Environmental and Social Impact Assessment for the Construction/ Rehabilitation of the National TB Reference Laboratory and Five Satellite Laboratories in Uganda

Project area: Arua Regional Referral Hospital

(Reference No.: MoH-EAPHLNP/SRVCS/2010-11/00006)

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Acronyms, units and definitions

Acronyms

ARAP:	Abbreviated Resettlement Action Plan
CFR:	Crude Fertility Rate
CHD:	Community Health Department
ESIA:	Environmental & Social Impact Assessment
ESIS:	Environmental & Social Impact Statement
ESMP:	Environmental and Social Management Plan
GH:	General Hospital(s)
GIS:	Geographical Information Systems
GOU:	Government of Uganda
HC:	Health Centre (e.g. HC IV, HC III, HC II)
HCF:	Healthcare Facility/ Facilities
HCW:	Healthcare Waste
HSD	Health Sub-District
HSSPII:	Health Services Support Project II
LC:	Local Council
IP/PAP:	Interested Parties / project-affected people
MOH:	Ministry of Health
NEMA:	National Environment Management Authority
NWSC:	National water & Sewerage Corporation
NHS:	National Health System
OPD:	Out Patient Department
PCDP:	Public Consultation and Disclosure Plan
PFP:	Private for Profit
PHC:	Primary Health Care
PHP:	Private Health Provider
PID:	Photo-Ionization Detector
PMTCT:	Prevention of Mother to Child Transmission
PNFP:	Private Not for Profit
RRH:	Regional Referral Hospital(s)
TASO:	The Aids Support Organisation
TB:	Tuberculosis
TCMP:	Traditional and Complimentary Medicine Practitioner
TOR:	Terms of Reference
UBOS:	Uganda Bureau of Statistics
UNFPA:	United Nations Fund for Population Activities
UNMHCP:	Uganda National Minimum Healthcare Package
VCT:	Volume Computed Tomography
VHT:	Village Health Team
WB:	World Bank
WHO:	World Health Organization

Units of measures

Ha: hectare
km: kilometre
m: metre

Definitions:

Dioxins or Polychlorinated dibenzodioxins (PCDDs):	These are a group of polyhalogenated compounds which are known to be potent human carcinogens (cancer-causing chemical compounds). Dioxins can occur as by-products of incineration of chlorine-containing substances such as chlorine-containing plastics.
Incineration:	This is a waste treatment technology that involves combustion of organic materials and/or substances converting them into incinerator bottom ash, flue gases, and particulates. Flue gases may contain significant amounts of particulate matter, heavy metals, dioxins, furans, sulphur dioxide and hydrochloric acid. Flue gases should therefore be cleaned before they are dispersed in the atmosphere.
Infectious waste:	This is the portion of medical waste that can transmit disease. On average about 10-15 percent of medical waste is actually infectious waste. Infectious waste comprises five categories: cultures and stocks, human pathological waste, human blood and blood products and sharps.
Hazardous waste:	Shares the properties of a hazardous material (for example, ignitability, corrosivity, reactivity or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.
Hospital waste:	All solid waste, both biological and non-biological, that is produced at a hospital and is discarded without further use.
Medical waste:	Materials generated as a result of patient diagnosis and/or treatment or the immunization of human beings.
Solid (non-hazardous) wastes:	Generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste).

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Executive Summary

The Government of the Republic of Uganda, with funding from the International Development Association (IDA), plans to construct a medical laboratory at Arua Regional Referral Hospital. The construction shall be undertaken through the East African Public Health Laboratory Networking Project (EAPHLNP) with support from the World Bank.

The general objective of the project is to improve access to diagnostic services among vulnerable populations living in the cross-border areas of the Republic of Southern Sudan, Democratic Republic of Congo and Uganda. The laboratory networking project also aims to address the common challenges facing the East African countries, that is, dilapidated infrastructure that was built decades ago; inadequate supply and quality of human resources which are a backbone of quality diagnostics; and manual information systems which are not effective for decision making.

The project site is located within Arua Regional Referral Hospital (Arua RRH). Arua RRH is located in the Arua Municipality, Arua District approximately 439 km by road, northwest of Kampala. It is the referral hospital for the districts of Adjumani, Arua, Koboko, Maracha-Terego, Moyo, Nebbi and Yumbe. The hospital also receives referrals from neighbouring parts of Southern Sudan and the Democratic Republic of the Congo.

Arua district lies in the north western part of Uganda bordered by Yumbe in the North West, Moyo district in the north east, Maracha district in the North West, Democratic Republic of Congo in the west, Nebbi district in the south, and Amuru district in the east Arua Municipality, the administrative and commercial headquarters is 520 km away from Kampala, Uganda's capital city.

Arua is an important and rapidly growing trading area serving Democratic Republic of Congo (DRC) and Southern Sudan. Due to influx of a large number of local and regional traders the District has often had diseases outbreaks and this buttresses the importance of healthcare services in the local government. The proposed laboratory will enable diagnosis of disease to facilitate delivery of improved healthcare services in the region. The proposed laboratory will conform to level 2 safety designs and practices, shall handle clinical specimens mainly from the wards and clinics in the hospital, but also some specimens referred from other health facilities. In addition, a limited number of specimens shall be collected within the laboratories. A broad range of testing including clinical chemistry, haematology, immunology and microbiology shall be offered. The laboratory shall also act as a site for internship for students from various institutions in the country.

Potential impacts of the proposed project are outlined below and discussed in detail in Chapter 6.

CONSTRUCTION-PHASE IMPACTS

Positive Impacts:

- **Income to material/ equipment suppliers and contractors**

Development of the project will entail civil works requiring materials such as gravel, bricks, lumber, steel reinforcement and cement. This is a ***positive*** but ***short-term*** and ***reversible*** impact. Considering that construction labour would be local or national but medical equipment procured internationally, this impact has local, national and international spatial extent.

- **Employment**

Construction will avail skilled and unskilled job opportunities. This would be a ***positive*** but ***short-term*** and ***reversible*** impact, lasting only during the construction period.

Negative Impacts

a) Waste generation (improper construction waste management)

Solid waste will be generated at the site during site preparation and construction phases. The waste may consist of timber or metal cuttings, excavated materials, paper/cement bags, empty paint and solvent containers, broken glass among others. Some of the waste materials such as paints, cement, adhesives and cleaning solvents contain hazardous substances, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have ***long-term*** and ***cumulative*** effects on the environment. It impacts on the environment through blockage of drainage systems and negative impacts on human health.

Mitigation strategies:

i) The wastes will be properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated stone materials can be used as backfills.
ii) Hazardous waste will not be mixed with other solid waste generated and should be managed by way of incineration or land-filling.
iii) The contractor and hospital administration will work together with the Municipal Council to facilitate proper waste handling and disposal from the site. All wastes must be taken to the approved dumpsites.

b) Pressure on existing resources

During the construction stage, demand for basic amenities such as water and electricity may put pressure on the existing infrastructure.

Considering the nature of the project, the impact ***intensity*** shall be ***low*** and *short term* limited to the construction phase only. The hospital has power backup and it was reported to be stable. The hospital has a water reservoir although it is not big enough to sustain the hospital demand. However, the ***sensitivity*** on the receptors will be ***high*** since it hampers with utility supplies to hospital community, thereby giving a ***moderate*** impact *significance*.

Mitigation strategies:

The contractor should provide separate storage for water to use at the construction. Instead of connecting to the hospital water supply system, the contractor should opt to use water bowsers for supply.

c) Generation of noise

Noise will be one of the most undesirable consequences of the construction phase. Relatively high noise levels are expected in the area during construction phase. Considerable levels of noise and vibrations will mainly result from use of heavy equipment including bulldozers, graders and dump trucks during site preparation and construction activities.

Mitigation strategies:

i) Contractor will be careful when selecting equipment to avoid use of old or damaged machinery with high level of noise emissions that would have a negative impact in the environment.
ii) Contractor will ensure that equipment is properly serviced and efficient.
iii) All generators and heavy duty equipment will be insulated or placed in enclosures to minimize disrupting ambient noise levels.

d) Traffic and associated emissions

Traffic-borne emissions include dust and exhaust fumes. Dust emissions will arise from construction activities, earthworks and construction traffic. The trucks used to transport various building materials from their sources to the project site generate emissions of SO_2, CO_2, CO, NO_x and particulates. The impacts of

such emissions can be greater in at the construction site and through communities construction vehicles will travel. Impact receptors include communities along the haulage routes, road-side markets and shops, construction workers and possibly hospital residents (workers and patients).

Mitigation strategies:

i) Construction activities will be carried out during the day.
ii) Travel speeds of construction vehicles especially through business centres will be controlled;
iii) Trucks shall be covered during haulage of construction materials;
iv) Wherever dust suppression is necessary, water will be sprayed over dusty areas;
v) Workers will be provided with PPE and the use of PPE shall be enforced.

e) Temporary scenic blight

Construction activities will require material, equipment and cordons at the hospital. Since the hospital will remain open for access by public, presence of these activities and materials thereof will cause temporary visual blight at the construction site. Presence of construction activities will alter visual impressions accustomed to.

Mitigation strategy: The contractor shall ensure minimal footprint of construction activities.

f) Occupational health safety (OHS) Risks for Contractors

Construction activities have potential to pose occupational risks some of which could be life-threatening, for example, fatal falls if workers do not use safety latches when working at heights. Working with high voltage and hot works (welding) pose a risk of electrocution. In addition, falling debris could injure workers if personal protective equipment (PPE) are not provided or properly used. Back injury could occur if workers lift heavy objects using inappropriate body posture.

Uganda and WBG Guidelines require that workers exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day wear hearing protection. Related OHS safeguards are comprised in (Uganda's) *Occupational Safety & Health Act (2006) and Employment Act,* 2006.

Mitigation strategies that will be undertaken are:

i) Training will be conducted on how to prevent and manage incidences. This will involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All workers will fully be aware and mentally prepared for potential emergency.
ii) Strict instructions shall be given for drivers of heavy equipment.
iii) Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work equipment.
iv) Provide adequate OHS protective gear to construction workers.

g) Accidents

The hospital is located in the business district of the municipality with a lot of human activity on the adjoining road at the access gate to the hospital. With an increase in number of heavy vehicles during transportation of construction materials and equipment, there will be an increase of community risk of traffic-related accidents or injuries. Traffic accidents would be a significant social impact and especially likely to involve children, women (who commonly cross roads slower than men), disabled and elderly people, notwithstanding the safety risks created by the falling debris from construction activities.

Mitigation strategies:

i) Contractors will adopt best transport safety practices with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public, as follows:
ii) Project will require contractors to regularly maintain vehicles to minimize potentially serious accidents such as those caused by brake failure commonly associated with loaded construction trucks.
iii) For falling debris, and hoarding/scaffoldings; clear warning signs will be placed around the construction premise, install interceptors and net traps to divert falling debris, and emphasize (provide) person protective gears to persons in the area.

h) Social misdemeanour by construction workers

While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. Irresponsible sexual relationships in project communities can break families and heighten risk of contracting HIV/AIDS. Illicit sexual relationships can be short-term but have long-term and irreversible effects if HIV or Hepatitis-B were contracted. If this impact occurred, extent of disease spread would be local or national depending on origin and next destination of infected persons.

Mitigation strategies:

i) As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution.
ii) All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.

OPERATION PHASE IMPACTS

Positive Impacts

a) Improved medical surveillance services

The project will positively impact health of Ugandans and the East African region through easing access to diagnostic services for TB and other communicable diseases. It will help to enhance access to diagnostic services for vulnerable groups; improve capacity to provide specialized diagnostic services and conduct drug resistance monitoring; and strengthen laboratory based disease surveillance to provide early warning of public health events.

Enhancement measures: Appropriate staffing with technical/ medical personnel adequately trained in use of newly installed equipment.

b) Employment opportunities

Operation of the laboratory will create additional long-term technical and non-technical job opportunities for medical professionals, janitors, etc.

Negative Impacts

Negative impacts during operation of the laboratory may arise from:

i) Improper waste management (including laboratory/medical waste and wastewater discharges);
ii) Misuse or inability to use installed equipment for improved service delivery;
iii) Lack of maintenance, hence laboratory facilities degenerating to decay again;
iv) Safety and occupational risk to health workers; and
v) Risk of fire outbreak
vi) Emissions from the incinerator.

vii) Theft of laboratory equipment
viii) Theft and misuse of laboratory reagents, especially highly concentrated acids known to be used in vengeful attacks on people in Uganda

These are discussed in sections below.

a) Improper management of waste

As a result of the operation of this laboratory it is expected that waste will be generated. Mainly there will be *domestic waste and hazardous waste.* Since laboratory activities involve certain medical examinations and also there will be a need for usage of different sorts of chemicals or reagents, it can be concluded that different types of hazardous wastes shall be generated. Therefore, improper waste decontamination and disposal can cause public health risks due to environmental pollution: impaired air quality, contamination of water courses and infections when people or children rummage through improperly dumped infectious waste or raw waste stockpiles.

Mitigation strategies:

i) An incinerator will be installed on site to enhance disposal of relevant material through burning.
ii) Appropriate waste bins will be provided for the different types of waste generated in the laboratory to allow segregation and collection at the point of generation.
iii) Hospital/ Laboratory staff shall be trained or educated on the importance and means of waste management and handling during operation.
iv) The laboratory will ensure proper waste management practices as recommended in the study on improvement of healthcare waste management in Uganda.

b) Air pollution due to incineration of waste

Incineration of laboratory waste if carried out in an inappropriate facility could result into localized pollution of air. The key emissions to the air from operation of the incinerators are odour, particulate matter, hydrogen chloride, nitrogen oxides, sulphur dioxide, carbon monoxide, and volatile organic compounds (from methane to polycyclic aromatic hydrocarbons (PAH), dioxins and furans (PCDD/F) Dioxins are known to promote cancers in humans. Downwash of incinerator emissions has potential to degrade indoor air quality for buildings.

Mitigation strategies:

i) The laboratory will ensure that operator of incineration unit is properly trained;
ii) The incinerator shall be operated at its design temperatures and combustion air supply;
iii) Consultations with potentially affected people shall be done by design consultant to inform choice of the most appropriate location of incinerator;
iv) All exhaust air from the laboratory shall pass through high efficiency particulate air filters; and

c) Occupational health and safety risks

Inadequate treatment or handling of contaminated samples or waste can have potential to expose laboratory staff to risk of transmission of life threatening infections at work. This transmission can take place through equipment, clothing and vehicles transporting samples. The infectious waste could be in gaseous, liquid or solid forms. A list of OHS risk sources for staff is presented below:

Mitigation strategies the laboratory will undertake are:

i) Orient all staff on safe work practices and guidelines and ensure that they adhere to them.
ii) Training staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences.
iii) Regular safety drills to constantly follow on various possible incidences.

iv) Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places.
v) Develop evacuation procedures to handle emergency situations.
vi) Provide adequate OHS protective gear for all laboratory staff.

d) Risk of fire outbreak

Without provisions for fire safety, there is a risk of fire outbreak in the laboratory with disastrous life and financial impact. Fires can start from ignitable materials in laboratories, cigarette smoking in non-designated places or old electrical connections.

Mitigation strategies:

i) Fire extinguishers to be provided at strategic locations within the laboratory and ensure that all fire-fighting equipment are regularly maintained and serviced.
ii) Key healthcare staff shall have training in fire control through regular firefighting drills.
iii) Fire emergency telephone numbers shall be displayed in communal areas.
iv) Automatic fire alarm system for the entire laboratory will be installed and water hose reels installed in the laboratory.
v) Fire hazard signs such as 'No Smoking' signs will be provided. Directions to exit in case of any fire incidence and emergency contact numbers shall be provided. The contact/emergency numbers shall be displayed within the laboratory.

An EMP has been proposed in Chapter 8 for construction works and operation of laboratory facility. The EMP identifies potential environmental and social aspects that should be monitored, parties responsible for monitoring actions, associated costs, indicators and training or capacity building needs and reporting.

The proposed project has potential to significantly improve quality of laboratory services and efficiency of service provision in the Arua region with socio-environmental benefits such as reduced morbidity and increased productivity of labour hence higher household incomes; opportunity to have access to laboratory services hitherto unavailable at Arua Regional Referral Hospital due to lack of equipment or facilities. Possible socio-environmental impacts can be adequately controlled with mitigation measures presented in this report.

Table ES1: Impact Monitoring & Management Plan

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
6.2	**CONSTRUCTION PHASE**						
6.2.1	**Positive impact**						
6.2.1.1	**Income to equipment ad material suppliers**						
	Project will promote local procurement where technically or commercially reasonable and feasible.	Ensure that local communities and businesses benefit from procurement process	Number of local businesses benefiting from construction related procurement	Before and during commencement of construction	MOH; Contractor	Negligible	None
	For earth materials, procure from legitimate sources to avoid encouraging environmental degradation	Project's material demand does not encourage environmental degradation	All quarries from which materials (sand, stone) are obtained are licensed by the local authorities.	Before and during construction	MOH; Contractor	Negligible	None
6.2.1.2	**Employment**						
	Contractor will avail local communities with information leaflets in their local languages to create awareness about the proposed project activities	The participation of local community members in all project activities possible.	Local community awareness of project progress status	Before and during construction	MOH; Contractor	Negligible	None
	Unskilled labour will be recruited exclusively from local community, and semi-skilled labour will be recruited preferentially from such communities, provided that they have the requisite qualification, competence and desired experience.	The participation of local community members will be maximised during site preparation and construction activities.	Number of local people (unskilled and semi-skilled) employed during construction phase	Before and during construction	MOH; Contractor	Negligible	None
	Contractors will be encouraged to pay a "living wage" to all workers.	Improve livelihood of the local community	No complaints of poor remuneration	Before and during construction	MOH; Contractor	Negligible	None
	Contractors' employment activities on a monthly basis, including number of jobs	Contractor has records of filled vacancies by; number of placement,	No complaints of inconsistencies in recruitment criteria and wages	Before and during construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	created by employment type (skilled / semi-skilled / unskilled); number of jobs by gender, employment type and geographical area; total man hours and wages paid, by employment type, gender and geographical area; and rate of employee turnover by gender and area.	level of skill, gender, type, turnover, and man hours and wage.					
6.2.2	**Negative impacts**						
6.2.2.1	**Improper construction waste management**						
	Contractor should seek guidance of local environmental officers to identify acceptable disposal sites	Contractor has records of proper waste disposal indicating quantities dumped and location of dumping site,	No report of illegal waste dumping in non-designated areas	Throughout construction	MOH ; Contractor; Local Environmental Officer.	Negligible	None
	Contractors should undertake waste segregation onset to separate hazardous waste from non-hazardous waste	Hazardous waste separated from non-hazardous waste on site and each waste stream disposed of according to NEMA requirements in designated sites.	Separate containers for hazardous waste and non-hazardous waste on site	Throughout construction	MOH ; Contractor; Local Environmental Officer.	Negligible	Likely hazardous and non-hazardous construction waste
	Waste (such as metal scrap or wood waste) that can be reused/ recycled may be given to local people.	Amount of waste disposed minimized by reuse, wherever feasible	Record of material types and estimated quantity diverted for reuse	Throughout construction	Contractor; local environment officer	Negligible	None
6.2.2.2	**Pressure on infrastructure**						
	Contractor should provide separate source and storage for to use for construction (use water bowsers for	Uninterrupted water supplies to hospital community	No complaint of irregularities in water supply related to construction activities	Throughout construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	supply); should not connect to hospital water supply system						
	Contractor should provide separate source power for construction (use generators); should not connect to hospital energy grid system	Uncompromised energy supply to hospital community	No complaint of irregularities in energy supply related to construction activities	Throughout construction	MOH; Contractor	Negligible	None
	Contractor should provide mobile onsite toilets and washrooms and washing water for workers.	Workers do not compete with hospital community for lavatory facilities.	Ablution facilities exist on site	During construction	MOH	Negligible (should be part of contractor's bid)	None
6.2.2.3	**Generation of noise**						
	Construction workers should be sensitised on the sensitive nature of workplace they are operating in and advised to limit verbal noise or other forms of noise. For example, metallic objects or tools can be passed on to a colleague rather than dropping or throwing them with loud bangs.	No excessive noise from workers	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Contractor should ensure that all equipment and machinery are in good and sound condition of old or damaged equipment with high level of noise emissions that would have a negative impact in the environment	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	All generators and heavy duty equipment should be insulated or placed in	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	enclosures to minimize disrupting ambient noise levels.						
	Contractor will ensure that equipment is properly maintained and fully functional.	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Contractors should cordon off areas under construction with noise absorbing materials, for example, plywood rather than iron sheets;	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Comprised in cost for control of flying debris	None
	The contractor should ensure that noise levels emanating from machinery, vehicles and noisy construction activities are kept at a minimum for the safety, health and protection of people in the nearby buildings.	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Construction workers and drivers should be sensitised to switch off Equipment, machinery and vehicle engines when not in use and/or offloading materials.	Minimized noise and vibration at the project site.	Patients and health workers do not complain about noise and vibration during construction	During construction	MOH; Contractor	Negligible	None
	Construction activities should be carried out during the day	Afford hospital community noise-free night time to rest	No complaints of restless nights due to noise and vibration from project activities.	During construction	MOH; Contractor	Negligible	None
6.2.2.4	**Traffic and fugitive emissions**						
	The project area will be cordoned off to minimise on dust and emission migration to nearby facilities by wind;	No excessive dust emissions noted outside construction areas	No complaints of excessive dust from construction areas	During construction	MOH; Contractor	Comprised in cost for control of flying debris	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	Truck drivers should be sensitised on and ensure they observe speed limits on roads especially at business centres;	Minimise dust and exhaust emissions	No complaints of trucks ruthless driving from communities along roads used by project vehicles	During construction	MOH; Contractor	Negligible	None
	Trucks should be covered during haulage of construction materials;	No material spills on roads during haulage to sites	No accidents caused by construction material split on road	Throughout construction	MOH ; Contractor; Police	Negligible (this should be part of contractor's bid)	None
	Wherever dust suppression is necessary, water should be sprayed over dusty areas;	Minimise dust levels	Recognition of locales of contractor's efforts to minimise dust nuisance.	During construction	MOH; Contractor	Negligible	None
	Keep all construction equipment in good operating condition to reduce exhaust emissions;	Minimise air pollution levels	No complaints of excessive fumes	During construction	MOH; Contractor	Negligible	None
	All dust should be quickly swept away to avoid migration to other non-construction areas;	Reduce dust levels in off-site locations	No dust hips on-site	Throughout construction	MOH; Contractor	Negligible	None
	Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility;	Employment of best Construction practices to minimise adverse impacts	Implementation of proposed mitigation measures	Throughout construction	MOH; Contractor	Negligible	None
	Workers will be provided with PPE and the use of PPE shall be enforced;	Minimise OHS on workers from fugitive emissions	All workers on-set with appropriate PPE	Throughout construction	MOH; Contractor	Comprised in cost for provision of PPE	None
6.2.2.5	**Temporary scenic blight**						
	Contractor should ensure minimal footprint of construction activities.	Project workers and activities restricted to construction site	Workers and materials not found at locations away from construction site	Throughout construction	MOH; Contractor	Negligible	None
6.2.2.6	**Occupational health safety (OHS) for contractors**						
	Orient all construction	Reduce OHS on	Records of workers' orientation	Throughout	MOH;	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	workers on safe work practices and guidelines and ensure that they adhere to them.	construction workers		construction	Contractor		
	Training should be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency.	Reduce OHS on construction workers	Records of training and Impromptu interviews with workers on OHS emergency response	Throughout construction	MOH; Contractor	Negligible	None
	Regular drills should constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences.	Reduce OHS on construction workers	Records of drills on OHS emergency response	Throughout construction	MOH; Contractor	Negligible	None
	Use signage to warn staff and/ or visitors that are not involved in construction activities of dangerous places.	Reduce OHS on construction workers and the public	Presence of appropriate signage on-site	Throughout construction	MOH; Contractor	Negligible	None
	Supervision of works should be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed	Reduce OHS on construction workers	Presence of supervisor on-site	Throughout construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	following the best practices regarding safety at work equipment.						
	Develop evacuation procedures to handle emergency situations.	Reduce OHS on construction workers	Documented Emergency Response Preparedness Plan (ERPP)	Throughout construction	MOH; Contractor	Negligible	None
	Provide appropriate PPE to all workers not limited to; • Ear Muffs: One size fits all, comfortable, less ear infection risk • Ear Plugs: Small, lightweight, can get dirty and cause infection • Face/Eye (Working with any chemical or using any mechanical equipment) • Face Shield: Protect face from splashing and particles • Safety Glasses: Protection from solids (cutting, sanding, grinding) • Safety Goggles: Protects eyes from splashing • Hand (Use correct gloves for the job) • Chemical Gloves: (Nitrile, Latex, PVC) • Gloves for other use: special gloves for cutting, burning, abrasions/ blisters • Body	Reduce health and safety risks to construction workers	Zero injuries in any month of construction phase	Before construction commences	MOH; Contractor	**USD 2,000**	Application of various types of PPE and their proper use.

