: Environmental Management Plan for the operation phase

<table>
<thead>
<tr>
<th>Expected Negative impact</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Approx. Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minimization of solid waste generation and ensuring more efficient solid waste management</td>
<td>Solid waste generation 1. Provide colour coded solid waste handling facilities such as waste bins and skips</td>
<td>Proponent/Management</td>
<td>One-off</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>2. Ensure that solid waste generated from A&amp;EC facility units is regularly disposed of appropriately at authorized dumping sites</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil- Standard best practice</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that management of the rooms manage their waste efficiently through recycling, reuse and proper disposal procedures.</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil- Standard best practice</td>
</tr>
<tr>
<td></td>
<td>3. Donate redundant but serviceable equipment to charities and institutions</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil</td>
</tr>
<tr>
<td>2. Minimize risks of sewage release into environment</td>
<td>Sewage disposal 1. Provide adequate and safe means of handling sewage generated at the rooms i.e. directed to the sewer line</td>
<td>Proponent &amp; Contractor</td>
<td>One-off</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>2. Conduct regular inspections for drainage pipe blockages or damages and fix appropriately</td>
<td>Proponent &amp; Contractor</td>
<td>Continuous</td>
<td>5,000 per inspection</td>
</tr>
<tr>
<td></td>
<td>3. Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>5,000/parameter</td>
</tr>
<tr>
<td>3. Minimize energy consumption</td>
<td>Energy Resource Utilization 1. Switch off electrical equipment, appliances and lights when not being used</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil- Standard best practice</td>
</tr>
<tr>
<td></td>
<td>2. Install occupation sensing lighting at various locations such as storage areas which are not in use all the time</td>
<td>Proponent/Management</td>
<td>One-off</td>
<td>10-40 % higher than ordinary lighting</td>
</tr>
<tr>
<td></td>
<td>3. Install energy saving fluorescent tubes at all lighting points within the A&amp;EC rooms instead of bulbs which consume higher electric energy</td>
<td>Proponent/Management</td>
<td>One-off</td>
<td>10-40 % higher than ordinary lighting</td>
</tr>
<tr>
<td></td>
<td>4. Monitor energy use during the operation of the project and set targets for efficient energy use</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>10,000/month</td>
</tr>
</tbody>
</table>
4. Minimize water consumption and ensure more efficient and safe water use

<table>
<thead>
<tr>
<th>Water consumption</th>
<th>1. Promptly detect and repair water pipe and tank leaks</th>
<th>Proponent/Management</th>
<th>Continuous</th>
<th>10,000/month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Management to conserve water e.g. by avoiding unnecessary toilet flushing.</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>3. Ensure taps are not running when not in use</td>
<td>Proponent/Management</td>
<td>Continuous</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>4. Install water conserving taps that turn-off automatically when water is not being used</td>
<td>Proponent</td>
<td>One-off</td>
<td>10–40% higher than ordinary taps</td>
</tr>
<tr>
<td></td>
<td>5. Install a discharge meter at water outlets to determine and monitor total water usage</td>
<td>Proponent</td>
<td>One-off</td>
<td>20,000</td>
</tr>
</tbody>
</table>

5. Minimization of health and safety impacts

| 1. Implement all necessary measures to ensure health and safety of the workers and the general public during operation of proposed Accident and Emergency Centre building project as stipulated in OSHA, 2007 | Proponent/Management | Continuous | Nil - Standard best practice |

6. Ensure the general safety and security of the premises and surrounding areas

| 1. Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the facility. | Proponent/Management | Continuous | Factored in the hospital wages |

8.3 Medical and Hazardous Waste Management Plan during operation phase

Table 7: Medical and Hazardous Waste Management Plan

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Summary of treatment and disposal options</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infectious waste:</strong> includes waste suspected to contain pathogens (e.g. bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical material (e.g. tissues, organs, body parts, human fetuses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.</td>
<td><strong>Waste Segregation Strategy:</strong> Yellow or red colored bag / container, marked “infectious” with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved. <strong>Treatment:</strong> Chemical disinfection; Wet thermal treatment; Microwave irradiation; Safe burial on hospital premises; Sanitary landfill; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator) • Highly infectious waste, such as cultures from lab work, should be sterilized using wet thermal treatment, such as autoclaving. • Anatomical waste should be treated using Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator).</td>
<td>Management</td>
</tr>
<tr>
<td><strong>Sharps:</strong> includes needles,</td>
<td><strong>Waste Segregation Strategy:</strong> Yellow or red color code, marked</td>
<td>Management</td>
</tr>
</tbody>
</table>
“Sharps”. Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled “infectious waste”.  
**Treatment**: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Encapsulation; Safe burial on hospital premises; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)  
• Following incineration, residues should be landfilled.  
• Sharps disinfected with chlorinated solutions should not be incinerated due to risk of generating POPs.  
• Needles and syringes should undergo mechanical mutilation (e.g. milling or crushing) prior to wet thermal treatment