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	• Overalls: Can protect against dust, vapours, splashes • Foot Protection • If electrical hazard present ensure boots offer protection • Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists • Water/Chemical Resistant Boots: Use in a spill situation • Non-slip boots for working on wet/slippery floors.						
6.2.2.7	**Accidents**						
	Adopt best transport safety practices with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public	No road accident by project traffic	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	Contractor needs road safety awareness to project personnel and the public
	Ensure drivers respect speed limits through built areas and urban centres.	No road accident by project traffic	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	Contractor needs speed awareness through built areas and urban areas
	Ensure that vehicles are regularly maintained to minimize potentially serious accidents such as those caused by brake failure commonly associated with loaded construction trucks	No road accident due to poor mechanical conditions of project vehicles.	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	None
	Employ safe traffic control	No road accident by	No accident occurs in each month	During	MOH;	**USD 500**	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	measures, including temporary road signs and flag persons to warn of dangerous conditions and children crossings	project traffic	of construction duration	construction	Contractor		
	Contractors should cordon off areas under construction and provide signage to warn of on-going construction works.	Construction works do not cause injury to patients and health workers	Zero injuries in any month of construction phase	During construction	MOH; Contractor	Negligible	None
	Contractors should use screens or nets to avoid flying debris and dust	No debris noted outside construction areas	No complaints about flying debris from construction areas (this should be verified by perusal of records in complaints log)	During construction	MOH; Contractor	**USD 1,500**	None
6.2.2.8	**Social misdemeanour by construction workers**						
	As a contractual obligation, contractors should be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement it during project execution.	No illicit sexual relationships among construction workers and local community	All construction workers living in a camp adhere to a "No fraternization" and comply with latest entry time into camp (6PM) set to avoid prostitution.	Throughout construction	MOH; contractor	Negligible	None
	All construction workers should be orientated, trained and sensitized about responsible sexual behaviour and HIV/AIDS	No aggravated spread of HIV/AIDS due to project implementation	All construction workers are aware of HIV/AIDS risk and responsible living.	Throughout construction	MOH; contractor	**USD 1,000** for HIV/AIDS posters/fliers and free condoms	None
6.2 (all sub-sections)	Impact of construction activities	Construction activities do not cause adverse socio-environmental impacts	Annual construction audits do not indicate adverse impacts not mitigated	1 time per year *(NB. Estimated construction duration = 1 year per lot, see Table.20)*	MOH (construction audit may be undertaken by MOH or consultant it hires)	**USD 4,000**	Environmental auditing of construction projects

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
6.3	**OPERATION PHASE**						
6.3.1	**Positive**						
6.3.1.1	**Improved medical surveillance services**						
	Construction of laboratory facilities should be matched with commensurate staffing with laboratory personnel adequately trained in use of newly installed equipment	Installed laboratory equipment fully utilised to enhance laboratory services at the hospital.	laboratory has trained staff to properly and safely operated provided laboratory equipment	1 month after equipment installation	MOH and supplier	None (procurement cost assumed to include training)	Staff training in operation of newly installed laboratory equipment
	Reduced public risks due to improvement in laboratory waste management	Environmental audits show that medical waste and incinerator emissions do not cause onsite/ offsite public health risk	Annual environmental audits find no plume downwash from incinerators. Incinerators stacks designed based on GIIP / WBG EHS guidelines No un-incinerated medical solid waste on premises or waste dumps	Undertake full environmental audit once per year	MOH	Environmental audit cost: **USD 10,000**.	Operation of incineration units; Decontamination procedure in the laboratory
6.3.1.2	**Employment opportunities**						
	Operation of the laboratory will create additional long-term technical and non-technical job opportunities for laboratory professionals, janitors, etc.	Improve laboratory services	Laboratory has adequate trained staff.	Daily	MOH	Negligible	None
6.3.2	**Negative**						
6.3.2.1	**Improper waste management**						
	Ensure proper waste management practices as recommended in the study on improvement of laboratory waste	No community health risk due to improper waste management	No raw medical waste is dumped at public dumps	Daily	Healthcare facility administrator/ Superintend	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	management.						
	The collection of waste should be made at least once in 24 hours, and it should be done in such a way to minimize nuisance of smell and dust during collection and all the waste collected must be carried away from the storage site to an approved disposal point.	No accumulation of waste in and around laboratory facility	No smell or accumulated waste in and around the laboratory	Daily	Hospital administrator/ Superintend	Negligible	None
	Provide appropriate waste bins for the different types of waste generated in the laboratory to allow segregation and collection at the point of generation.	Waste segregation and no litter.	Presence of adequate waste bins in and around the laboratory facility	Daily	Hospital administrator/ Superintend	Negligible	None
	Hospital/ Laboratory staff should be trained or educated on the importance and means of waste management and handling during operation.	Proper waste handling and management	Presence of labelled waste bins on-site	Daily	Hospital administrator/ Superintend	Negligible	None
	The hospital administration should work together with a private refuse handlers and the Municipal Council to facilitate sound waste handling and disposal from the site noting that hazardous waste must not be mixed with municipal waste.	Proper waste disposal	Documentation of formal engagement of refuse handlers	Monthly	Hospital administrator/ Superintend	Negligible	None
	Laboratory should have standard operation and decontamination procedure	Efficient containment of pathogens	Display at appropriate point(s)	Daily	Hospital administrator/ Superintend	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	manuals and clearly displayed at appropriate point(s) with the laboratory						
6.3.2.2	**Air pollution due to incineration of waste**						
	Ensure incinerator stacks designed according to GIIP or WBG guidelines	No offsite air pollution from incineration (such as due to plume downwash).	Visual observation reveal no plume downwash of stack emissions	From start of use of new incinerators	MOH; Hospital administrator	Negligible	None
	Ensure Training of Incinerator operators for efficient and proper incineration units operations.	Incineration does not generate dioxins	Incinerator operator complete training course	1 month before commissioning incinerator	MOH	**USD 1,000**	Operation of incineration unit/ facility
	The laboratory should provide bio-safety areas equipped with all necessary equipment and have ventilation system that fulfils standards of biosafety;	Pathogen containment	Presence of bio-safety areas	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Ensure that all exhaust air from the laboratory should pass through high efficiency particulate air filters;	Pathogen containment	Presence of air filters	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
6.3.2.3	**Occupational health and safety risks**						
	All workers to be Provided with appropriate PPE against exposure to infectious pathogens, hazardous chemicals and ionizing radiation in accordance with recognized international safety standards and guidelines.	Minimal work-related injuries or infections	All healthcare staff have necessary PPE.	Daily	Healthcare facility administrator/ Superintend	Negligible since all requisite PPE to be provided as part of by equipment supplier bid.	None
	Orient all staff on safe work practices and guidelines and ensure that they adhere to them.	Reduce staff OHS	Records of staff orientation on safety practices and guidelines	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	Safety practices and guidelines

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	Training should be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences	Reduce incidences in and around laboratory facility	Records of staff training on prevention of incidences	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	Prevention and manage incidences.
	Regular drills should constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences.	Staff preparedness to combat possible incidences	Records of incidence prevention drills	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places	Public and other staff safety	Presence of appropriate and clear signage in and around laboratory facility	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Develop evacuation procedures to handle emergency situations.	Public and other staff safety	Evacuation procedure document	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
6.3.2.4	**Risk of fire outbreak**						
	Ensure Provision of fire extinguishers at strategic locations within the laboratory and ensure that all fire-fighting equipment are regularly maintained and serviced.	Laboratory has basic capacity to fend off a small or average fire outbreak	Laboratory has a minimum of 2 medium-size fire extinguishers (one of which should be for electrical fires) .	During equipment installation upon completion of construction/ renovation works	MOH	**USD 1,000** (100 per extinguisher)	Basic firefighting skills

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	Ensure that Key laboratory staff have basic training in fire control.	Laboratory has basic capacity to fend off a small or average fire outbreak	At least 2 medical staff have certificate of basic firefighting.	During equipment installation upon completion of construction/ renovation works	MOH	To be provided as part of by equipment supplier bid.	Fire drills
	Fire emergency telephone numbers should be displaced in communal areas.	Laboratory has capacity to contact fire department in case of major fire outbreak	Fire emergency telephone numbers displaced in at least 2 communal areas	Throughout operation life of laboratory	MOH	Negligible	None
	Install an automatic fire alarm system for the entire laboratory and provide enough water hose reel around the property with a fire reserve water tank attached with an automatic booster pump for hose reel.	Laboratory has basic capacity to fend off a small or average fire outbreak	Presence of automatic fire alarm system, adequate water hose reel and reverse water tank equipped with automatic booster pump	Throughout operation life of laboratory	MOH	Negligible	None
	Laboratory facility should have a fire emergency management plan. And should undertake fire drills at a minimum once a year.	Laboratory has basic capacity to fend off a small or average fire outbreak	A documented fire emergency plan. A documented fire drill.	Throughout operation life of laboratory	MOH	Negligible	None
	Provide fire hazard signs such as 'No Smoking' signs. Directions to exit in case of any fire incidence and emergency contact numbers should be provided.	Laboratory has basic capacity to fend off a small or average fire outbreak	Presence of fire hazard signs and exit in appropriate points	Throughout operation life of laboratory	MOH	Negligible	None
TOTAL COST						**USD 21,000**	

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Government of the Republic of Uganda, with funding from the International Development Association (IDA), plans to construct a medical laboratory at Arua Regional Referral Hospital. The construction shall be undertaken through the East African Public Health Laboratory Networking Project (EAPHLNP) with support from the World Bank. The general objective of the project is to improve access to diagnostic services among vulnerable populations living in the cross-border areas of the Republic of Southern Sudan, Democratic Republic of Congo and Uganda. The laboratory networking project also aims to address the common challenges facing the East African countries, that is, dilapidated infrastructure that was built decades ago; inadequate supply and quality of human resources which are a backbone of quality diagnostics; and manual information systems which are not effective for decision making.

1.2 OVERVIEW OF UGANDA'S HEALTH SECTOR

The health services provision in the country has always been guided by a clear strategic framework to ensure all actions are aimed at improving the health of the people, in a manner that is responsive to their legitimate health needs, and ensure fairness in financing of services being accessed. The Health Services Support Project (HSSP) provides the medium-term strategic framework and focus that the Government intends to pursue in regard to attaining the health goals for the country and it is developed with the prevailing socio-economic and development context in mind. It is anchored on the National Health Policy II (NHP II) and the National Development Plan ensuring its goals and deliverables are aimed at achieving the overall goals and deliverables of the country.

The National Health System (NHS) is made up of the public and the private sectors. The public sector includes all Government of Uganda (GOU) health facilities under the Ministry of Health (MOH), health services of the Ministries of Defence (Army), Education, Internal Affairs (Police and Prisons) and Ministry of Local Government (MOLG). The private health delivery system consists of Private Not-for-Profit (PNFPs) providers, Private Health Practitioners (PHPs) and the Traditional and Complementary Medicine Practitioners (TCMPs).

The provision of health services in Uganda is decentralised with districts and health sub-districts (HSDs) playing a key role in the delivery and management of health services at those levels. The health services are structured into National Referral Hospitals (NRHs), Regional Referral Hospitals (RRHs), General Hospitals, Health Centre (HC) IVs, HC IIIs, HC IIs and Village Health Teams (HC Is).

The National Hospital Policy (2005), operationalized during HSSP II, spells out the role and functions of hospitals at different levels in the NHS. Hospitals provide technical back up for referral and support functions to district health services. Hospital services are provided by the public, private health providers (PHPs) and private not for profit (PNFPs). The public hospitals are divided into three groups:

i) **General Hospitals** provide preventive, promotive, curative, maternity, in-patient health services, surgery, blood transfusion, laboratory and medical imaging services. They also provide in-service

training, consultation and operational research in support of the community-based health care programmes.

ii) **Regional Referral Hospitals (RRHs)** offer specialist clinical services such as psychiatry, Ear, Nose and Throat (ENT), ophthalmology, higher level surgical and medical services, and clinical support services (laboratory, medical imaging and pathology). They are also involved in teaching and research. This is in addition to services provided by general hospitals.

iii) **National Referral Hospitals (NRHs)** provide comprehensive specialist services and are involved in health research and teaching in addition to providing services offered by general hospitals and RRHs.

All hospitals are supposed to provide support supervision to lower levels and to maintain linkages with communities through Community Health Departments (CHDs). Currently, there are 65 public hospitals: 2NRHs, 11 RRHs and 52 general hospitals. There are 56 PNFP and 9 PHP hospitals. With decentralisation, the public general hospitals are managed by the local governments. The RRHs have been granted self-accounting status and remain under MOH oversight. The NRHs, namely Mulago and Butabika, are semi-autonomous. All PNFP hospitals are autonomous as granted by their respective legal proprietors.

a) District health systems

The Constitution (1995) and the Local Government Act (1997) mandate the Local Governments (LGs) to plan, budget and implement health policies and health sector plans. The LGs have the responsibility recruitment, deployment, development and management of human resource (HR) for district health services, development and passing of health related by-laws and monitoring of overall health sector performance. LGs manage public general hospitals and HCs and also supervise and monitor all health activities (including those in the private sector) in their respective areas of responsibility. The public private partnership at district level is however still weak.

b) Health Sub-District (HSD) system

The HSDs are mandated with planning, organization, budgeting and management of the health services at this and lower health centre levels. HSDs carries an oversight function of overseeing all curative, preventive, promotive and rehabilitative health activities including those carried out by the PNFPs and PFP service providers in the health sub district. The headquarters of an HSD will remain a HC IV or a selected general hospital.

Health Centres III, II and Village Health Teams (HC I)

HC IIIs provide basic preventive, promotive and curative care. They also provide support supervision of the community and HC IIs under their jurisdiction. There are provisions for laboratory services for diagnosis, maternity care and first referral cover for the sub-county. The HC IIs provide the first level of interaction between the formal health sector and the communities. HC IIs only provide out patient care, community outreach services and linkages with the Village Health Teams (VHTs). A network of VHTs has been established in Uganda which is facilitating health promotion, service delivery, community

participation and empowerment in access to and utilization of health services. The VHTs are responsible for:

- Identifying the community's health needs and taking appropriate measures;
- Mobilizing community resources and monitoring utilization of all resources for their health;
- Mobilizing communities for health interventions such as immunization, malaria control, sanitation and promoting health seeking behaviour;
- Maintaining a register of members of households and their health status;
- Maintaining birth and death registration; and
- Serving as the first link between the community and formal health providers.
- Community based management of common childhood illnesses including malaria, diarrhoea and pneumonia; and management and distribution of any health commodities availed from time to time.

c) Laboratory services provision

With regard to laboratory services, the Central Public Health Laboratories has the responsibility of coordinating health laboratory services in Uganda, developing policies and guidelines and training and implementing quality assurance schemes for laboratories. A comprehensive national health laboratory services policy was developed and this provides a framework for the future development of laboratory services in the country. The provision of good laboratory services laboratory support for disease surveillance is affected by low levels of funding for laboratory services, a weak regulatory framework and the limited number of laboratory professionals in the country.

2 PROJECT DESCRIPTION

2.1 PROPONENT CONTACT

Name and address: MINISTRY OF HEALTH
Ministry of Health Headquarters
Plot 6/7 Lourdel Road,
P.O. Box 7272, Kampala, Uganda
T: +256-414-340872, Fax: 256-41-4231584.

2.2 LOCATION OF PROJECT SITE

The project site is located within Arua Regional Referral Hospital (Arua RRH). Arua RRH is located in the Arua Municipality, Arua District approximately 439 km by road, northwest of Kampala. It is the referral hospital for the districts of Adjumani, Arua, Koboko, Maracha-Terego, Moyo, Nebbi and Yumbe. The hospital also receives referrals from neighbouring parts of Southern Sudan and the Democratic Republic of the Congo.

Box 1.1: Site location according to administrative jurisdiction

Coordinates: 03°1'13.03"N, 30°54'45.89"E
Location according to areas of administrative jurisdiction:
- Arua Municipality
- Arua District

Figure 2.1 Location of the proposed project site

Photo 2.1: Location of the proposed project site

2.3 PROJECT OBJECTIVES

The general objective of the project is to improve access to diagnostic services among vulnerable populations living in the cross-border areas of the Republic of Southern Sudan, Democratic Republic of Congo and Uganda. The laboratory networking project also aims to address the common challenges facing the East African countries, that is, dilapidated infrastructure that was built decades ago; inadequate supply and quality of human resources which are a backbone of quality diagnostics; and manual information systems which are not effective for decision making.

2.4 PROJECT COMPONENTS

The laboratory which shall conform to level 2 safety designs and practices, shall handle clinical specimens mainly from the wards and clinics in the hospital, but also some specimens referred from other health facilities. In addition, a limited number of specimens shall be collected within the laboratories. A broad range of testing including clinical chemistry, haematology, immunology and microbiology shall be offered. The laboratory shall also act as a site for internship for students from various institutions in the country. The requirements and specifications for space and safety for the laboratories are outlined in Table 2.1 while the general considerations or standards for the proposed laboratory are presented in Table 2.2.

Table 2.1: Requirements and specifications for space and safety for the proposed laboratory

Room	Description	Space (m^2)
Haematology/ Chemistry	Laboratory space for blood analysis: Automated blood counts, coagulation, automated chemistry as well as staining and microscopy. Allows about 6 people working at a time	50
Blood bank	Laboratory space for processing and storage of blood for transfusion. Requires a bench to allow work for 1 personnel at a time and should hold 2 blood bank refrigerators and a water bath	12
Microbiology/Parasitological	Laboratory space for managing a broad range of specimens. Procedures include microscopy, serology and isolation of pathogens from the specimens. Key equipment in the laboratory shall include a biosafety cabinet, bench top centrifuge, blood culture system. A microscopy station (bench with 2 microscopes) shall be needed. Requires a fume hood for preparation of volatile/irritant reagents. Laboratory should allow for up to 4 people working at a time	40
Mycology laboratory	Laboratory space for microscopy and isolation of fungi. Should be adjacent to but separate from the microbiology laboratory to protect the microbiology lab from fungal contamination. Should house a biosafety cabinet, microscope and incubator and allow one person to work at a time	9
Media Preparation Room	Laboratory space adjacent to the microbiology laboratory and wash-up. Should have a clean room protected from air currents (about $6M^2$) to enable aseptic pouring of culture media. The additional space shall have 2 water baths for holding media before it is poured and a refrigerator for storage of the media	9
Wash-up room	Extension of laboratory space for cleaning of re-useable laboratory items (mostly from the microbiology laboratory) and autoclaving of laboratory supplies like media. It is also the site for autoclaving of laboratory waste for decontamination as well as temporary holding of decontaminated waste prior to its transportation to its site of destruction. Shall hold 2 autoclaves of about 200L capacity as well as 2 large sinks and a flash sluice sink	16
Phlebotomy room	Space with desk, 2 seats and cabinets for supplies for phlebotomy. Linked to the reception by a window for transfer of specimens.	9
Specimen reception	Laboratory space for receiving specimens, entering them into the data system and performing some initial processing before their distribution to their laboratories. It shall be equipped with a biosafety cabinet, centrifuge and computer.	9
Staff Lounge	Time out room for staff for reading, meals and refreshments. Shall have some computers and books. Should be able to sit about 6 personnel at a time	16
Conference room	Room to hold meetings/workshops for up to 15 persons	30
Laboratory Director (Pathologist's office)	Administrative space: Table, computer, book shelf, storage of some critical documents and supplies.	12
Laboratory Manager's Officer	Administrative space: Table, computer, book shelf, storage of some critical documents and supplies. Allows for some limited lab work e.g. microscopy	12
Quality Assurance preparation room	Laboratory space dedicated to packaging and dispatching proficiency panels to peripheral laboratories	12

Room	Description	Space (m^2)
Waiting area	Shaded area outside laboratory with sitting benches for clients to wait. Should be well aerated and have adequate sunlight	20
Data room	Room for management of laboratory documents and records	12
Staff changing rooms	Space with separate male and female toilets, showers and lockers to allow staff change into laboratory/domestic attire	12
Patient ablutions	Separate male/ female toilets for patients	15
Janitor's room	Space for storage of janitor's utilities	3
Laboratory Store	Space for storage of laboratory supplies and equipment. It shall be supplementary to the central store.	20
Total utilizable space (M^2)		**268**
Circulation space (30% of utilizable spaces) (M^2)	**For corridors, staircase etc.**	**80.4**
Gross total space (M^2)		**348.4**

Table 2.2: General considerations for the proposed laboratory features

Item	Description
Fire safety	Most of the clinical laboratories are classified as **class C** (Low fire Hazard) laboratories. They should have the following fire safety features: • Wall with a fire rating of one hour • Walls extending to the underside of ceiling/floor slab above to maintain smoke and fire separation between rooms • A fire alarm system in the laboratory area • An easy and unobstructed fire egress should be provided • Corridor for egress should not have items that feed fire (e.g. paper storage, waste items, electrical equipment, lockers) • Egress corridors should be a minimum of 183 cm wide • Two or more exits, with the furthest point in the lab being no more than 23 m from an exit • Egress should be away from areas of high fire hazard e.g. fume hoods, gas cylinders, flammable storage cabinets • Smoke detectors on the ceiling in the testing area • A class 'B' extinguisher within the vicinity of the exit doors • Paint for finishing should not be of flammable types like oil paint
Walls	• Should be made of Brick and Concrete • Should have a fire rating of one hour • All walls should extend to the underside of the ceiling/floor slab above to maintain smoke and fire separation • Finishing should be waterproof and smooth for easy cleaning • Beige or cream silk vinyl paint should be used for finishing • All penetration from pipes, ductwork, or wires should be sealed. • Ceiling –wall – floor joints should be curved for easy cleaning
Floor	• Should be smooth to ease cleaning • Finishing should be soft white epoxy or Terrazzo • Seams should be minimized to ease cleaning and minimize seepage of fluids • Should be Slip resistant • Should be impervious to liquids • Should be resistant to chemicals and disinfectants. • Any joints should be sealed with water and chemical resistant material
Floor Plan	• Should ease workflow, allowing for logical movement during specimen processing e.g. reception-specimen preparation-staining-microscopy-printing and dispatch of

Item	Description
	results
Ceiling	• The ceiling should exhibit high sound absorbance rating to minimize noise in the laboratory. • Joints between Ceiling –wall – floor should be curved joints for ease of cleaning
Work tops and furniture	• Work tops should: - Be at least 76 cm deep (from front to wall) - Be at least 91 cm above finished floor - Be smooth and easy to clean, water resistant, and resistant to acids, alkalis, disinfectants organic solvents and moderate heat. Epoxy resin is the preferred material - Edges of worktops should be rounded to ease cleaning. - Provide sufficient knee room for sitting tasks (At least 91 cm clear width) - Provide for lockable cupboards beneath the work tops. • Spaces between/beneath furniture should be easy to clean and decontaminate • Space between equipment should be 1 – 1.5 m • Joints between fixed caseworks and countertops should be sealed to minimize harbourage of pests • Should be flexible enough to enable future modifications of the space • Shelves should be provided in the main working area. They should: - Start at 0.6M above the work top - Be 0.45M apart
Power	• There should be a primary source of power for all electrical equipment and lighting • Adequate number of sockets in vicinity of areas for equipment placement to avoid unfixed extension cables • Sockets should be located above the worktop and away from sinks and other wet places • Design should take into consideration specific power ratings of equipment recommended at the facility • Cabling should not interfere with movement • Provisions for additional sockets to allow flexibility in case of additional equipment/reorganization of floor plan • Provision of 24 hour stand-by power backup source (preferably inverters & accumulators) to supply refrigerators, freezers and incubators
Water and Plumbing	• Tank should be installed to ensure uninterrupted flow of water • There should be no cross-connection between the laboratory water and the public water systems. An anti-backflow valve should be installed to protect the public water system • Each lab room should have a clean sink for hand washing preferably near the exit door • Staining sinks should be resistant to corrosives like acids and stains • Laboratory sinks should be at least 41 cm wide x 41 cm long x 15 cm deep • Eyewash stations should be provided in each laboratory preferably near the hand wash basin. They should be 84 -114 cm above the floor and at least 15cm from the wall or obstruction on either side • Emergency showers must be provided. They should be 208 – 244 cm above the floor and no more than 30.5m from hazardous area. • Laboratory drainage should not be continuous with non-laboratory drainage • Flash sluice sink should be provided in the wash up • Taps should be elbow operated (Hands free) • Drainages from laboratory sinks and basins should be closed and connected to a septic tank or closed deep pit as it may contain body fluids/bio-hazardous materials • Water source and drainage system for water distiller should be provided

Item	Description
Ventilation	• Windows should: - Enable adequate lighting - Allow cross-ventilation with 6 – 10 air changes per hour - Ventilation on external doors and window tops in the glass glazing and not steel plates. - Not be in direction of prevailing winds to avoid disturbance of equipment like scales and generation of aerosols - Should have mesh screens to keep insects out - Should cover an area 15 – 20 percent of the floor area.
Data cabling	• Should not be embedded, instead should be on the surface (ducted / trunked). • Should be wide enough to enable additional expansion • Should be located above the bench
Lighting	• Laboratory should be adequately lit (500 Lux of light are required) • Ceiling lights should be mounted parallel to the work surface to provide uniform, shadow-free and glare-free illumination of the laboratory work top. • Typical ceiling mounted lights should be 61 x 122 cm or 61 x 61 cm fixtures with a parabolic lens placed in the ceiling grid • Dimmers that allow users to adjust light intensity should be considered for microscopy areas
Wall brackets and lockers	• There should be a provision for hanging coats in each laboratory close to the exit • There should be provisions for a clean area outside the laboratory for personnel to keep their bags/domestic issues
Time out room	• There should be a time out room adjacent to the laboratory to work as office and staff room
Waste management	• Space for temporary waste storage should be provided (within/close to the wash-up)
Doors	• Two exits should be provided. One for routine use and one as an emergency exit. • Doors should be within 23 m of furthest point of the laboratory for big laboratories • Laboratory exit doors should be self-closing to contain the laboratory area from surrounding area • Should have a vision panel • Main laboratory doors should swing in the direction of travel when escaping a fire in the laboratory • Doors should NOT be sliding type • Utility door (at least one of the lab doors) should be at least 122 cm wide to enable movement of large equipment • Material used should have a fire rating of 1 hour
Security	• Adequate lockable cupboards, lockable store room, for storage of major equipment poisons and chemicals. • All windows and vents must be protected with strong burglar proofing. • All doors must be provided with secure locks.

2.5 PROJECT ALTERNATIVES

2.5.1 'No Project' Scenario

The "*No project scenario*" means that the proposed project would not be implemented. This would be based on the assumption that existing facilities would still effectively deliver required services without any improvements. With this alternative, the financial costs and environmental and social impacts associated with implementation of this proposed project would not manifest. However, this was not found to be a sustainable option. Without the proposed development, Uganda Government would not

be able to improve access to diagnostic services, potential jobs creation and secondary socio-economic benefits which the proposed development would have created to the vulnerable populations living in West Nile sub-region, or other patients from cross-border areas in the Democratic Republic of Congo and Republic of Southern Sudan. More importantly, if this project is not implemented, existing facilities cannot deliver desired services in their current dilapidated state.

2.5.2 "Action" Scenario Alternatives Considered

The "*Action Scenario*" means that the proposed project will be implemented as planned. The major benefits of the proposed project are improving availability and access to modern medical services currently not available due to dilapidated infrastructure and lack of equipment and facilities at Arua Regional Referral Hospital. This option considered two alternatives discussed in sections below:

2.5.2.1 Renovation of existing facility

The option of renovating existing laboratory facilities would involve limited internal modification of the built environment hence entailing demolition, remodelling and reconstruction of walls. This option requires less resources (funds, workforces and material) and time, in addition to minimising construction impacts such as:

- Indoor dust
- Exhaust emissions since construction traffic volume will be smaller on roads;
- Construction waste and rubble since only some walls would be demolished;

Besides denying the public laboratory services for some part of renovation period, the existing laboratory facility after remodelling and reconstruction would not provide necessary adequate space to accommodate laboratory staff, equipment, patients, samples and materials, and maintenance as proposed by WB guidelines (Section 5.5.2) and WHO guidelines (section 0) in order to provide the desired diagnostic services.

2.5.2.2 Construction of new facility

Besides allowing public to continue accessing existing laboratory services, the option of constructing new laboratory facilities, would maximise desired development benefits of this project since it is designed to accommodate laboratory staff, equipment, samples and materials, maintenance, and waste management as required by national and international standards.

Implementation of this option would require a longer period of time to accomplish and use of more resources (funds, workforces and material). Consequently, this is likely to cause and accelerate construction and operational socio-environmental impacts. However, this ESIA study has assessed these impacts and proposed measures to enhance beneficial impacts and mitigate adverse impacts (section 0), thus making this option cost effective and more sustainable.

2.6 PROJECT CLASSIFICATION FOR ESIA PURPOSES

2.6.1 Classification according to Uganda's National Environment Act, Cap 153

The *Third Schedule* of the National Environment Act Cap 153 prescribes projects for which EIA is mandatory and according to Section 1 and Section 12 (b & d) in this Schedule, the project should undertake detailed EIA.

2.6.2 Project Classification according to World Bank

The Bank classifies a proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

a) Category A

A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. The project impacts may affect an area broader than the sites or facilities subject to physical works. Environmental assessment for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives including the "without project" situation, and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

b) Category B

A proposed project is classified as Category B if it's potential adverse environmental impacts on human populations or environmentally important areas, including wetlands, forests, grasslands, and other natural habitats, are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects. Here the assessment also involves examination of the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

The proposed project is classified as EA Category B. The proposed construction, equipping and operation of the proposed laboratory will be restricted within the hospital premises with the exception of waste management/ pollutants generated that may go beyond the boundaries of the hospital. The project will not directly affect ecosystems such wetlands, forests, grasslands, etc.

c) Category C

A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment is required for a Category C project.

d) Category FI

A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

3 ESIA METHODOLOGY

3.1 INTRODUCTION

This section describes the broad principles of methodology of the ESIA indicating approaches, practices and techniques used for impact identification, quantification, analysis and abatement. Impacts of the project were predicted in relation to environmental and social receptors and natural resources. This was accomplished by comparing prevailing conditions ("pre-project") and "post-project" situations.

The requirement for environmental assessment in Uganda is set out by the National Environment Act (1995) and the Environmental Impact Assessment Regulations (1998). The process was guided by the EIA Guidelines (NEMA, 1997).

The methodology used consisted of a review of Uganda's institutional arrangements, regulations and policies and those of the World Bank and World Health Organisation. Also done were baseline measurements, identification of impact receptors and their relation to project's site. Consultation with NEMA, Ministry of Health officials, Arua district and municipality officials, and stakeholders at all levels. Other activities included data collection & analysis, review of engineering designs of the laboratory, utilizing national, WHO guidelines and relevant healthcare waste management literature

Impacts of the project were predicted in relation to environmental and social receptors and natural resources. This was accomplished by comparing prevailing conditions ("pre-project") and "post-project" situations.

3.2 ESTABLISHMENT OF ENVIRONMENTAL & SOCIO-ECONOMIC BASELINE CONDITIONS

Baseline air quality and noise levels were measured, not only to inform construction contractors about pre-construction conditions existing at proposed sites, but also the first annual environmental audit: subsequent baseline conditions would be those values measured in the first annual full environmental audit. These were determined through the following actions:

Air quality: Baseline air quality was measured using a pair of digital MX6 iBrid™ portable gas meters (Industrial Scientific-Oldham) and a Microdust 880nm digital aerosol monitor (Casella®) (Photo 3.1). Measurement points or locations (Figure 3.1) were selected basing on presence of potential receptors.

Ambient noise: Measurement of ambient noise levels was carried out using a precision integrating sound level meter (Photo 3.2), with an active range of 0-140 decibels (dB) and complying with IEC 651 and ANSI S4 standards. Baseline noise measurements were undertaken at locations (Figure 3.2) around the proposed storage facility site with potential receptors. A Casella CEL-621C digital noise logger was set to record for a sample period of ten minutes at each of the selected locations. The assessment procedure involved recording the LA_{MAX} and LA_{MIN} decibel levels. Measurement points were recorded using a GPS receiver and the noise sources together with the ambient environment at each location noted.

CASELLA Microdust meter

Digital 6-gas MX6 Ibrid meter

Photo 3.1: Digital CASELLA microdust and 6-gas MX6 iBrid™ meters to be used measure air quality

Noise measurement will be done with a CASELLA CEL-621C2/K1 Integrating 1/3 Octave Band Sound Level Meter (Class2)

Photo 3.2: Noise measurement meter

3.3 CONSULTATION AND PROJECT DISCLOSURE

Relevant and adequate project information was provided to stakeholders to enable them to understand project risks, impacts and opportunities. Stakeholder consultation aimed at:

- Generating understanding of the project
- Understanding local expectations of the project
- Characterising potential environmental, socio-economic impacts
- Garnering consensus on mitigation options

The following techniques were used:

- Face-to-face or telephone interviews
- Data and literature review
- Email consultation correspondences

Figure 3.1 Location of air quality measurement points

Figure 3.2 Location of noise measurement points

3.4 REVIEW OF POLICY, REGULATIONS, INSTITUTIONAL FRAMEWORK & INTERNATIONAL GUIDELINES

This was done to determine if the proposed project was in line with national policies and met environmental laws and regulations, to achieve this, the following actions were undertaken:

i) Review of national environmental laws, policies and institutional framework.
ii) Review of World Bank Group (IDA is one of the 5 World Bank Group member organizations) guidelines on environment.
iii) Review of World Health Organisation (WHO) guidelines on biosafety

3.5 IMPACT IDENTIFICATION AND ANALYSIS

3.5.1 Impact Description

Describing a potential impact involved an appraisal of its characteristics, together with the attributes of the receiving environment. Relevant impact characteristics included whether the impact is:

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional or global scale; including trans-boundary; and
- Cumulative (such an impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. A cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions").

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative **intensity** of the impact. The **sensitivity** of the receiving environment was determined by specialists based on the baseline data collected during the study.

3.5.2 Impact Evaluation

Each impact is evaluated using the criteria listed in Table 3.1. To provide a relative illustration of impact severity, it is useful to assign numerical or relative descriptors to the impact intensity and receptor sensitivity for each potential impact. Each is assigned a numerical descriptor of 1, 2, 3, or 4, equivalent to very low, low, medium or high. The severity of impact was then indicated by the product of the two numerical descriptors, with severity being described as negligible, minor, moderate or major, as illustrated in Table 3.1. This is a qualitative method designed to provide a broad ranking of the different impacts of a project. Illustrations of the types of impact that were assigned the different grades of severity are given in Table 3.2.

Table 3.1: Classification of impact evaluation

	Classification	Description
1	Extent:	Evaluation of the area of occurrence/influence by the impact on the subject environment; whether the impact will occur on site, in a limited area (within 2 km radius of the site); locally (within 5 km radius of the site); regionally (district wide, nationally or internationally).
2	Persistence/Duration:	Evaluation of the duration of impact on the subject environment, whether the impact was temporary (<1 year); short term (1 – 5 years); medium term (5 – 10 years); long term (>10); or permanent.
3	Social Context / Sensitivity or Potential for Stakeholder Conflict:	Assessment of the impacts for sensitive receptors in terms of ecological, social sensitivity and such things as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts. The sensitivity classification is shown below: ***High sensitivity:*** Entire community displacement, destruction of world heritage and important cultural sites, large scale stakeholder conflict, etc. ***Medium sensitivity:*** Displacement of some households, moderate level of stakeholder concern ***Low sensitivity:*** No displacements, no potential for stakeholder conflict.
4	Regulatory and Legal Compliance:	Evaluation of the impact against Local and International legislative requirements. ***High:*** Prohibition terms for specific activities/emissions. Major breach of regulatory requirements resulting in potential prosecution or significant project approval delays. ***Medium:*** Potential breach of specific regulatory consent limits resulting in non-compliance. ***Low:*** No breach of specific regulatory consent limits anticipated.
5	Overall Impact rating (Severity):	Using a combination of the above criteria, the overall severity of the impact was assigned a rating Severe, Substantial, Moderate, Minor and negligible. Refer to Table 5.2 for broad categories of impact for each rating. **Note:** These are just guidelines that will constitute professional judgement required in each individual case.

3.5.3 Impact Significance

Impact significance is determined from an impact significance matrix (Table 3.2) which compares severity of the impact with probability of its occurrence. Impact significance criteria are as follows:

- ***Very High (VH) and High (H):*** These denote that the impact is unacceptable and further mitigation measures must be implemented to reduce the significance. Shaded red in the Table 3.2.
- ***Medium (M):*** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical. Shaded yellow in the impact significance matrix.
- ***Low (L):*** Impacts in this region are considered acceptable. Shaded green.

Table 3.2: Determination of impact severity

			Sensitivity of receptor			
			Very low	Low	Medium	High
			1	2	3	4
Intensity of impact	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 Major
	High	4	4 Minor	8 Moderate	12 Major	16 Major

3.6 CUMULATIVE IMPACTS

Cumulative effects manifest when socio-environmental conditions are already or will be affected by past or reasonably probable future development or activities. The ESIA identified current, past and probable future similar activities that may compound socio-environmental conditions in the project area.

3.7 MITIGATION OF ENVIRONMENTAL IMPACTS

Mitigation measures are designed in order to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts and inform the Environmental and Social Management Plan (ESMP).