### Pharmaceutical waste:  
Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.).  
**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container.  
**Treatment**: Sanitary landfill; Encapsulation; Discharge to sewer; Return expired drugs to supplier; Incineration (Rotary kiln; pyrolytic incinerator); Safe burial on hospital premises as a last resort.  
• Small quantities: Landfill disposal acceptable, however cytotoxic and narcotic drugs should not be landfilled. Discharge to sewer only for mild, liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Incineration acceptable in pyrolytic or rotary kiln incinerators, provided pharmaceuticals do not exceed 1 percent of total waste to avoid hazardous air emissions. Intravenous fluids (e.g. salts, amino acids) should be landfilled or discharged to sewer. Ampoules should be crushed and disposed of with sharps.  
• Large quantities: Incineration at temperatures exceeding 1200 °C. Encapsulation in metal drums. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal.

### Genotoxic / cytotoxic waste:  
Genotoxic waste may have mutagenic, teratogenic, or carcinogenic properties, and typically arises from the feces, urine, and vomit of patients receiving cytostatic drugs, and from treatment with chemicals and radioactive materials. Cytotoxic drugs are commonly used in oncology and radiology departments as part of cancer treatments.  
**Waste Segregation Strategy**: See above for “infectious waste”. Cytotoxic waste should be labeled “Cytotoxic waste”.  
**Treatment**: Return expired drugs to supplier; Chemical degradation; Encapsulation; Inertization; Incineration (Rotary kiln, pyrolytic incinerator);  
• Cytotoxic waste should not be landfilled or discharged to sewer systems.  
• Incineration is preferred disposal option. Waste should be returned to supplier where incineration is not an option. Incineration should be undertaken at specific temperatures and time specifications for particular drugs. Most municipal or single chamber incinerators are not adequate for cytotoxic waste disposal. Open burning of waste is not acceptable.

### Chemical waste:  
Waste may be hazardous depending on the toxic, corrosive, flammable, reactive, and genotoxic properties. Chemical waste may be in solid, liquid, or gaseous form and is generated through use of chemicals during diagnostic / experimental work, cleaning, housekeeping, and disinfection. Chemicals typically include  
**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container resistant to chemical corrosion effects.  
**Treatment**: Return unused chemicals to supplier; Encapsulation; Safe burial on hospital premises; Incineration (Pyrolytic incinerator);  
• Facilities should have permits for disposal of general chemical waste (e.g. sugars, amino acids, salts) to sewer systems.  
• Small hazardous quantities: Pyrolytic incineration, encapsulation, or landfilling.  
• Large hazardous quantities: Transported to appropriate facilities for disposal, or returned to the original supplier using shipping arrangements that abide by the Basel Convention. Large
formaldehyde, photographic chemicals, halogenated and nonhalogenated solvents, organic chemicals for cleaning / disinfecting, and various inorganic chemicals (e.g. acids and alkalis).

Radioactive waste: Includes solid, liquid, and gaseous materials that have been contaminated with radionuclides. Radioactive waste originates from activities such as organ imaging, tumor localization, radiotherapy, and research / clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients.

Waste with high content of heavy metals: Batteries, broken thermometers, blood pressure gauges, (e.g. mercury and cadmium content).

Pressurized containers: Includes containers / cartridges / cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases.

General health care waste (including food waste and paper, plastics, cardboard): quantities of chemical waste should not be encapsulated or landfilled.

**Waste Segregation Strategy:** Lead box, labeled with the radioactive symbol.


Waste Segregation Strategy: Waste containing heavy metals should be separated from general health care waste.

**Treatment:** Safe storage site designed for final disposal of hazardous waste.

- Waste should not be burned, incinerated, or landfilled.
- Transport to specialized facilities for metal recovery.

Waste Segregation Strategy: Pressurized containers should be separated from general health care waste.

**Treatment:** Recycling and reuse; Crushing followed by landfill

- Incineration is not an option due to explosion risks
- Halogenated agents in liquid form should be disposed of as chemical waste.

Waste Segregation Strategy: Black bag / container. Halogenated plastics such as PVC should be separated from general health care facility waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (e.g. hydrochloric acids and dioxins).

**Treatment:** Disposal as part of domestic waste. Food waste should be segregated and composted. Component wastes (e.g. paper, cardboard, recyclable plastics [PET, PE, PP], glass) should be segregated and sent for recycling where available.