4 ENVIRONMENT AND SOCIO-ECONOMIC BASELINE

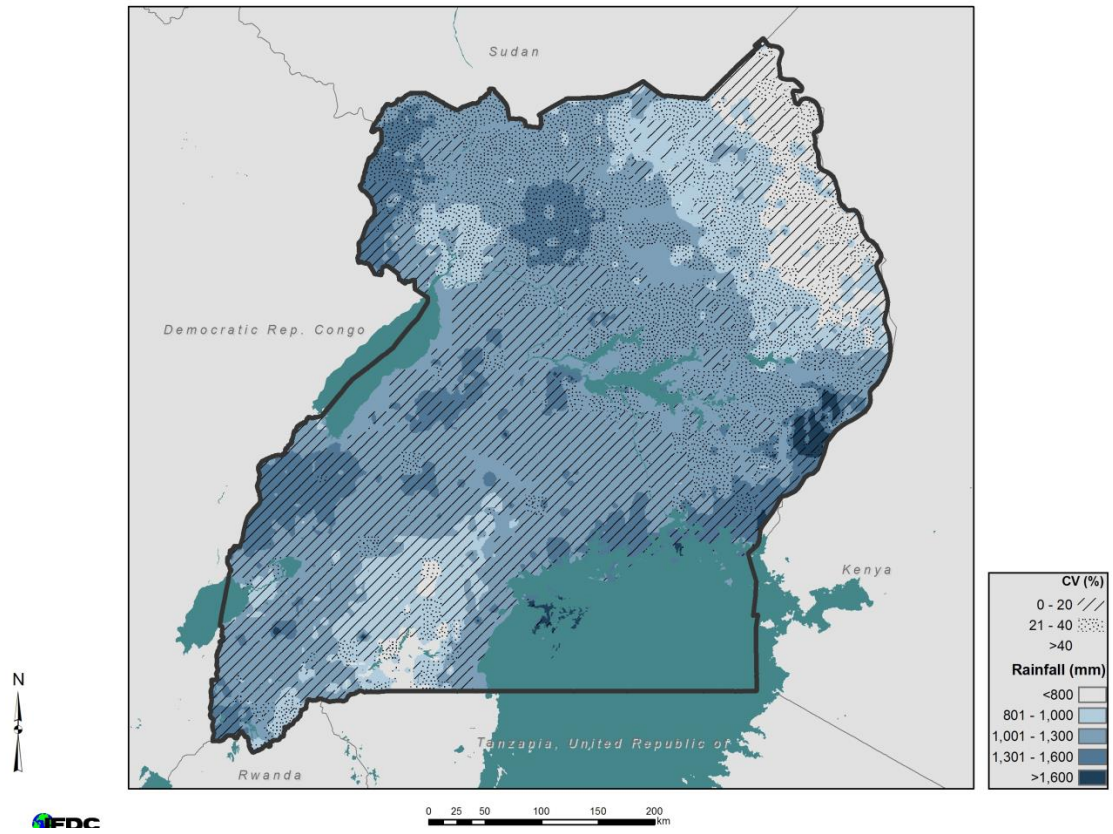
4.1 INTRODUCTION

This section describes environmental and social baseline conditions of the area in which the proposed laboratory is to be located and in which impacts may be experienced. Proposed site is located in Arua Regional Referral Hospital in Arua Municipality (See Section 2.2). The description is designed to enable identification of particularly sensitive receptors and resources around the proposed site that may be vulnerable to impacts arising from the project.

4.2 ENVIRONMENT PROFILE

4.2.1 Climate

Arua district has a bi-modal rainfall pattern with light rains between April and October. The wettest months are normally August and September which receive 120 mm/month. The average total rainfall is 1250 mm (Figure 4.1). The mean monthly evaporation ranges from 130 mm – 180 mm. In the dry season (December -March) temperatures remain high throughout.



Source: IFDC (www.amitsa.org)

Figure 4.1 Distribution of annual rainfall in Uganda

4.2.2 Air

Uganda's currently has no comprehensive database about national air quality. However, motor vehicles are major emission sources for several air pollutants, including nitrogen oxides (NO_X), carbon monoxide

(CO), particulate matter (PM), and hydrocarbons (HCs) (WHO, 2005). Measurements carried out at selected locations at the proposed project site indicated an environment free from key air pollutants such as carbon monoxide, ammonia, nitrogen and nitrogen oxide emissions as indicated in Table 4.1 .

Table 4.1: Air quality at the proposed project site

Easting	Northing	Particulates ($\mu g/m^3$)	CO_2 (%)	LEL (%)	H_2 (ppm)	PID (ppm)	O_2 (%)	Remark/ Location
268013	333908	36	0.03	0	0	4.2	20.9	UNICEF donated water tank
268112	333967	39	0.03	2	2	2.4	20.9	Alternative site proposed for the laboratory
268056	334122	38	0.03	3	0	0.0	20.9	Generator rooms/mortuary
268010	334056	35	0.03	3	0	1.1	20.9	Existing laboratory
267293	333993	27	0.03	3	0	0.0	20.9	Administration office block/hospital fence line.

4.2.3 Noise

The major sources of noise in urban centres of Uganda include humans and transportation activities. The most common form of noise pollution at the project site is from transportation activities, principally motor vehicles and motor cycles (commonly known as boda boda). Noise levels recorded at the proposed project are presented in Table 4.2.

Table 4.2: Levels of noise at the proposed project site

Easting	Northing	LAF_{Max}	LA_{eq}	LA_{90}	LA_{50}	Remark
268013	333908	66.4	52.4	47.5	51.5	Human conversation. Chirping birds. Road traffic.
268112	333967	54.3	45	42.5	44.0	Chirping birds. Human conversation. Crowing cockerel.
268056	334122	56.2	44.5	41.5	43.5	Human conversation. Aircraft overhead. Chirping birds.
268010	334056	68.1	48.7	44.5	47.5	Human conversation. Chirping birds
267293	333993	76.1	62.4	55.5	60.5	Vehicular traffic. Human conversation.

4.2.4 Water Resources and Drainage

In Arua district, the major sources of water supply include groundwater, rivers, springs and gravity flow scheme. The coverage of water resources over various counties is fairly equal. Although the Nile is a very reliable water source and has attracted significant settlement pattern along it, it is not strategically located and covers less than 0.2 percent of the total area of the district. Part of the Albert Nile is found in the east of the district and benefits only Madi-Okollo County. The Albert Nile is fed by numerous streams in the district and groundwater during the heavy rains. However, some of the rivers and streams lose their water during the dry season through evaporation and also to the surrounding unconsolidated sands, silt and gravel which recharge the water content of the surrounding countryside through natural means. Important rivers include Enyau, Jurei, Ala, Ora, and Kochi which all drain into the Nile in the east.

4.2.5 Geology, Geomorphology and Soils

Arua district is underlain by Pre-Cambrian rocks of basement complex, which include granitic and metamorphic rocks. The rocks are composed largely of aplitic granulites, which generally form enclaves in the gneiss complex. These cover parts of Vurra and Ayivu counties. They are part of the tectonic groups.

The District comprises mainly of rolling plains rising from the Nile floor in the rift valley (600m above sea level) to the Zaire - Nile water divide (1200 to 1400 m above sea level). Arua's landscape can generally be grouped into three topographical zones:

Madi Plateau - Occurs at an altitude of about 900 m above sea level. It occupies the eastern parts of the district in Terego and Madi - Okollo counties. Several broad valleys that cut across to enter River Nile dissect this plateau.

Western highland - this upper plateau occurs at an altitudinal range of 1200 to 1800 m above sea level. The parent rocks include basement complex metamorphose which is responsible for the formation of the hilly terrain. The zone generally covers the central western parts of Arua district especially in Ayivu and Vurra Counties. The slopes in Vurra consist of many facets.

Rift valley - The rift valley escarpments are highest in the South and fade off to the North. They consist of several faults carps arranged, roughly parallel with the Albert Nile. These scarps separate the Rift valley plains from the Madi plateau. The rift valley low lands consist of wide seasonal swamps. All major valleys are aggraded and consist of alluvial and swamp deposits.

The district covers a total area of 4274.13 sq.km of which 87 percent of the land is arable. The predominant soils are ferralitic and sand loams covering large areas in Arua district. These soils are fine textured with loose structure erodible and easily erodible and easily leached. Most soils are acidic. Vertisols are found in the north-western parts of the district. These soils have poor drainage and thus easily become water logged. There is a lateritic layer in most soils. This reduces the rooting depth and moisture conditions, where it is close to the surface, making the land difficult to cultivate. Sub-soils lack minerals for plants. They are good for building/construction purposes. Soil types in Arua include:

- Yellow-red sandy, clay loam latosols varying from dark grey to dark brown which are slightly acidic and mainly derived from granite, gneissic and sedimentary rocks. They occur on gently undulating-hilly topography.
- Brown-yellow clay loams with laterite horizon with a variation of dark brown to dark greyish brown, which are slightly acidic. These occur on flat ridge tops or on top of undulating topography.
- Light-grey white mottled loamy soils with laterite horizon ground (water laterite), structure less loamy sands. They are acidic-alkaline and are mainly found on the lower and bottom slopes.

In Arua Municipality, the dominant soils are of Arenosols type (Figure 4.2). These are sandy-textured soils that lack any significant soil profile development. They exhibit only a partially formed surface horizon (uppermost layer) that is low in humus, and they are bereft of subsurface clay accumulation.

Given their excessive permeability and low nutrient content, agricultural use of these soils requires careful management.

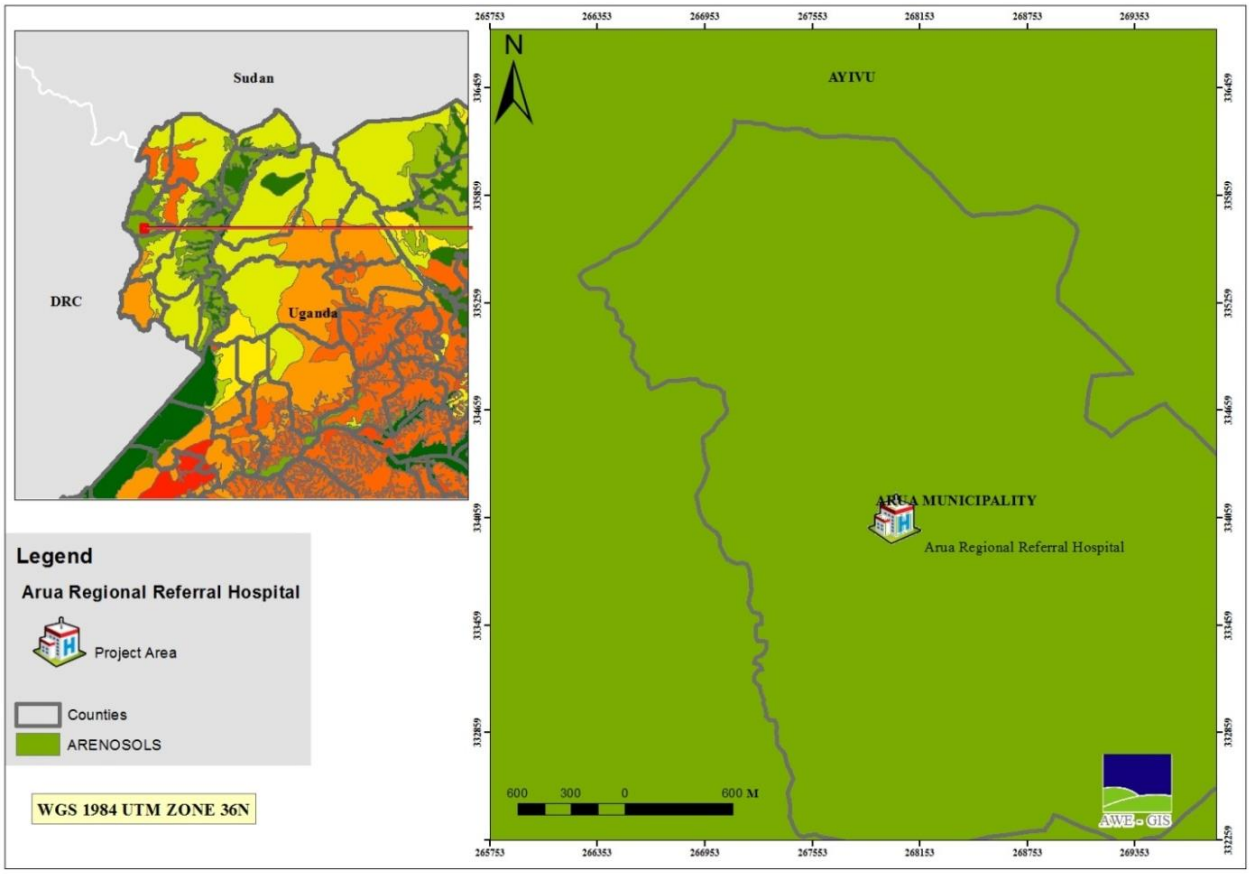


Figure 4.2 Types of soils in Arua District and Municipality

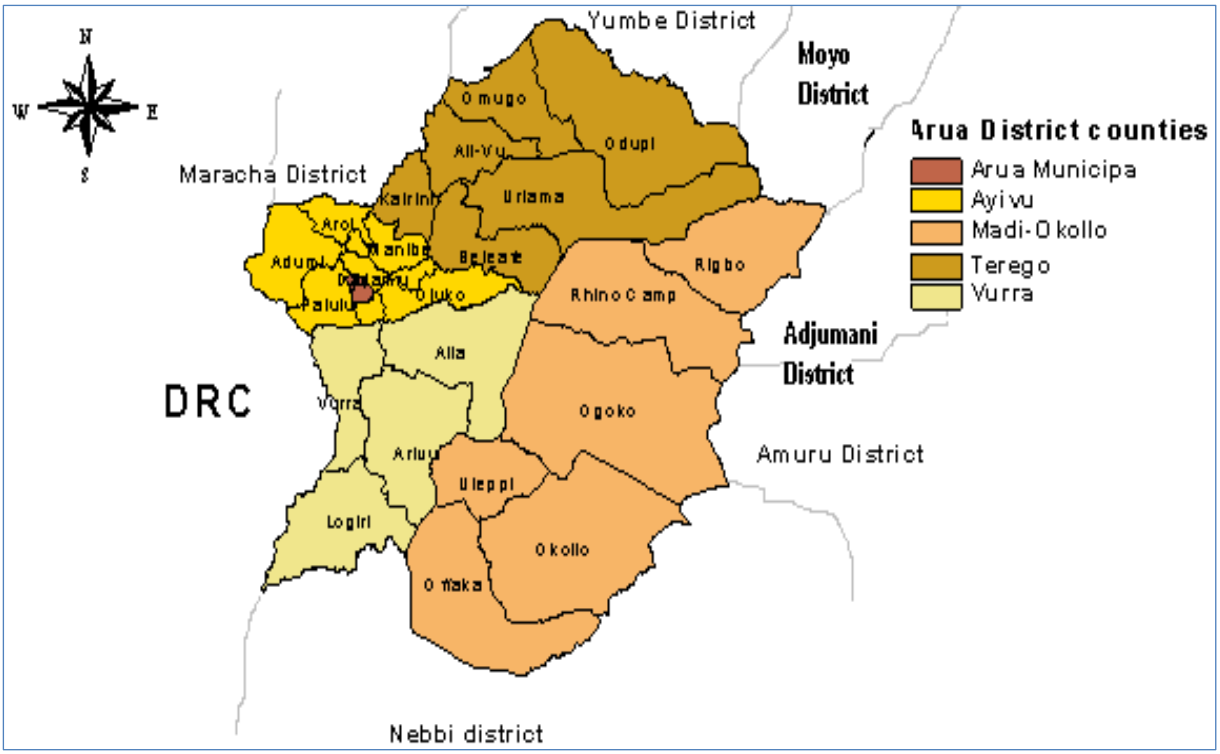
4.3 SOCIO-ECONOMIC AND LAND USE ACTIVITIES

4.3.1 Administrative Structure

Arua district lies in the north western part of Uganda bordered by Yumbe in the North West, Moyo district in the north east, Maracha district in the North West, Democratic Republic of Congo in the west, Nebbi district in the south, and Amuru district in the east (Figure 4.3). Arua Municipality, the administrative and commercial headquarters is 520 km away from Kampala, Uganda's capital city.

The administrative set up of Arua District is based on a five-tier Local Council (LC) ranging from LC I at village level to LC V at district level. The LC I executive is headed by a Chairperson who has the authority to facilitate implementation of programmes and projects within his/ her area of jurisdiction. The municipality is headed by the mayor and the supreme policy-making organ is the Town Council, composed of elected councillors. The technical staff of the municipality are headed by the town clerk, under whom there are several municipal departments.

The municipality has two divisions/sub counties, Arua Hill and River Oli, each with three parishes. Arua Hill is composed of 22 villages while River Oli has 26 villages.



Source: UBOS, 2012

Figure 4.3 Administrative boundaries of Arua district and the location of the Municipality

4.3.2 Employment

The economy of Arua is dependent on agriculture and employs over 81 percent of the total population. Fertile soils and suitable climate combine to support the cultivation of a number of crops in most parts of the district. Agriculture is mainly subsistence (80%) and takes place on small holdings of approximately two acres using mainly simple farming tools (hoes, pangas and harrowing sticks). Only 0.5 percent of the population are engaged in commercial agriculture. Family members constitute the single most important source of labour. The farming community heavily rely on natural weather which is not easily been predicted. There have often been situations of late start of rain which often affected agricultural production. This unreliable rainfall both in quantity and timing is still a big challenge to farmers as it often results into crop failure and loss of livestock during adverse weather conditions hence household food insecurity.

Other important economic activities in the district include formal employment, which employs about 9 percent of the population, petty and formal trade, which employs 3.8 percent and 0.7 percent respectively and cottage industry that employs 2.3 percent. The remaining proportion of the population depends on family support and other miscellaneous activities.

4.3.3 Land Tenure and Use Activities

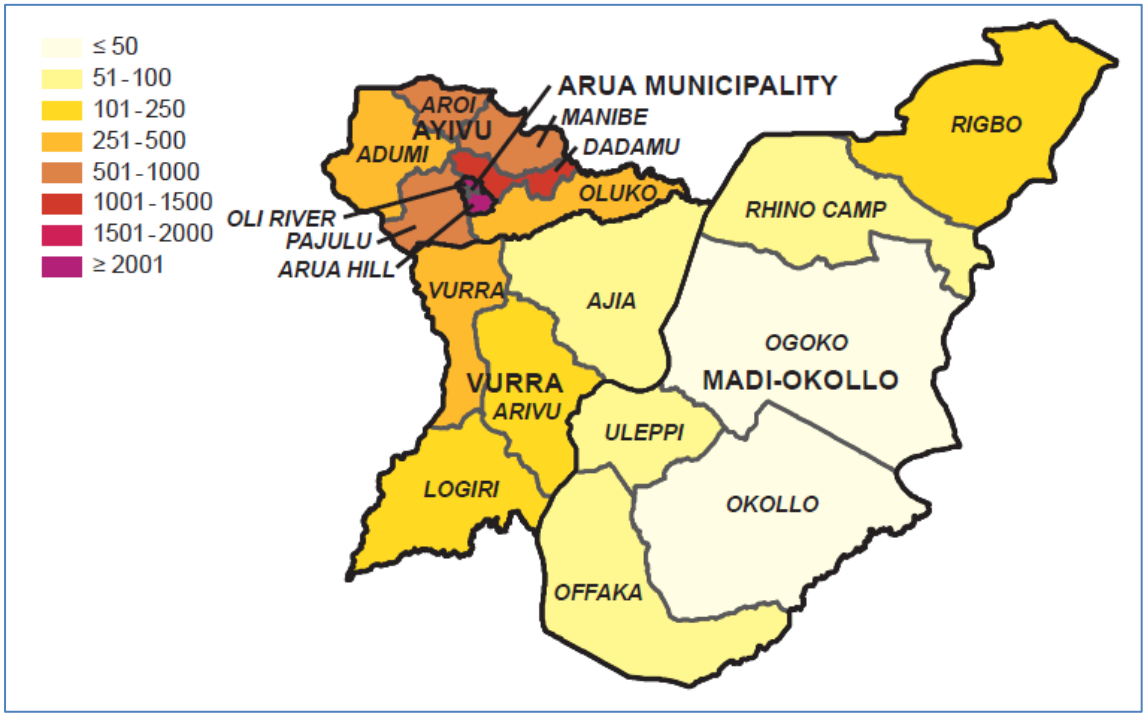
Typical land holdings in the district vary generally from ½ to 3 acres per household (with exceptions of up to 4 acres) and more than half of the farmers would like to cultivate more land. This situation varies significantly; farmers in the less populated county of Madi Okollo usually have bigger plots than farmers elsewhere in the District.

Agriculture is the major land use in Arua district. The sector provides employment to over 80 percent of the active rural population. Agricultural land occupies about 85 percent of the total district area. However, land put under cultivation is about 40 percent of the total agricultural land. The main food crops grown are cassava, beans, millet, simsim, peas, sweet potatoes, rice, horticultural crops, etc. The cash crops grown are tobacco, cotton and coffee. Most of the food crops are also money earning. Forestry is the second major land use in the district. It occupies 8.2 percent of the total District land area. The district has 38 gazetted forest reserves consisting of 18 local forest reserves and 20 central forest reserves totalling 60 235 Ha. Other land uses in the District include game and tourism (2.9%).

The settlements occupy about 452 acres of land and the majority of the settlers are tenants paying rent ranging between 10000 to 80000 shillings per month. 90% of the people within the settlements in Arua are low income earners earning an average daily income of 3,000 – 5,000 shillings.

4.3.4 Population and Demographic Characteristics

The population distribution in the district was far from even. There was a relatively heavy concentration of people in the counties of Arua Municipality Ayivu, Terego and Vurra County are moderately populated while Madi- Okollo County is sparsely populated. Overall, the population density of the district, based on the 2002 census is 153 persons per square kilometres. The distribution of the population in the district is presented in Figure 4.4.



Source: MWE, 2010

Figure 4.4 Population densities by sub-county in Arua district (persons/km^2)

4.3.5 Level of Education and Literacy

Education is an indispensable tool in human development. It is also determinant pointer in the productive capacity of a nation's economy. It influences all human activities right from birth to death and these coupled with good level of Education improves the standard of living of society (UBOS, 2012).

The number of primary schools, secondary schools and other educational institutions are indicated in Table 4.3 and Table 4.4. Arua District has a total of 224 government owned schools and 39 community schools. Enrolment by gender in primary and secondary schools is indicated in Table 4.5 and Table 4.6, respectively. The District has one Public University called Muni University located at Muni Hill. Uganda Christian University has a constituent College while Kampala International University, Islamic University in Uganda and Bugema University have study centres in the district. The District also houses a National Teachers' College, a Primary Teachers College and a Technical Institute at Ragem. There is one rehabilitation centre in the district - Ocoko Rehabilitation Centre. This one currently has an enrolment of 60 students, 35 of whom are males and 25 females.

Table 4.3: Number of pre-primary schools in the district per county

County	Number	Enrolment	No. of Teachers
Ayivu	20	4,800	120
Terego	5	500	25
Vurra	3	650	15
Madi	2	168	8

Table 4.4: Number of primary schools and secondary schools per county and ownership

County	Protestant	Catholic	Moslem	Community	Total
Primary schools					
Terego	19	50	3	10	82
Ayivu	20	31	1	3	55
Madi	20	49	0	10	79
Vurra	10	37	0	3	50
Municipality	2	4	16	4	26
Secondary schools					
Ayivu	10	20	3	25	33
Madi	16	2	0	3	8
Vurra	10	1	0	5	11
Municipality	4	6	1	7	10

Source: UBOS, 2012

Table 4.5: Enrolment by gender in primary schools in 2008

Gender	Primary level							
	1	2	3	4	5	6	7	Total
Male	27020	16844	15533	13926	11345	8300	4908	97876
Female	27836	16466	15194	13646	10743	7337	3421	94643
Total	54856	33310	30727	27572	22088	15637	8329	192519

Source: UBOS, 2012

Table 4.6: Enrolment by gender in secondary schools in 2008

Gender	Secondary level						
	1	2	3	4	5	6	Total
Male	2776	3060	2073	2171	822	854	11758
Female	2266	2214	1701	1610	541	449	8781
Total	**5044**	**5274**	**3774**	**3781**	**1363**	**1303**	**20539**

Source: UBOS, 2012

4.3.6 Healthcare Services

Health units in Uganda are categorized into hospitals, health centres IV, III and II. The district has a regional referral hospital in Arua and Kuluva hospital. It also maintains three Health Centre IVs at Oli, Adumi and Rhino camp (Table 4.7). The health sector in Arua district is supported by the Government of Uganda through the Ministry of Health, other line Ministries and Non-Government organisations indicated in Table 4.8.

Table 4.7: Number of functional health units by county in April 2007

County	Hospital	HCIV	HC III	HC II
Arua Municipal Council	1	1	1	6
Ayivu		1	3	5
Lower Madi		1	2	8
Vurra/ Upper Madi	1		8	8
Total	2	3	14	27

Source: UBOS, 2012

Table 4.8: Health sector partners operating in the district

Partner	Geographical coverage	Activities implemented
WHO	Whole district	Logistical support for PHC, HBC in Vurra/ Upper Madi
UNFPA	Whole district	Support to sexual and adolescent reproductive health and rights activities
UNHCR	Lower Madi and Vurra/ Upper Madi HSDs	Curative and PHC health services in the Refugee settlements
MSF (F)	Arua Municipality, Whole district	Support PMTCT, VCT, ARVs and medical emergencies
DANIDA	Whole district	Support to PHC
CUAMM	Whole district	Advisory and rehabilitation health services
LIONS AID	Entire district	District eye care programme
NORWAY AIC	Whole district	VCT, support counsellor training
TASO	Arua Municipal Council	VCT, home-based care, support to OVC
UPMB	Four health units	PHC and curative services
UCMB/ CUAMM	Eight health units	PHC and curative services
UPHOLD	Entire district	Malaria and HIV/ AIDS
USDC	Entire district	Rehabilitative services

Source: UBOS, 2012

Malaria is the most common cause of morbidity among all age groups in the district accounting for 80 percent for those under five and 52 percent for those above five years. Another cause of morbidity for those above 5 is injuries/trauma accounting for 31 percent. Other causes of morbidity are indicated in Table 4.9. The tuberculosis notification cases in the district were 31 percent (Table 4.10) which is below the national target for tuberculosis notification cases of 70 percent.

Table 4.9: Major causes of morbidity in the district

Children under 5 years				5 years and above			
Disease/ condition	**New cases**	**New deaths**	**CFR**	**Disease/ condition**	**New cases**	**New deaths**	**CFR**
Anaemia	1170	61	5.2	Anaemia	245	18	7.3
Diarrhoea Acute	2524	18	0.7	AIDS	232	42	18.1
Diarrhoea Persistent	30	3	10	Benign Neoplasm	106	6	5.7
Injuries or Trauma	164	6	3.7	Injuries or Trauma	1695	42	2.5
Gastro-intestinal disorders	138	5	3.6	Liver cirrhosis	241	52	21.6
Malaria	11454	270	2.4	Malaria	2884	83	2.9
Other respiratory infections	1384	6	0.4	Meningitis	328	23	7
Pneumonia	1597	70	4.4	Pneumonia	696	27	3.9
Septicaemia	255	18	7.1	Other liver diseases	110	10	9.1
Severe malnutrition	144	22	15.3	Tuberculosis	488	91	18.6
Total rest of diagnosis	2369	45	1.9	Total rest of diagnosis	11118	262	2.4
Total Diagnosis	**21229**	**524**	**54.7**	**Total Diagnosis**	**18143**	**656**	**99.1**

Source: UBOS, 2012

Table 4.10: Percentage of tuberculosis cases notification

Item	Description	Value
Numerator	Number of TB cases notified this year	688
Denominator	District catchment population x 0.003	2256
Indicator percent	Numerator x 100 / Denominator	30.5

Source: UBOS, 2012

The rate of out-patient attendance and laboratory tests carried out are presented in Table 4.11 and Table 4.12, respectively.

Table 4.11: Out-patient attendance by sex and age groups

Category	0 – 4 years		5 years and above		Total
	Male	**Female**	**Male**	**Female**	
New attendance	82 299	82 174	106 156	178 118	448 747
Re-attendance	11 007	10 739	17 587	21 548	60 881
Total attendance	93 306	92 913	123 743	199 666	509 628
Referrals to Unit (all ages)	2 172	2 690	1 304	1 613	7 779
Referrals from Unit (all ages)	753	793	1 189	1 502	4 237

Source: UBOS, 2012

Table 4.12: Laboratory tests by sex and age groups

Category	Number of tests done		Number of tests positive	
	0 – 4 years Male	**5> years**	**0 – 4 years Male**	**5> years**
Malaria blood	38 241	35 760	16 543	15 160
TB sputum	1 204	4 266	1	380
Syphilis	246	6 511	26	1 436
Pap smear	0	0	0	0

Source: UBOS, 2012

4.3.7 Water Supply

Arua Municipality is connected to the water supply system provided by the National Water and Sewerage Corporation. Access to safe drinking water by sub-county is presented in Figure 4.5 with the municipality having accessibility ranging between 61 and 80 percent. The distribution of different types of water sources in the district is presented in Figure 4.6 while the piped water system coverage is presented in Figure 4.7.

Source: MWE, 2010

Figure 4.5 Access to safe drinking water in Arua district (%)

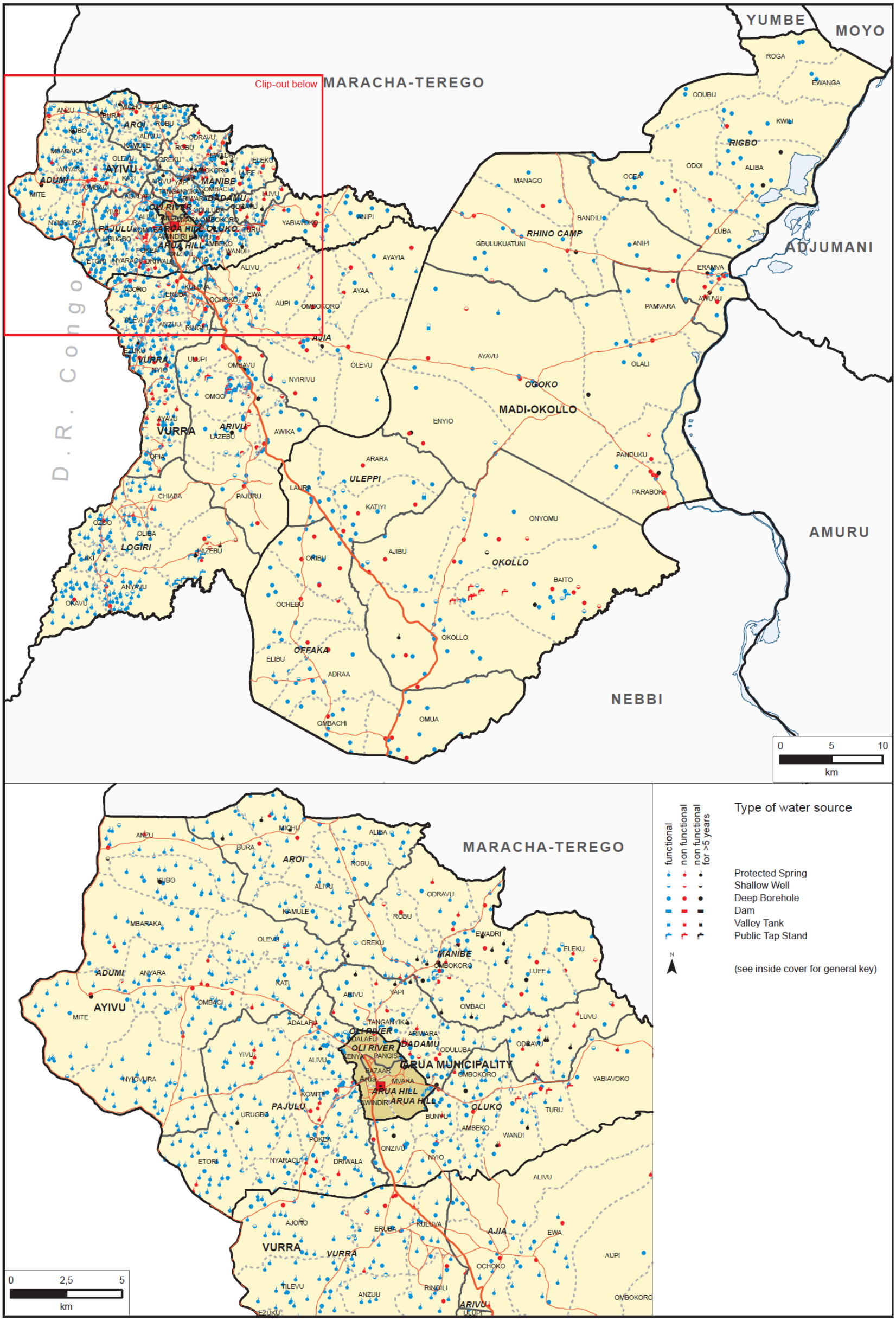


Figure 4.6 Distribution of drinking water sources in Arua district

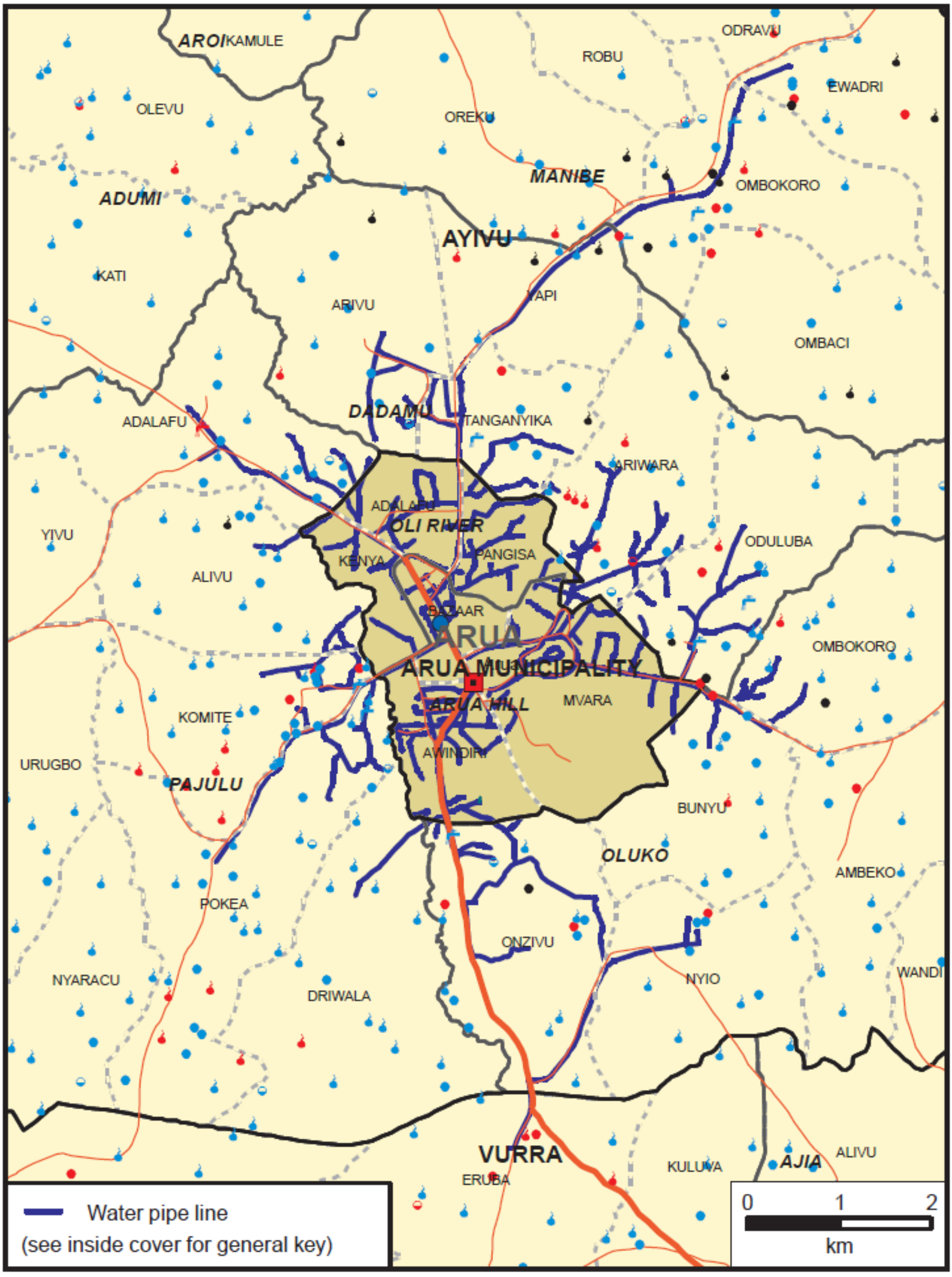


Figure 4.7 NWSC piped water supply system

The Arua RRH is connected to NWSC's piped water supply network. The hospital also has a water reservoir (Photo 4.1) to ensure storage and uninterrupted supply to the hospital.

Photo 4.1: Water reservoir for the Arua RRH

4.3.8 Waste Management

Solid waste management is one of the major problems in the district both in the urban and rural areas. Arua municipal council is currently not able to manage the waste properly as stipulated in the Public Health Act of 1964 and Local Government Act of 1997. The hospital has an open waste dump and incinerator. Some of the waste collected is taken to a municipality landfill while the rest is incinerated on site.

Photo 4.2: Solid waste collection area

Photo 4.3: Incinerators used for burning waste

4.3.9 Sources of Energy

A greater part of Arua District lacks grid electricity. An old 1.5MW thermal power plant provides electric power for only a few hours a day and is often non-operational. However, the district is expected to benefit from Nyagak hydroelectric scheme commissioned recently. Lack of a reliable and sufficient source of electricity has kept the District backwards in terms of attracting investments in spite of its strategic location near to two neighbouring countries of the DRC and the Southern Sudan; the high potential of the area of agricultural production and agro processing; and the high population which constitutes a big market for manufactured products among others. Ninety nine percent (99%) of the population rely on wood fuel for their domestic energy needs.

5 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 INTRODUCTION

In Uganda, the key legislation governing an ESIA study includes the National Environmental Act (Cap 153) of the laws of Uganda and the Environmental Impact Assessment Regulations (1998). National Environmental Act established NEMA and entrusts it with the responsibility to ensure compliance with ESIA process and procedures in planning and execution of development projects. The procedures require that a project proponent prepares an EIS with a clear assessment of relevant potential impacts, based on terms of reference (TORs) developed from a scoping exercise. This requires that the ESIA addresses potential direct and indirect socio-environmental impacts during the pre-construction, construction, operation and decommissioning phases together with attendant environmental and social management plan (ESMP).

Policies, legal and institutional framework considered relevant to this proposed project are discussed in this section. Various laws here reviewed relate to minimum acceptable construction operational requirements, environmental quality, land use, public health, occupational safety, labour standards and international legal obligations. The construction and equipping of health faculties ESIA was also be benchmarked against international best-practice standards of the World Bank and WHO.

5.2 POLICY FRAMEWORK

5.2.1 The National Environment Management Policy, 1994

The overall goal of this policy is the promotion of sustainable economic and social development mindful of the needs of future generations and the EIA is one of the vital tools it considers necessary to ensure environmental quality and resource productivity on a long-term basis. It calls for integration of environmental concerns into development policies, plans and projects at national, district and local levels. Hence, the policy requires that projects or policies likely to have significant adverse ecological or social impacts undertake an EIA before their implementation. This is also reaffirmed in the National Environment Act, Cap 153 which makes EIA a requirement for eligible projects (Third Schedule).

Relation to the project: *At the national policy level, environment and development are interrelated and this policy requires that environmental aspects are considered in all development projects such as the proposed health project.*

5.2.2 The National Medical Equipment Policy, 2009

The objective of the policy is to ensure equipment and furniture are managed economically, efficiently, effectively and sustainably through guided:

- Acquisition of medical equipment and furniture,
- Utilization, regulation and quality assurance of medical equipment and furniture,
- Maintenance of medical equipment and furniture,
- Monitoring and evaluation of performance of medical equipment and furniture and
- Proper disposal of medical equipment and furniture.

Relation to the project: This policy calls for sustainable management of equipment installed at healthcare facilities. Sustainable management entails regular maintenance to reduce breakdown (hence waste) and inefficient energy consumption.

5.2.3 The National Health Policy, 1999

The overall objective of health sector policy is to reduce mortality, morbidity and fertility, and the disparities therein. Ensuring access to the minimum health care package is a central strategy to this goal. This project is therefore in line with the strategies of this policy.

5.2.4 National Policy on Injection Safety and Health Care Waste Management, 2004

The policy aims at ensuring safe injection practices and proper management of healthcare waste through appropriate procurement, distribution and monitoring of equipment/ supplies and increased awareness.

Relation to the project: One of the key objectives of this policy is to ensure proper healthcare waste management which should be an important environmental sustainability aspect of the proposed project.

5.3 LEGAL FRAMEWORK

5.3.1 Constitution of the Republic of Uganda, 1995

The 1995 Uganda Constitution provides that every person has a right to own property [Section 26.1] and that no person shall be deprived of property or any interest in or right over property without payment of fair and adequate compensation. The same constitution gives government powers to acquire land (compulsory acquisition) in public interest [Article 273(a)]. The Constitution [Chapter 3, Article 17J] entrusts Government with the duty of ensuring that Ugandans enjoy a healthy environment.

Relation to the project: The constitution is the cardinal law in Uganda upon which all environmental laws and regulations are founded. All environmental impact actions of the project are therefore meant to conform to the broader objectives of the Constitution which requires a health environment for all citizenry.

5.3.2 National Environment Act, Cap 153

The National Environment Act (Chapter 153 of Laws of Uganda) establishes and defines functions of NEMA as a body responsible for management, monitoring and supervision of all environmental conservation activities (Section 4). This act provides for various strategies and tools for environment management, which also includes the EIA (Section 19) for projects likely to have significant environmental impacts. The Act also mandates NEMA with a leading role to review environmental impact statements. NEMA sets multimedia environmental standards (Sections 24-32) to prevent contamination of air, water and soil resources. The Act also mandates NEMA with responsibility for in-situ and ex-situ conservation of biological fauna and flora resources either on land or in water (Sections 42 and 43). Section 48 empowers NEMA, district environment committees and local environment committees to be responsible for monitoring of local land-use plans, which should be in conformity with national land-use plan. Section 106 outlines provisions to enable compliance with obligations of international environmental conventions. Section 35 entrusts NEMA, lead agencies and local government environment committees with powers to protect the environment from human activities that

could adversely affect it. Section 56 prohibits discharge of hazardous substances, chemicals, oil, etc. into the environment except in accordance with guidelines prescribed by NEMA.

The Act outlines principles of environmental management and rights to a decent environment and also sets out principles for:

- Institutional arrangements;
- Environmental planning;
- Environmental regulations;
- Environmental standards;
- Environmental restoration orders and easements;
- Records, inspection and analysis;
- Financial instruments;
- Offences;
- Judicial proceedings; and
- International obligations.

The Third Schedule of the National Environment Act (Cap 153) does not specifically list healthcare facilities under scheduled projects, nonetheless, two sections thereof related to function or waste management mean that these facilities are not exonerated from the general EIA process. Section 12 on the Schedule requires that projects related to:

a) Sites solid waste disposal;
b) Sites for hazardous waste disposal;
c) Sewage disposal;
d) Atmospheric emissions;
e) Offensive odours; should undertake a full EIA.

This Act also formed the basis for enactment of the Environmental Impact Assessment Guidelines, 1997 and Environmental Impact Assessment Regulations, 1998 which together prescribe the EIA process in Uganda. The process is schematically presented in NEMA's Environmental Impact Assessment (EIA) Reference Manual as shown in Figure 5.1.

Relation to the project: The Act is governs and guides environmental management in Uganda. This EIA is prepared to conform to the Act's requirement that projects likely to have significant environmental impact undertake EIA before they are implemented.