Management

---

8.4 Decommissioning Phase

In addition to the mitigation measures provided in the table above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the Accident and Emergency Centre project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined below.
Table 8: Environmental Management Plan for the decommissioning phase

<table>
<thead>
<tr>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Demolition waste management</strong></td>
<td></td>
<td></td>
<td>To be determined</td>
</tr>
<tr>
<td>1. All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible</td>
<td>Contractor, Proponent</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td>2. All foundations must be removed and recycled, reused or disposed of at a licensed disposal site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site</td>
<td>Contractor, Proponent</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td>4. Donate reusable demolition waste to charitable organizations, individuals and institutions</td>
<td>Contractor, Proponent</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td><strong>2. Rehabilitation of project site</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Implement an appropriate revegetation programme to restore the site to its original status</td>
<td>Contractor, Proponent</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td>2. Consider use of indigenous plant species in revegetation</td>
<td>Contractor, Proponent</td>
<td>One-off</td>
<td></td>
</tr>
<tr>
<td>3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent buildings and the development.</td>
<td>Contractor, Proponent</td>
<td>Once-off</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER NINE

9.0 GENERAL CONCLUSION AND RECOMMENDATIONS

a) Conclusion

The analysis of the EIA Project Report has evidenced that the demolition, construction and occupation/operation of the proposed Accident and Emergency Centre project will have positive impacts to the Kenyan society. The impacts will include: provision of quality and adequate medical services, employment to local community members, increase in the national/local medical housing stock and quality, increase in Government revenue, and improvement of standards of living. However, despite the outlined positive impacts, the proposed development will come up with some negative impacts such as increased pressure on existing infrastructure, pollution (to Air, Water, soil) mostly during construction phase, and increased medical hazardous wastes (solid and liquid) generation among others.

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. During project implementation and operation, sustainable environmental management (SEM) 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 facility, general public at the vicinity and neighbouring premises.

In relation to the proposed mitigation measures that will be incorporated during construction and operational 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 health 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 Management and Monitoring Plans (EMPs).

Finally, the project proponent has promised to work closely with the Environmental Experts and relevant government bodies to enhance the facilitation of the issues of concern. This will ensure that environmental concerns are integrated into the project at every stage of the implementation phase and the co-existence of the proposed project with the environment during and after-implementation.

b) RECOMMENDATION

➢ To landscape the remaining compound using flowers ang grass after project completion.
➢ Installation of proper drainage system.
➢ Clearing of all unutilized building materials.
➢ Ensure that all designs, plans and maps are approved by the respective responsible authorities.
➢ Ensure that all the water bodies are un-interfered with.
➢ Liaise with the project neighbours to maintain relationship.
➢ Install proper sewage system to channel all the effluent from the building to the existing main hospital sewer treatment plant.
➢ Proper medical/ hazardous waste management plan
REFERENCES

Plate 1: Front view of the MCH block to be altered and expanded into Accident and Emergency Centre

Plate 2: Current entrance ramp to the MCH block

Plate 3: Adjacent Casualty block and water fountain to be removed

Plate 4: Abutting visitors toilet to be demolished to pave way for proposed expansion

Plate 5: Adjacent Casualty block and water fountain to be removed

Plate 6: Current MCH runoff drainage to be reconstructed
Plate 7: Improper ventilation in the current building leading to lights being switched on during the day

Plate 8: Congestion at the waiting bay within the current MCH block leading to use of the corridors by patients

Plate 9: Good waste management practice (color coding of waste bins) at the MCH block

Plate 10: Overcrowding at the waiting bay

Plate 11: Main hospital entrance gate to be redesigned and expanded for increased traffic

Plate 12: Adjacent building on the southern side of the MCH block
ARCHITECTURE AND ENGINEERING SERVICE PROVIDER
CERTIFICATION OF COMPLIANCE

U.S. Organization Name: WORLD GOSPEL MISSION (WGM)

Overseas Institution Name: TENWNE K HOSPITAL

Award No.: AID-ASHA-A-17-00017 Country: KENYA

For all USAID-funded construction activities, an Architecture and Engineering (A&E) Service Provider, for which ASHA has provided concurrence, is responsible for the engineering design and must incorporate all findings of the Initial Environmental Examination (IEE) and Climate Risk Management (CRM) screening into the final design and construction documents. The A&E Service Provider must also adhere to the Standard Provision entitled “Standards For Accessibility For The Disabled In USAID Assistance Awards Involving Construction” and ensure that Gender Integration is considered during implementation.

1. Initial Environmental Examination: 22 CFR 216: Environmental Procedures
2. Climate Risk Management: Mandatory Reference ADS 201: Climate Risk Management for USAID Projects and Activities
4. Gender Integration: ADS 205: Integrating Gender Equality and Female Empowerment in USAID’s Program Cycle

ASHA-Cleared Architecture & Engineering Service Provider

A&E Service Provider Name: [Redacted]
Signature: __________________________  Date: 3rd March 2020

Authorized A&E Point of Contact: __________________________

Email Address: __________________________