5.3.3 Local Governments Act, Cap 243

This Act provides for decentralized governance and devolution of central government functions, powers and services to local governments that have own political and administrative set-ups. According to Section 9 of the Act, a local government is the highest political and administrative authority in its area of jurisdiction and shall exercise both legislative and executive powers in accordance with the Constitution.

Relation to the project: The project will be under jurisdiction of Arua District, which is mandated under the Local Governments Act, Cap 243 to sanction and oversee development projects in the local government. The District Environmental Officer and Municipal Environmental Officer are mandated to inspect and monitor environmental considerations for development projects in their areas of jurisdiction.

5.3.4 Public Health Act, Cap 281

The Public Health Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. It gives local authorities powers (Section 103) to prevent pollution of watercourses in interest of public good.

Relation to the project: This Act relates to disposal of waste from the proposed laboratory in so far as improper handling, disposal of solid waste and effluent some of which will be classified hazardous, could potentially impact the public health.

5.3.5 National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999

Section 6 (2) details maximum permissible limits for 54 regulated contaminants which must not be exceeded before effluent is discharged into water or on land. For this project, this standard is appliance to liquid waste/ sewage disposal from the laboratory.

Table 5.1: National discharge standards for selected pollutants

Parameter	National discharge standards
BOD_5 (mg/l)	50
Suspended solids (mg/l)	100
Faecal coliforms	10,000 counts/ 100ml
Chlorine residual (mg/l)	1 mg/l
pH	6-8
Phenols (µg/l)	0.2 mg/l
Oil and grease (mg/l)	10 mg/l
Total Phosphorus (mg/l)	10 mg/l
Temperature	20-35^{o}C

Source: The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999.

Relation to the project: Effluent discharged from the laboratory should conform to these regulations.

5.3.6 National Environment (Noise Standards and Control) Regulations, 2003

Part III Section 8 (1) requires facility operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite ear protection.

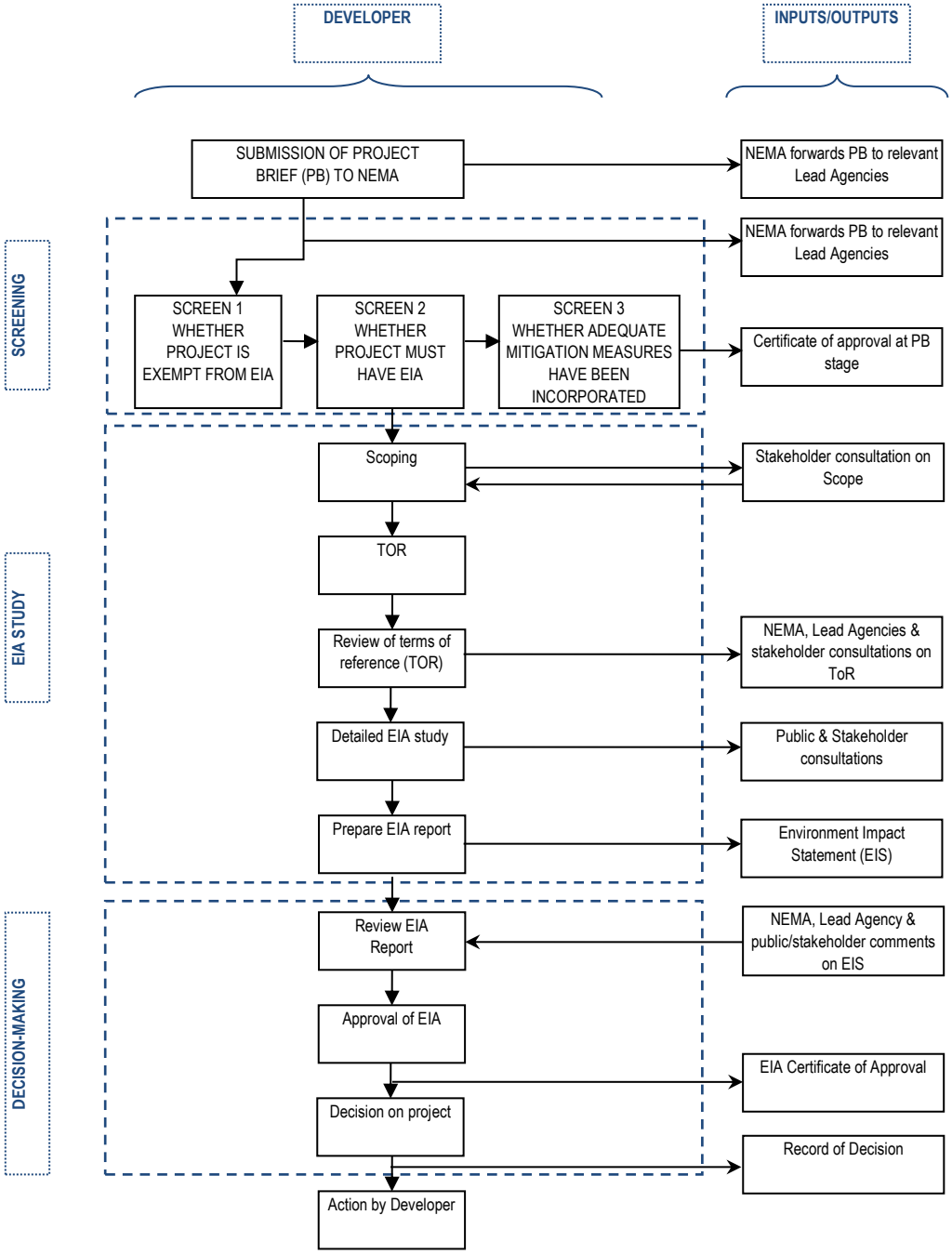


Figure 5.1 ESIA process in Uganda

Table 5.2: Regulatory noise limits

Facility	Noise limits dB (A) (Leq)	
	Day*	Night*
Construction sites	60	50
Mixed residential (with some commercial and entertainment)	55	45
*Time frame: Day 6.00 a.m -10.00 p.m; Night 10.00 p.m. - 6.00 a.m.		

Source: The National Environment (Noise Standards and Control) Regulations, 2003.

Relation to the project: Both during construction and operation of the laboratory, noise generated should not exceed limits prescribed by these regulations.

5.3.7 National Environment (Waste Management) Regulations, 1999

These regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health.

Relation to the project: These regulations apply to both construction and operation-phase waste which should be managed in a way such as to avoid environmental and public health impact.

5.3.8 Draft National Air Quality Standards, 2006

The draft national air quality standards provide the following regulatory limits (Table 5.3).

Table 5.3: Uganda's regulatory air quality standards for selected pollutants

Pollutant	Averaging time for ambient air	Standard for ambient air
Carbon dioxide (CO_2)	8 hour	9.0 ppm
Carbon monoxide (CO)	8 hour	9.0 ppm
Hydrocarbons	24 hour	5 mg m^{-3}
Nitrogen oxides (NO_x)	24 hour 1 year arithmetic mean	0.10 ppm
Smoke	Not to exceed 5 minutes in any one hour	Ringlemann scale No.2 or 40% observed at 6m or more
Soot	24 hour	500 µg Nm^{-3}
Sulphur dioxide (SO_2)	24 hour	0.15 ppm
Sulphur trioxide (SO_3)	24 hour	200 µg Nm^{-3}

Note: ppm = parts per million; "N" in µg/Nm-3 connotes normal atmospheric conditions of pressure and temperature (25oC and 1 atmosphere).

Relation to the project: These standards will apply to especially onsite waste incineration during (post-construction) use of the laboratory. Emissions from the incinerator should be within limits prescribed by the regulations.

5.3.9 Employment Act, 2006

Employment Act, 2006 repeals Employment Act (Cap 219) enacted in 2000. This Act is the principal legislation that seeks to harmonize relationships between employees and employers, protect workers interests and welfare and safeguard their occupational health and safety through:

i) Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV).
ii) Providing for labour inspection by the relevant ministry (Part III).
iii) Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI).
iv) Continuity of employment (continuous service, seasonal employment, etc. (Part VIII).

This Act is relevant to the project both during the construction and operational phase.

Relation to the project: The Act will govern labour type and conditions under which person hired by the project work. It prohibits Child labour (a condition the contractor must comply with) as well as providing guidance on work rights during the post-construction phase.

5.3.10 Occupational Safety and Health Act (2006)

The Act replaces the Factories Act (1964). It departs from the original listing of "don'ts" and adopts a scientific approach in which technical measures required for protection of workers are prescribed, hence taking on a "preventive approach". The Act provides for prevention and protection of persons at all workplaces from injuries, diseases, death and damage to property. It covers not just the "factory" (as did the Factories Act) but also any workplace where persons are employed and its provisions extend not just to employees but to any other persons that may be legitimately present in a workplace and are at risk of injury or disease. Employers must protect workers from adverse weather and provide clean and healthy work environment, sanitary conveniences, sanitary and protective gear.

Relation to the project: The Act is applicable relation to protection of the construction workers and health workers (and medical waste collectors) against secondary injuries during execution of their duties or work.

5.4 INSTITUTIONAL FRAMEWORK

5.4.1 National Environmental Management Authority (NEMA)

The National Environmental Act, Cap 153 establishes NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental conservation activities. NEMA is under the Ministry of Water and Environment (MWE) but has a cross-sectoral mandate to oversee the conduct of EIAs through issuance of guidelines, regulations and registration of practitioners. It reviews and approves environmental impact statements in consultation with any relevant lead agencies.

NEMA works with District Environment Officers and local environment committees at local government levels who also undertake inspection, monitoring and enforce compliance on its behalf. In Government ministries, NEMA works with Environmental Liaison Units to ensure incorporation of environmental issues in their activities, policies and programs.

Role in the project: NEMA will:

- *Review and approve the ESIA report (ESIS)*
- *Through Arua District Environment Officer, undertake environmental monitoring during project implementation.*

5.4.2 Ministry of Health (MOH)

This project will be executed by MOH which is to undertake policy formulation, quality assurance, coordination, monitoring and evaluation of health service delivery in Uganda.

Role in the project: MOH is the project proponent with obligation to fulfil all environmental requirements for every aspect of the project that could bear socio-environmental impact.

5.4.3 Ministry of Gender, Labour & Social Development

This ministry sets policy direction and monitoring functions related to labour, gender and general social development. Its OHS Department in the ministry is responsible for inspection and mentoring of occupational safety in workplaces and this could be during project construction and operation of the laboratory facilities.

Role in the project: The OHS Department in this Ministry will be responsible for undertaking inspections of construction sites to ensure safe working conditions.

5.4.4 District Local Administration Structures

The proposed project is within the jurisdiction Arua District Local Government headed by a Local Council V (LC V) Chairman and Chief Administration Officer (CAO) who are the political head and technical head respectively. Various district offices whose functions would be relevant to the project include offices of Natural Resources/Environment, District Health Inspector, District Planner, Community Development Officer, District Director of Health Services, District Water Officer, Town Council and District Engineer. Equally important are village-level local council administration (LC I and LC III). Leaders at these levels of local administration are closer to residents and therefore important in effective community mobilization, sensitization and dispute resolution given that the laboratory is also going to serve cross-border communities.

Role in the project: Local government structures are important for mobilising support for the project as wells monitoring its social-environmental impacts both during construction and operation phases.

5.5 WORLD BANK GROUP POLICIES AND GUIDELINES

This project has been benchmarked against World Bank Group (WBG) standards since IDA is one of the 5 member organizations of the WBG. These standards, practices or guidelines are discussed below.

5.5.1 World Bank Operating Policies

The World Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. Environmental Assessment is one of the 10 environmental and social Safeguard Policies that WBG uses to examine potential environmental risks and benefits associated with Bank lending operations. The Bank's Environmental Assessment policy and procedures are described in Operational Policy/Bank Procedures - OP/BP 4.01. Detailed advice and guidance on the conduct of environmental assessment is provided publicly by the World Bank in its Environmental Sourcebook and updates. During project preparation, the World Bank examines the implications of the proposed project for a series of policies below:

- Environmental Assessment;
- Natural Habitats;
- Forestry;
- Pest Management;
- Cultural Property;

- Indigenous Peoples;
- Involuntary Resettlement;
- Safety of Dams;
- Projects in International Waters; and
- Projects in Disputed Areas.

From the nature of proposed project and the fact that project activities would largely entail construction of new buildings on hospital premises, only policy OP/BP 4.01 would be triggered by this project.

5.5.2 WB Guidelines

Under its "General EHS Guidelines (April 30, 2007)", the World Bank has several guidelines shown in Table 5.4, many of which are applicable to various components of the proposed project namely:

i) Air emissions from onsite waste combustion units ("incinerators")
ii) Hazardous waste management
iii) Noise
iv) Occupational health and safety (against biological and radiological hazards).
v) Community health and safety including traffic safety such as during project construction or disease prevention (where incinerators emission waft into and affect not only local communities but also patients visiting or admitted in hospital including their attendants and the hospital staff).
vi) Construction and decommissioning.

While most of above WBG guidelines apply to the proposed project in one way or the other, in sections below are discussed four environmental, health and safety (EHS) guidelines, namely:

i) EHS Guidelines - Air Emissions And Ambient Air Quality
ii) EHS Guidelines - Waste Management
iii) EHS Guidelines - Health Care Facilities
iv) EHS Guidelines - Hazardous Materials Management
v) EHS Guidelines - Construction and Decommissioning

5.5.2.1 WBG EHS Guidelines: "Air emissions and ambient air quality"

a) General approach

These guidelines require projects with "significant" sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards (or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources). Uganda currently has (draft) national air quality standards applicable to this project, specifically incinerator emissions. The standards, however, make no mention of dioxins which are potent cancer-inducing, expected in incineration emissions.

In these guidelines "significant" refers to sources which can contribute a net emissions increase of one or more of the following pollutants within a given air shed:

- Particulate matter of size 10 microns (PM10): 50 tons per year (tpy);

- Oxides of nitrogen (NOx): 500 tpy;
- Sulphur dioxide (SO_2): 500 tpy; or as established through national legislation;
- Equivalent heat input of 50 MWth or greater.

Table 5.4: WBG General EHS Guidelines (April 30, 2007)

1. Environmental
1.1 Air Emissions and Ambient Air Quality
1.2 Energy Conservation
1.3 Wastewater and Ambient Water Quality
1.4 Water Conservation
1.5 Hazardous Materials Management
1.6 Waste Management
1.7 Noise
1.8 Contaminated Land
2. Occupational Health and Safety
2.1 General Facility Design and Operation
2.2 Communication and Training
2.3 Physical Hazards
2.4 Chemical Hazards
2.5 Biological Hazards
2.6 Radiological Hazards
2.7 Personal Protective Equipment (PPE)
2.8 Special Hazard Environments
2.9 Monitoring
3. Community Health and Safety
3.1 Water Quality and Availability
3.2 Structural Safety of Project Infrastructure
3.3 Life and Fire Safety (L&FS)
3.4 Traffic Safety
3.5 Transport of Hazardous Materials
3.6 Disease Prevention
3.7 Emergency Preparedness and Response
4. **Construction and Decommissioning**
4.1 Environment
4.2 Occupational Health & Safety
4.3 Community Health & Safety

Going by this classification, all onsite incineration units at the laboratory/ hospital facilities are "non-significant" sources since no unit at the facilities had capacity to generate the foregoing levels of air pollutants. Two national documents on healthcare waste indicate that a hospital generates 0.1 kg/bed/day excluding pathological waste.

The fact that onsite incineration units burn small waste volumes and generate low levels of emissions could be the reason such "non-significant" units are not provided with (and probably do not require) emissions control.

It should nonetheless be noted WBG guidelines advise that impact significance of emission of inorganic and organic pollutants should be established on a project-specific basis taking into account toxic and other properties of the pollutant. While emissions from such small combustion units are considered low and, with a sufficiently tall stack, would be easily dispersed in the atmosphere with little health risk, locating incineration units close to dwellings and healthcare buildings poses a risk of downwash and emissions wafting into indoor environment- a paradoxical situation for facilities supposed to heal the sick.

Incineration emissions from healthcare facilities may contain significant amounts of particulate matter, heavy metals, dioxins, furans, sulphur dioxide and hydrochloric acid. Of key concern are dioxins which are potent cancer-inducing compounds.

The temperatures needed to breakdown dioxin are typically not reached when burning waste in open air (200-400°C) causing high dioxin emissions. Dioxin can only be destroyed above 850°C, otherwise it remains in atmosphere emissions or in incineration ash where it can leach into groundwater when rain falls on ash piles.

b) Emissions control recommendations

To control emission from small combustion sources, WBG guidelines provide several recommendations but in the context of this project, one factor that can be improved is incinerator stack height. Indeed the guidelines advise that stack height for all point sources of emissions, (whether "significant" or not) should be designed according to good international industry practice (GIIP) (see Figure 5.2) to avoid high ground-level pollutant concentrations due to downwash, building wakes or eddy effects and to ensure reasonable dispersion to minimize environmental or health impacts. These guidelines also recommend annual stack emission testing for NOx and SO_2.

Annex 1.1.3 - Good International Industry Practice (GIIP)

Stack Height

(Based on United States 40 CFR, part 51.100 (ii)).

$H_G = H + 1.5L$; where

H_G = GEP stack height measured from the ground level elevation at the base of the stack

H = Height of nearby structure(s) above the base of the stack.

L = Lesser dimension, height (h) or width (w), of nearby structures

"Nearby structures" = Structures within/touching a radius of 5L but less than 800 m.

Source: (WBG EHS Guidelines, April 2007, pg

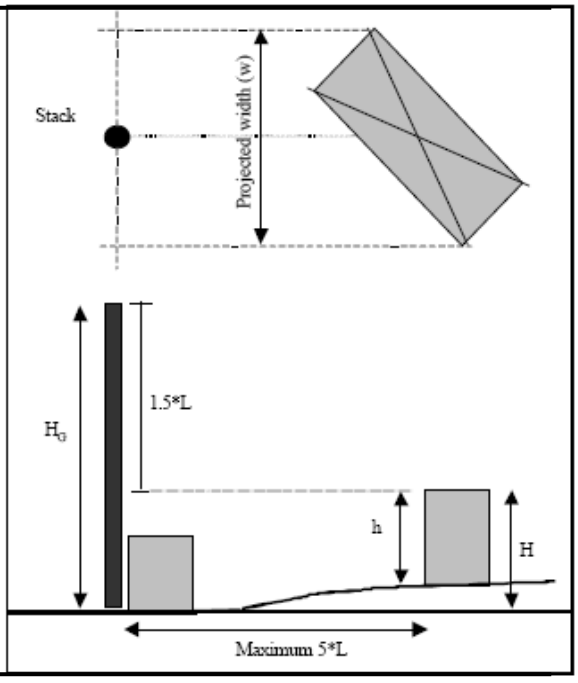


Figure 5.2 Recommended stack design for small combustion sources

c) Implication for this project

For this project, unless space is a critical limitation, this stack design approach should be adopted wherever incinerators are installed. The guidelines discourage open-burning of solid wastes, whether hazardous or non-hazardous, is not considered good practice and should be avoided, as the generation of polluting emissions from this type of source cannot be controlled.

While small onsite incineration units handling minimal healthcare waste volumes might not require emission control according to these Guidelines, the management including disposal of healthcare waste has become an issue of growing concern in many places in Uganda. Infectious medical waste has been dumped indiscriminately, burned uncontrollably and buried irresponsibly posing considerable public health risk. To abate this impact, government should start to think of a medium-term approach where medical waste is incinerated at centralized (local, regional or national) facilities designed to offer the following social-environmental benefits:

- Total destruction of hazardous constituents (e.g. dioxins only destroyed >850°C).
- Destruction of Infectious Waste.
- Scrub or treat to remove obnoxious gaseous emissions (dioxins, respirable particulates or $PM_{2.5}$, mercury, etc.).
- Assured process control.
- Cost-effective operation.

This approach would necessitate appropriate policy and regulatory framework to induce private sector involvement.

5.5.2.2 WBG EHS Guidelines: "Waste management"

a) General approach

These guidelines apply to both non-hazardous and hazardous waste. They advocate for waste management planning where waste should be characterized according to: composition, source, types, and generation rates. This is essential for laboratory facility comprised in this project since there is a need to segregate the different categories of waste generated both at the laboratory level and overall hospital level.

These guidelines call for implementation of a waste management hierarchy that comprises prevention, recycling/reuse; treatment and disposal. The guidelines require segregation of conventional waste from hazardous waste streams and if generation of hazardous waste cannot be prevented (as is the case at healthcare facilities); its management should focus on prevention of harm to health, safety, and environment, according to the following principles:

- Understanding potential impacts and risks associated with management of any generated hazardous waste during its complete lifecycle.
- Ensuring that people handling, treating and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good industry practice.
- Ensuring compliance with applicable regulations.

b) Implication for this project

The laboratory will generate relatively small quantities of (hazardous and non- hazardous) waste and for large generators (for example, the project hospitals), the Guidelines recommend monitoring to include:

i) Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labelled and stored.
ii) Regular audits of waste segregation and collection practices.
iii) Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments.
iv) Keeping manifests or other records that document the amount of waste generated and its destination.
v) Periodic auditing of third party treatment and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal location.

5.5.2.3 WBG EHS Guidelines: "facility design"

a) Applicability

The EHS Guidelines for facility design include information relevant to management of EHS issues associated with laboratories which includes a diverse range of activities involving a referral hospital; inpatient and outpatient facilities.

These guidelines are applicable for planning new laboratory facilities.

b) Laboratory facility design considerations

These guidelines advise that design and functional layout of laboratory should ensure the following:

- Separation of clean / sterilized and dirty / contaminated materials and people flows;
- Development and inclusion of adequate disinfection / sterilization procedures and facilities;
- Adequate space for the storage of recyclable materials (e.g. cardboard and plastic) for pickup;
- Ventilation systems that provide isolation and protection from airborne infections;
- Design of water systems to provide adequate supplies of potable water to reduce risks of exposure waterborne pathogens;
- Provision of hazardous material and waste storage and handling areas;
- Selection of easily cleaned building materials that do not support microbiological growth, are slip-resistant, non-toxic, and non-allergenic, and do not include volatile organic compound (VOC)-emitting paints and sealants.

c) Waste management

Waste from laboratory can be divided into two groups:

- General waste similar in composition to domestic waste, generated during administrative, housekeeping, and maintenance functions.
- Specific categories of hazardous healthcare waste (see as detailed in Table 5.5).

Table 5.5: Treatment and disposal methods for categories of healthcare waste

Type of waste	Summary of treatment and disposal options / notes
Infectious waste: 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 foetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.	**Waste Segregation Strategy**: Yellow or red coloured bag / container, marked "infectious" with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved. **Treatment**: 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).
Sharps: Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	**Waste Segregation Strategy**: Yellow or red colour code, marked "Sharps". Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labelled "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[a]; Encapsulation[a]; Discharge to sewer [a]; Return expired drugs to supplier; Incineration (Rotary kiln; pyrolytic incinerator [a]); Safe burial on hospital premises[a] 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.

Type of waste	Summary of treatment and disposal options / notes
	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 faeces, 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 labelled "Cytotoxic waste". **Treatment**: Return expired drugs to supplier; Chemical degradation; Encapsulation[a]; 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 formaldehyde, photographic chemicals, halogenated and nonhalogenated solvents, organic chemicals for cleaning / disinfecting, and various inorganic chemicals (e.g. acids and alkalis).	**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container resistant to chemical corrosion effects. **Treatment**: Return unused chemicals to supplier; Encapsulation[a]; Safe burial on hospital premises[a]; Incineration (Pyrolytic incinerator[a]; • 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 quantities of chemical waste should not be encapsulated or landfilled.
Radioactive waste: Includes solid, liquid, and gaseous materials that have been contaminated with radionuclides. Radioactive waste originates from activities such as organ imaging, tumour localization, radiotherapy, and research / clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients.	**Waste Segregation Strategy:** Lead box, labelled with the radioactive symbol. **Treatment**: Radioactive waste should be managed according to national requirements and current guidelines from the International Atomic Energy Agency. IAEA (2003). Management of Waste from the Use of Radioactive Materials in Medicine, Industry and Research. IAEA Draft Safety Guide DS 160, 7 February 2003.
Waste with high content of heavy metals: Batteries, broken thermometers, blood pressure	**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

Type of waste	Summary of treatment and disposal options / notes
gauges, (e.g. mercury and cadmium content).	waste. • Waste should not be burned, incinerated, or landfilled. Transport to specialized facilities for metal recovery.
Pressurized containers: Includes containers / cartridges / cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases.	**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.
General health care waste (including food waste and paper, plastics, cardboard)**:**	**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.
***Source**: Safe Management of Wastes from Health-Care Activities. International Labour Organization (ILO), Eds. Pruss, A. Giroult, and P. Rushbrook (1999)* ***Notes:** a. Small quantities only*	

Laboratory facilities should establish, operate and maintain a health care waste management system (HWMS) adequate for the scale and type of activities and identified hazards but entailing:

i) Waste minimization, reuse, and recycling
ii) Waste segregation at the point of generation,
iii) On-site handling, collection, transport and storage based on safe practices below;

- Seal and replace waste bags and containers when they are approximately three quarters full. Full bags and containers should be replaced immediately;
- Identify and label waste bags and containers properly prior to removal;
- Transport waste to storage areas on designated trolleys / carts, which should be cleaned and disinfected regularly;
- Waste storage areas should be located within the facility and sized to the quantities of waste generated;
- Unless refrigerated storage is possible, storage times between generation and treatment of waste should not exceed (in Warm climate) 48 hours during cool season, 24 hours during hot season;
- Store radioactive waste in containers to limit dispersion, and secure behind lead shields;
- Packaging containers for sharps should be puncture-proof;

These guidelines recognize incineration as a key source of air emission at healthcare facilities and pollutants emitted from incineration include:

i) Heavy metals
ii) Organics in flue gas
iii) Various organic compounds (dioxins and furans)
iv) Hydrogen chloride (HCl) and fluorides and potentially other halogens-hydrides (e.g. bromine and iodine)
v) Typical combustion products such as sulphur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds, monoxide (CO), carbon dioxide (CO_2), and nitrous oxide (N_2O).
vi) Incineration residues such as fly ash and bottom ash may contain high concentrations of persistent organic pollutants (POPs).

For being ineffective in regard to emissions control, these WBG Guidelines caution against use of single-chamber and brick incinerators should be used only as a last resort option.

The Guidelines advise against mixing domestic and hazardous waste. Waste should be segregated at point of generation and non-hazardous waste, such as paper and cardboard, glass, aluminium and plastic, should be collected separately for possible recycling. Food waste should be segregated and composted. Infectious and / or hazardous wastes should be identified and segregated according to its category using a colour-coded system (see Table 5.5) which provides good reference information for especially healthcare facility operators). If different types of waste are mixed accidentally, waste should be treated as hazardous.

d) Occupational health and safety

Health and safety hazards in healthcare facilities may affect healthcare providers, cleaning and maintenance personnel, and workers involved in waste management handling, treatment and disposal. Typical hazards which should be prevented with proper safety gear and practices include:

- Exposure to infections and diseases (blood-borne pathogens, and other potential infectious materials (OPIM)
- Exposure to hazardous materials / waste
- Fire safety
- Exposure to radiation

Occupational radiation exposure may result from equipment emitting X-rays and gamma rays (e.g. CT scanners), radiotherapy machines, and equipment for nuclear medicine activities. HCF operators should develop a comprehensive plan to control radiation exposure in consultation with the affected workforce. This plan should be refined and revised as soon as practicable on the basis of assessments of actual radiation exposure conditions, and radiation control measures should be designed and implemented accordingly.

5.5.2.4 Air emission levels for hospital waste incineration facilities

WBG Guidelines advise emission levels of healthcare waste incinerators presented in Table 5.6.

Table 5.6: Air emission levels for hospital waste incineration facilities

Pollutant	Unit	Guideline value
Total Particulate matter (PM)	mg/Nm^3	10
Hydrogen Chloride (HCl)	mg/Nm^3	10
Total organic carbon (TOC)	mg/Nm^3	10
Hydrogen Fluoride (HF)	mg/Nm^3	1
Sulphur dioxide (SO2)	mg/Nm^3	50
Carbon Monoxide (CO)	mg/Nm^3	50
NOX	mg/Nm^3	200-400[a]
Mercury (Hg)	mg/Nm^3	0.05
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, and V	mg/Nm^3	0.05
Polychlorinated dibenzodioxin and dibenzofuran (PCDD/F)	ng/Nm^3TEQ	0.1

Notes:

a. 200 mg/m^3 for new plants or for existing incinerators with a nominal capacity exceeding 6 tonnes per hour; 400 mg/m^3 for existing incinerators with a nominal capacity of 6 tonnes per hour or less.

b. Oxygen level for incinerators is 7 percent.

5.5.2.5 WBG EHS Guidelines: "Hazardous materials management"

a) Application and approach

These guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances.

b) General hazardous materials management

Facilities which manufacture, handle, use, or store hazardous materials should establish management programs that are commensurate with the potential risks present. The main objectives of projects involving hazardous materials should be the protection of the workforce and the prevention and control of releases and accidents. These objectives should be addressed by integrating prevention and control measures, management actions, and procedures into day-to-day business activities.

5.5.2.6 WBG EHS Guidelines: "Construction and decommissioning"

These provide guidance, specific guidance on prevention and control of community health and safety impacts that may occur during new project development or due to expansion or modification of existing facilities. By thematic categories, they address three major aspects (environment, OHS and community health and safety) below.

a) Environment:

- **Noise and vibration:** During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people.
- **Air quality:** Project construction of new buildings that will require materials to be trucked in to the site and this could generate fugitive dust affecting adjoining service areas or

communities. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of construction waste on-site.

- **Solid waste:** During project implementation, non-hazardous solid waste generated at construction sites would include, scrap wood, glass cullet and metal.
- **Hazardous materials:** Asbestos might be encountered where entire buildings will be demolished and rebuilt.

b) Occupational Health and Safety

Likely OHS risks during construction of the proposed laboratory include over-exertion, slips and falls, work at heights, hot works (welding) and electrocution, being struck by objects, injury by moving machinery and dust from construction activities.

c) Community Health and Safety:

The guidelines recommend implementation of risk management strategies to protect general community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Key areas to consider are:

- **General site hazards:** where construction activities can injure people in or near buildings under construction.
- **Disease Prevention:** ensuring that risk of disease from construction-related activities (e.g. from water ponding).
- **Traffic Safety:** Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local/ hospital communities.

5.6 COMPARISON OF UGANDA STANDARDS AND WBG REQUIREMENTS

All key principles of the World Bank Operation Policies have been incorporated into the new IFC Performance Standards. There are differences between Uganda's guidelines and those of the WBG, not only about waste management and air quality but also resettlement as outlined in Table 5.7.

5.7 WORLD HEALTH ORGANISATION (WHO) GUIDELINES

This project has been benchmarked against World Health Organisation (WHO) guidelines for basic laboratories (WHO, 2004) and low-risk TB laboratories (WHO, 2012) since the project laboratory will be a biosafety level 2 TB laboratory designated to handle samples prone to generate aerosols.

5.8 WHO BIOSAFETY GUIDELINES: "FACILITY DESIGN"

a) Applicability

The WHO Guidelines for facility design include information relevant to management of Biosafety issues associated with laboratories which includes a diverse range of activities involving a referral hospital; inpatient and outpatient facilities.

Table 5.7: Comparison of Uganda requirements and those of WBG including IFC

Issue	Uganda requirement	IFC	World Bank requirement
Social and Environmental Assessment and Management System	EIA process based on 13 categories listed in the Third Schedule of *The National Environment Act (Cap 153)* as projects that must have EIA undertaken.	Documentation and processes are driven by risks and impacts, not project categorization.	Driven by project categorization.
		Goes beyond assessment to address implementation through the use of a social and environmental management system.	OP 4.01 mostly focuses on assessment only.
Involuntary Resettlement	Ugandan EIA guidelines/ regulations have no specific guidelines on resettlement action plans (RAP) apart from requiring analysis of social impact assessment.	Requires clients to establish a grievance mechanism.	No equivalent requirement in OP 4.01.
Healthcare Waste Management	Uganda has no specific environmental guidelines for healthcare sector.	Guidelines exist: (www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines)	
Incineration and emissions control	No national standards on design or general performance of incineration facilities. Emissions from incineration facilities expected to comply with national (draft) air quality standards. Uganda's air quality standards make no mention of dioxins (known carcinogenic or cancer-inducing) compounds from combustion / incineration facilities.	Detailed guidelines on incineration at healthcare facilities provided in: *"Environmental, Health and Safety Guidelines-HEALTHCARE FACILITIES".* World Bank has air quality standards (World Bank Group EHS Guidelines: *AIR EMISSIONS AND AMBIENT AIR QUALITY*, April 2007) for continuous point source emissions sources. *"Environmental, Health and Safety Guidelines-HEALTHCARE FACILITIES* detail air emission levels for hospital waste incineration facilities including dioxins.	
Air quality standards	Uganda's national air quality standards do not specify size/ capacity of facility they apply to.	WBG Guidelines apply to **significant** emissions sources which are able to contribute a net emissions increase of one or more of the following pollutants within a given air shed: ▪ PM_{10}: 50 tons per year (tpy); ▪ NOx: 500 tpy; ▪ SO_2: 500 tpy; ▪ Combustion sources with an equivalent heat input of 50 MWth or greater.	

b) Laboratory facility design considerations

These guidelines advise that design and functional layout of laboratory should ensure the following:

- Ample space must be provided for the safe conduct of laboratory work and for cleaning and maintenance.
- Walls, ceilings and floors should be smooth, easy to clean, impermeable to liquids and resistant to the chemicals and disinfectants normally used in the laboratory.
- Floors should be slip-resistant.
- Bench tops should be impervious to water and resistant to disinfectants, acids, alkalis, organic solvents and moderate heat.

- Illumination should be adequate for all activities. Undesirable reflections and glare should be avoided.
- Laboratory furniture should be sturdy. Open spaces between and under benches, cabinets and equipment should be accessible for cleaning.
- Storage space must be adequate to hold supplies for immediate use and thus prevent clutter on bench tops and in aisles. Additional long-term storage space, conveniently located outside the laboratory working areas, should also be provided.
- Space and facilities should be provided for the safe handling and storage of solvents, radioactive materials, and compressed and liquefied gases.
- Facilities for storing outer garments and personal items should be provided outside the laboratory working areas.
- Facilities for eating and drinking and for rest should be provided outside the laboratory working areas.
- Hand-washing basins, with running water if possible, should be provided in each laboratory room, preferably near the exit door.
- Doors should have vision panels, appropriate fire ratings, and preferably be self-closing.
- At Biosafety Level 2, an autoclave or other means of decontamination should be available in appropriate proximity to the laboratory.
- Safety systems should cover fire, electrical emergencies, and emergency shower and eyewash facilities.
- First-aid areas or rooms suitably equipped and readily accessible should be available
- Consideration should be given to the provision of mechanical ventilation systems that provide an inward flow of air without recirculation. If there is no mechanical ventilation, windows should be able to be opened and should be fitted with arthropod-proof screens.
- A dependable supply of good quality water is essential. There should be no cross-connections between sources of laboratory and drinking-water supplies. An anti-backflow device should be fitted to protect the public water system.
- There should be a reliable and adequate electricity supply and emergency lighting to permit safe exit. A stand-by generator is desirable for the support of essential equipment, such as incubators, biological safety cabinets, freezers, etc.
- There should be a reliable and adequate supply of gas. Good maintenance of the installation is mandatory.
- Laboratories are occasionally the targets of vandals. Physical and fire security must be considered. Strong doors, screened windows and restricted issue of keys are compulsory. Other measures should be considered and applied, as appropriate, to augment security.

c) Waste Handling

Waste from laboratory can be divided into five groups:

1. Non-contaminated (non-infectious) waste that can be reused or recycled or disposed of as general, “household” waste;
2. Contaminated (infectious) “sharps” – hypodermic needles, scalpels, knives and broken glass; these should always be collected in puncture-proof containers fitted with covers and treated as infectious;

3. Contaminated material for decontamination by autoclaving and thereafter washing and reuse or recycling;
4. Contaminated material for autoclaving and disposal; and
5. Contaminated material for direct incineration.

In laboratories, decontamination of wastes and their ultimate disposal are closely interrelated. In terms of daily use, few if any contaminated materials will require actual removal from the laboratory or destruction. The overriding principle is that all infectious materials should be decontaminated, autoclaved or incinerated within the laboratory.

Laboratory facilities should establish, operate and maintain a contamination containment system adequate for the scale and type of activities and identified hazards but entailing:

- A system to identify and separate infectious materials and their containers should be adopted. Categories should include:
  - Sharps
  - Contaminated (potentially infectious) materials for autoclaving and reuse
  - Contaminated (potentially infectious) materials for disposal
- Effective decontamination or disinfection of objects or material by an approved procedure.
- Containment of decontamination potential hazard residues prior to disposal.
- Appropriate packaging for immediate on-site incineration or transfer to another facility.

These guidelines recognize breakdown of the pathogen containment as a key source of contamination in laboratory facilities.

d) Chemical, fire, electrical, radiation and equipment safety

Workers in clinical laboratories are not only exposed to pathogenic microorganisms, but also to chemical, electrical, radiation and fire hazards. In addition, a breakdown in the containment of pathogenic organisms may be the indirect result of chemical, fire, electrical or radiation accidents. It is therefore essential to maintain high standards of chemical, fire, electrical, radiation and equipment safety in any microbiological laboratory.

It is mandatory that Laboratory facilities establish and maintain operation and safety manual adequate for the scale and type of activities but entailing:

- Staff induction and regular training on health and safety;
- Chemical containers clearly labelled and capped;
- Keep records of material safety data sheets or other chemical hazard information from chemical manufacturers and/or suppliers, and made accessible in laboratories where these chemicals are used;
- Only amounts of chemicals necessary for daily use should be stored in the laboratory. Bulk stocks should be kept in specially designated rooms or buildings;
- Avail appropriate spillage charts and displayed in a prominent position in the laboratory;
- Provision of chemical spill kits;

- Compressed gas cylinders and liquefied gas containers securely fixed (for example, chained) to the wall;
- Prominent display of fire warnings, instructions and escape routes in each room and in corridors and hallways;
- Provision of fire-fighting equipment placed near room doors and at strategic points in corridors and hallways: Fire extinguishers should be regularly inspected and maintained, and their shelf-life kept up to date;
- Regular inspection and testing of all electrical installations and equipment, including earthing/ grounding systems;
- Installation of Circuit-breakers and earth-fault-interrupters in appropriate laboratory electrical circuits;
- Earthing/ grounding all laboratory electrical equipment, preferably through three-prong plugs;
- All laboratory electrical equipment and wiring should conform to national electrical safety standards and codes.

6 POTENTIAL SOCIO-ENVIRONMENTAL IMPACTS

6.1 INTRODUCTION

In this chapter, prediction and analyses possible positive and negative impacts of construction, equipping and operation of satellite laboratory in Arua RRH is presented. Since the proposed site for the project is within an already established hospital, most of the socio-environmental impacts associated with this project will be direct in nature and mostly result from construction activities. Impact analysis involved determination of magnitude, extent, duration and significance of potential impacts. A detailed assessment of impacts is presented in sections below.

6.2 CONSTRUCTION-PHASE IMPACTS

6.2.1 Positive Impacts

6.2.1.1 Income to material/ equipment suppliers and contractors

Development of the project will entail civil works requiring materials such as gravel, bricks, lumber, steel reinforcement and cement. This is a ***positive*** but ***short-term*** and ***reversible*** impact. Considering that construction labour would be local or national but medical equipment procured internationally, this impact has local, national and international spatial extent.

Enhancement measure*:* Earth materials needed for construction, for example, murram, aggregate (stones and sand) are obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly promotes environmental degradation at illegal quarry sites and can cause medium- to long-term negative impacts. It should therefore be a contractual obligation for contractors to procure construction materials from quarries legitimately licensed by Arua District Local Government.

6.2.1.2 Employment

Construction will avail skilled and unskilled job opportunities. This would be a ***positive*** but ***short-term*** and ***reversible*** impact, lasting only during the construction period.

Enhancement measure*:* Wherever feasible, local people should be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

6.2.2 Negative Impacts

6.2.2.1 Waste generation (improper construction waste management)

Solid waste will be generated at the site during site preparation and construction phases. The waste may consist of timber or metal cuttings, excavated materials, paper/cement bags, empty paint and solvent containers, broken glass among others. Some of the waste materials such as paints, cement, adhesives and cleaning solvents contain hazardous substances, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have ***long-term*** and ***cumulative*** effects on the environment. It impacts on the environment through blockage of drainage systems and negative impacts on human health. Other wastes which will be generated by non-

construction activities because of the presence of the workers at the site include food debris, contaminated water from washing, cleaning equipment, construction tools and vehicles.

Inappropriate disposal of construction waste or spoil could have medium or long-term environmental and public health impact. Extent of this impact will be local to areas where waste is dumped or their immediate neighbourhoods.

Likelihood of the impact occurring is high considering prevalent lack of facilities to handle construction waste in all areas comprising project facilities. Where inappropriately dumped construction waste contaminates environmental resources (soil and water) in communities or causes public health effects, significance of this impact would be high. The intensity of the impact will be ***low*** and given that there are minimal water resources in the area, sensitivity of receptors is rated ***low***. Hence significance of the impact is ***minor***.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) The wastes will be properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated stone materials can be used as backfills.
ii) Hazardous waste will not be mixed with other solid waste generated and should be managed by way of incineration or land-filling.
iii) Waste will be picked off the site at least once in 24 hours and when temporarily kept on site it will be covered to minimize nuisance odour and vermin.
iv) The contractor and hospital administration will work together with the Municipal Council to facilitate proper waste handling and disposal from the site. All wastes must be taken to the approved dumpsites.
v) Hazardous wastes such as paints, cement, adhesives will be managed through a third party contractor certified by NEMA. The contractor and hospital administration will work together to facilitate sound waste handling and disposal from the site.

6.2.2.2 Pressure on existing resources

During the construction stage, demand for basic amenities such as water and electricity may put pressure on the existing infrastructure.

Considering the nature of the project, the impact ***intensity*** shall be ***low*** and *short term* limited to the construction phase only. The hospital has power backup and it was reported to be stable. The hospital has a water reservoir although it is not big enough to sustain the hospital demand. However, the ***sensitivity*** on the receptors will be ***high*** since it hampers with utility supplies to hospital community, thereby giving a ***moderate*** impact *significance*.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

The contractor should provide separate storage for water to use at the construction. Instead of connecting to the hospital water supply system, the contractor should opt to use water bowsers for supply.

6.2.2.3 Generation of noise

Noise will be one of the most undesirable consequences of the construction phase. Relatively high noise levels are expected in the area during construction phase. Considerable levels of noise and vibrations will mainly result from use of heavy equipment including bulldozers, graders and dump trucks during site preparation and construction activities. Though the level of discomfort caused by noise is subjective, the most commonly reported impacts of increased noise levels are interference in oral communication and disturbance in sleep or during resting time, disturbance or discomfort resulting from construction noise cannot be ruled out given that the proposed site is located in the vicinity of other hospital units (Photo 4.1 & Photo 4.2).

Impact receptors include hospital staff, patients and their attendants. The impact *intensity* will be *medium* if an experienced contractor is contracted to carry out the construction activities. However, *sensitivity* on receptors will be *high* since the proposed site is less than 50 m from the surgical ward and the X-ray laboratory, hence a *major* impact *significance*.

Photo 4.1: Existing laboratory near the proposed project site

Photo 4.2: The surgical ward and other hospital units near proposed project site may be affected by construction activities.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) Contractor will be careful when selecting equipment to avoid use of old or damaged machinery with high level of noise emissions that would have a negative impact in the environment.
ii) Contractor will ensure that equipment is properly serviced and efficient.
iii) Contractors will cordon off construction site with noise absorbing materials, for example, plywood rather than iron sheets.
iv) Construction workers will be aware of the sensitive nature of workplaces they are operating in and advised to limit verbal noise or other forms of noise. For example, metallic objects or tools can be passed on to a colleague rather than dropping or throwing them with loud bangs.
v) The contractor shall ensure that noise levels emanating from machinery, vehicles and noisy construction activities are kept at a minimum for the safety, health and protection of people in the nearby buildings.
vi) Noise and vibration will be minimized at the project site and surrounding areas through sensitization of construction truck drivers to switch off vehicle engines while offloading materials.
vii) All generators and heavy duty equipment will be insulated or placed in enclosures to minimize disrupting ambient noise levels.

6.2.2.4 Traffic and associated emissions

Traffic-borne emissions include dust and exhaust fumes. Dust emissions will arise from construction activities, earthworks and construction traffic. The trucks used to transport various building materials from their sources to the project site generate emissions of SO_2, CO_2, CO, NO_x and particulates. The impacts of such emissions can be greater in at the construction site and through communities construction vehicles will travel. Impact receptors include communities along the haulage routes, road-side markets and shops, construction workers and possibly hospital residents (workers and patients).

The hospital is located close to the main highway with high traffic thus the impact ***intensity*** will be ***low.*** This is in addition to the intermittent and short term nature of activities. However, the ***sensitivity*** on the receptors will be ***high*** since there could be asthmatic construction workers, patients and health workers in the vicinity of the proposed site resulting in a ***moderate*** impact significance.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) Construction activities will be carried out during the day.
ii) Travel speeds of construction vehicles especially through business centres will be controlled;
iii) Trucks shall be covered during haulage of construction materials;
iv) Wherever dust suppression is necessary, water will be sprayed over dusty areas;
v) Construction equipment will be maintained in good operating condition to reduce exhaust emissions;
vi) All equipment leaving the site, clean up their tires in case they are dirty; and
vii) Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility.
viii) Workers will be provided with PPE and the use of PPE shall be enforced.
ix) The project area will be cordoned off to minimise dust migration to nearby facilities by wind.

6.2.2.5 Temporary scenic blight

Construction activities will require material, equipment and cordons at the hospital. Since the hospital will remain open for access by public, presence of these activities and materials thereof will cause temporary visual blight at the construction site. Presence of construction activities will alter visual impressions accustomed to.

Duration of visual impact will be ***short-term*** only lasting through the construction phase. The impact ***intensity*** will be ***very low*** considering the dilapidated state of all existing facilities; therefore ***sensitivity*** on receptors will be ***low***, hence ***minor*** impact significance.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategy: The contractor shall ensure minimal footprint of construction activities.

6.2.2.6 Occupational health safety (OHS) Risks for Contractors

Construction activities have potential to pose occupational risks some of which could be life-threatening, for example, fatal falls if workers do not use safety latches when working at heights. Working with high voltage and hot works (welding) pose a risk of electrocution. In addition, falling debris could injure workers if personal protective equipment (PPE) are not provided or properly used. Back injury could occur if workers lift heavy objects using inappropriate body posture. Other potential hazards might be: inadequate lighting during the night working hours or limited level of visibility during rainstorms creating difficulty for staff driving heavy equipment, driving equipment with improper brake system, lack of concentration while working and exposure to hazardous wastes such as paints, cement, adhesives and cleaning solvents. Duration of the impact will be ***short-term*** occurring only during the construction phase. Extent of the impact will be ***local or national*** depending on origin of construction workers.

Uganda and WBG Guidelines require that workers exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day wear hearing protection. Related OHS safeguards are comprised in (Uganda's) *Occupational Safety & Health Act (2006) and Employment Act,* 2006.

The likelihood of the impact occurring will be high considering the usually low level of safety at construction sites in Uganda. Intensity of the impact will be ***medium*** given that some accidents could be minor and not life threatening while others can be grave leading to permanent disability or loss of life of construction workers. Sensitivity of the receptor is ***medium*** resulting in a ***moderate*** impact significance.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) Orient all construction workers on safe work practices and guidelines and ensure that they adhere to them.

ii) Training will be conducted on how to prevent and manage incidences. This will involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All workers will fully be aware and mentally prepared for potential emergency.

iii) Regular drills shall constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences.
iv) Use signage to warn staff and/ or visitors that are not involved in construction activities of dangerous places.
v) Strict instructions shall be given for drivers of heavy equipment.
vi) Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work equipment.
vii) Communication will be ensured in between workers and drivers of heavy equipment.
viii) Develop evacuation procedures to handle emergency situations.
ix) Provide adequate OHS protective gear to construction workers. The guide below shall be useful:

Hearing (Over 80 Decibels for 8 hours a day requires hearing protection)

- Ear Muffs: One size fits all, comfortable, less ear infection risk
- Ear Plugs: Small, lightweight, can get dirty and cause infection

Face/Eye (Working with any chemical or using any mechanical equipment)

- Face Shield: Protect face from splashing and particles
- Safety Glasses: Protection from solids (cutting, sanding, grinding)
- Safety Goggles: Protects eyes from splashing

Hand (Use correct gloves for the job)

- Chemical Gloves: (Nitrile, Latex, PVC)
- Gloves for other use: special gloves for cutting, burning, abrasions/ blisters

Body

- Overalls: Can protect against dust, vapours and splashes

Foot Protection

- If electrical hazard present ensure boots offer protection
- Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists
- Water/Chemical Resistant Boots: Use in a spill situation
- Non-slip boots for working on wet/slippery floors.

6.2.2.7 Accidents

The hospital is located in the business district of the municipality with a lot of human activity on the adjoining road at the access gate to the hospital. With an increase in number of heavy vehicles during transportation of construction materials and equipment, there will be an increase of community risk of traffic-related accidents or injuries. Traffic accidents would be a significant social impact and especially likely to involve children, women (who commonly cross roads slower than men), disabled and elderly people, notwithstanding the safety risks created by the falling debris from construction activities.

Hoardings and scaffoldings may cause accidents detrimental to human life if they collapsed.

Duration of the impact will be *short-term* occurring only during the construction phase. Extent of the impact will be *local or regional* depending on origin of construction workers. The likelihood of the impact occurring is ***medium*** considering the usually low level of road safety caution by drivers and pedestrians in Uganda. The ***sensitivity*** of receptors is ***high*** given that some accidents would lead to permanent damage and others loss of life while ***the intensity*** of the impact is ***low*** given the relatively high volume of traffic assessing the hospital. Therefore significance of the impact is ***moderate***.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) Contractors will adopt best transport safety practices with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public, as follows:

- Contractors will emphasise safety among all drivers. Specifically they will ensure drivers respect speed limits through trading centres and areas with public institutions;
- Traffic guides will be positioned at road junction to the hospital to control driver speeds;
- Safe traffic control measures will be used, including road signs and flag persons to warn of dangerous conditions and children crossings.

ii) Project will require contractors to regularly maintain vehicles to minimize potentially serious accidents such as those caused by brake failure commonly associated with loaded construction trucks.

iii) The site shall be fenced and signs put in place with security personnel to stop unauthorised people from accessing the site.

iv) For falling debris, and hoarding/scaffoldings; clear warning signs will be placed around the construction premise, install interceptors and net traps to divert falling debris, and emphasize (provide) person protective gears to persons in the area.

v) Warning signs will be provided to warn of falling debris.

vi) Protective gear shall be provided to workers on site.

6.2.2.8 Social misdemeanour by construction workers

While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. Irresponsible sexual relationships in project communities can break families and heighten risk of contracting HIV/AIDS. Illicit sexual relationships can be short-term but have long-term and irreversible

effects if HIV or Hepatitis-B were contracted. If this impact occurred, extent of disease spread would be local or national depending on origin and next destination of infected persons.

Duration of the impact will be short-term or long-term depending on whether HIV/AIDS is contacted and the extent of the impact will be local or national depending on origin of construction workers. The likelihood of the impact occurring is low if contractor adequately sensitise workers about responsible and safe behaviour. The ***intensity*** of the impact is ***very low*** given the small size of the project. ***Sensitivity*** of the receptor is rated ***medium*** given that HIV/ AIDS is a long-term effect if contracted. Therefore significance of the impact is ***minor***.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution.
ii) All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.

6.3 OPERATION PHASE IMPACTS

6.3.1 Positive Impacts

6.3.1.1 Improved medical surveillance services

The project will positively impact health of Ugandans and the East African region through easing access to diagnostic services for TB and other communicable diseases. It will help to enhance access to diagnostic services for vulnerable groups; improve capacity to provide specialized diagnostic services and conduct drug resistance monitoring; and strengthen laboratory based disease surveillance to provide early warning of public health events.

Enhancement measures: Appropriate staffing with technical/ medical personnel adequately trained in use of newly installed equipment.

6.3.1.2 Employment opportunities

Operation of the laboratory will create additional long-term technical and non-technical job opportunities for medical professionals, janitors, etc.

***Enhancement measure**:* Wherever feasible, local qualified people will be considered for job opportunities. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

6.3.2 Negative Impacts

Negative impacts during operation of the laboratory may arise from:

i) Improper waste management (including laboratory/medical waste and wastewater discharges);
ii) Misuse or inability to use installed equipment for improved service delivery;
iii) Lack of maintenance, hence laboratory facilities degenerating to decay again;
iv) Safety and occupational risk to health workers; and
v) Risk of fire outbreak
vi) Emissions from the incinerator.
vii) Theft of laboratory equipment
viii) Theft and misuse of laboratory reagents, especially highly concentrated acids known to be used in vengeful attacks on people in Uganda

These are discussed in sections below.

6.3.2.1 Improper management of waste

As a result of the operation of this laboratory it is expected that some waste is generated. Mainly there will be *domestic waste and hazardous waste.* Since laboratory activities involve certain medical examinations and also there will be a need for usage of different sorts of chemicals or reagents, it can be concluded that different types of hazardous wastes shall be generated. Therefore, improper waste decontamination and disposal can cause public health risks due to environmental pollution: impaired air quality, stormwater contamination of water courses and infections when people or children rummage through improperly dumped infectious waste or raw waste stockpiles can be life-threatening.

The World Health Organization (WHO) classifies as infectious waste: sharps (needles, scalpels, etc.), laboratory cultures and stocks, blood and blood products, pathological wastes, and wastes generated from patients in isolation because they are known to have infectious diseases. Medical wastes can also include chemicals and other hazardous materials used in patient diagnosis and treatment. These constitute a grave risk, if they are not properly treated or disposed or are allowed to get mixed with other municipal waste. Examples of the types of bio-medical waste expected to be generated from the laboratory during the operational stage are indicated in Table 6.1.

Table 6.1: Expected waste from the laboratory

Type of waste	Waste description
Infectious solid waste	Items contaminated with blood and body fluids, including cotton, pathological wastes, infected blood, patient samples and specimens
Microbiology Waste	Cultures; stocks and microorganisms; dishes and devices used for culture
Sharps	Needles; syringes; scalpels; blades; glass, etc.
Disposables	Disposables other than sharps, e.g. Gloves, valves, and any other infected plastics
Liquid Waste	Waste generated in the laboratories

Type of waste	Waste description
Chemical Waste	Chemicals used in the production of biological, laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; outdated, contaminated and discarded chemicals
Incineration Ash	Ash from the incineration of any biomedical waste

Likelihood of the impact occurring is low given that the hospital is currently managing their waste fairly well. It is a long-term impact, local and cumulative in nature hence the ***intensity*** of the impact will also be ***low.*** However, ***sensitivity*** of receptors due to improper medical waste management is ***medium***, thereby giving a ***moderate*** impact significance.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) An incinerator will be installed on site to enhance disposal relevant material through burning.
ii) Wastewater discharged from laboratory shall be aggregated and eventually pre-treated prior being discharged into the sewerage system.
iii) Appropriate waste bins will be provided for the different types of waste generated in the laboratory to allow segregation and collection at the point of generation.
iv) Waste shall be collected from site at least once in 24 hours, and it shall be done in such a way to minimize nuisance odours, vermin and dust
v) Hospital/ Laboratory staff shall be trained or educated on the importance and means of waste management and handling during operation.
vi) The hospital administration shall work together with a private refuse handlers and the Municipal Council to facilitate sound waste handling and disposal from the site noting that hazardous waste must not be mixed with municipal waste.
vii) The laboratory will ensure proper waste management practices as recommended in the study on improvement of healthcare waste management in Uganda[1].

6.3.2.2 Air pollution due to incineration of waste

Incineration of laboratory waste if carried out in an inappropriate facility could result into localized pollution of air. The key emissions to the air from operation of the incinerators are odour, particulate

[1] *MoH 2005 (revised march 2009): Improvement of healthcare waste management in Uganda (conducted by Carl Bro)*

matter, hydrogen chloride, nitrogen oxides, sulphur dioxide, carbon monoxide, and volatile organic compounds (from methane to polycyclic aromatic hydrocarbons (PAH), dioxins and furans (PCDD/F) Dioxins are known to promote cancers in humans. Downwash of incinerator emissions has potential to degrade indoor air quality for buildings.

Duration of onsite and offsite air pollution would be *long-term* lasting entire life of incineration units and cumulative in nature since there are incinerators being operated on site. The ***intensity*** of the impact will be ***low*** if incinerator stacks design proposed in WBG EHS Guidelines: "Air emissions and ambient air quality" is adopted. However, ***sensitivity*** of health of patients and nearby communities to potential air pollution is ***medium*** since there are operating units in place, thereby giving a ***moderate*** impact significance.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) The laboratory will ensure that operator of incineration unit is properly trained;
ii) The incinerator shall be operated at its design temperatures and combustion air supply;
iii) Consultations with potentially affected people shall be done by design consultant to inform choice of the most appropriate location of incinerator;
iv) The laboratory will be equipped with bio-safety areas and have a ventilation system that fulfils standards of biosafety;
v) All exhaust air from the laboratory shall pass through high efficiency particulate air filters; and

6.3.2.3 Occupational health and safety risks

Inadequate treatment or handling of contaminated samples or waste can have potential to expose laboratory staff to risk of transmission of life threatening infections at work. This transmission can take place through equipment, clothing and vehicles transporting samples. The infectious waste could be in gaseous, liquid or solid forms. A list of OHS risk sources for staff is presented below:

i) Inadequate lighting and ventilation in workplaces
ii) Lack of safe access particularly for disabled employees
iii) Lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and handling of samples
iv) Misuse of equipment and materials for functions they are not designed

v) Lack of safety signage in specific areas
vi) Electrical hazard
vii) Eye hazards such as splashes
viii) Chemical hazards (acids, alkalis, expired drugs, oxidizing and reactive chemicals)
ix) Biological hazards (samples of blood or other body fluids with potential to cause diseases). Biological agents can be classified into four groups[2]:

1: Biological agents unlikely to cause human disease;
2: Biological agents that can cause human disease and are likely to require additional controls, but are unlikely to spread to the community;
3: Biological agents that can cause severe human disease, present a serious hazard to workers, and may present a risk of spreading to the community, for which there usually is effective prophylaxis or treatment available and are thereby likely to require extensive additional controls;
4: Biological agents that can cause severe human disease, are a serious hazard to workers, and present a high risk of spreading to the community, for which there is usually no effective prophylaxis or treatment available.

Duration of the impact would be ***long-term*** lasting entire life of the affected person or short-term depending of the hazard exposed to. The intensity of the impact is ***low*** if ''facility design'' (see section 0) proposed in WBG EHS Guidelines is adopted and PPE used by workers. However, ***sensitivity*** on the receptors will be ***high***, thereby giving a ***moderate*** impact *significance*.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies the laboratory will undertake are:

i) The primary measure to mitigate OHS impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. In part this can be achieved by following GIIP or national guidelines. For unavoidable risks, personal protective equipment (PPE) should be provided to workers.
ii) Orient all staff on safe work practices and guidelines and ensure that they adhere to them.
iii) Training staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences.

[2] *World Health Organization (WHO) Classification of Infective Microorganisms by Risk Group (2004).*

iv) Regular safety drills to constantly follow on various possible incidences.
v) Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places.
vi) Develop evacuation procedures to handle emergency situations.
vii) Provide adequate OHS protective gear for all laboratory staff.

6.3.2.4 Risk of fire outbreak

Without provisions for fire safety, there is a risk of fire outbreak in the laboratory with disastrous life and financial impact. Fires can start from ignitable materials in laboratories, cigarette smoking in non-designated places or old electrical connections.

Duration of the impact would be long-term lasting entire life of laboratory operation phase, local in spatial extent affecting onsite facilities, patients, health workers and neighbouring communities with possibly irreversible and the likelihood of the impact occurring and its intensity are ***low*** if ''facility design'' (see section 0) proposed in WBG EHS Guidelines and WHO "facility design" (see section 0) are adopted. However, ***sensitivity*** on the receptors will be ***medium***, thereby giving a ***moderate*** impact ***significance***.

Impact significance:

			Sensitivity of receptor			
			Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low**	**1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	**2**	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	**3**	3 Minor	6 Moderate	9 Moderate	12 Major
	High	**4**	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

i) Fire extinguishers to be provided at strategic locations within the laboratory and ensure that all fire-fighting equipment are regularly maintained and serviced.
ii) Key healthcare staff shall have training in fire control through regular firefighting drills.
iii) Fire emergency telephone numbers shall be displayed in communal areas.
iv) Automatic fire alarm system for the entire laboratory will be installed and water hose reels installed in the laboratory.
v) Fire hazard signs such as 'No Smoking' signs will be provided. Directions to exit in case of any fire incidence and emergency contact numbers shall be provided. The contact/emergency numbers shall be displayed within the laboratory.

7 KEY STAKEHOLDER VIEWS

Stakeholders consulted had the following views, some of which were utilised in above impact identification and analysis.

i) There have been challenges with facilities at various locations within the district especially planning for such facilities without consulting the relevant authorities.
ii) During construction of the proposed laboratory, Arua district engineers should be included on the team that will supervisor the works. The contractor should work together with Aura district officials during construction, these include: District Environmental Officer and Health Officer.
iii) Since Arua district is visited by many people for trade, it has often suffered many disease outbreaks. Arua regional Referral Hospital caters for Arua population and people from the neighbouring districts and countries (DRC and Southern Sudan). Therefore construction of the laboratory is welcome and should commence as soon as possible.
iv) Given its location, a lot of cross border trade can lead to disease outbreaks, and personnel sometimes have to move to neighbouring districts to address such challenges including an increase in demand for laboratory services. Therefore training of personnel should also be provided.
v) Arua municipality is also a busy town with many motorcyclists, motorists, bicycles and pedestrians and therefore the contractor should exercise caution when transporting materials to the site.
vi) During operation of the laboratory, waste must be properly managed to avoid public health impacts and disease spread.
vii) All laboratory workers should be properly safeguarded against occupational risks that would expose them to work-related accidents and infections.

8 ENVIRONMENTAL-SOCIO MANAGEMENT PLAN (ESMP)

This environmental-socio management plan, ESMP (Table 8.1) for proposed construction works and operation of laboratory facility, identifies potential environmental and social aspects that should be monitored. It identifies parties responsible for monitoring actions, associated costs, indicators and training or capacity building needs and reporting. Various aspects of the ESMP are detailed in sections below

8.1 INSTITUTIONAL ARRANGEMENTS

a) Institutional structure and responsibilities

Institutional responsibility of implementing this ESMP will rest with the Project Coordination Unit, PCU (or Task Team) at MOH. A key role of the unit would be among others, to review consultants' reports for compliance with the ESMP. Other roles will be:

- Monitoring implementation of mitigation actions by contractors
- Coordinating training and capacity building where planned
- Periodically report to IDA about implementation of the ESMP

The Project Coordination Unit is led by a Project Coordinator (PC), assisted by a Deputy Project Coordinator (DPC) under whom are 9 Component Coordinators (CC) each for areas such as Human Resource, Health Infrastructure, Leadership & Management, etc. Under CCs are 11 Focal Persons (FP) who have supervisory roles and are responsible for collecting information about respective components. Supervision of implementing this ESMP will under the Health Infrastructure component by the "Senior Engineer-Sanitary" in the Environmental Health Division.

MOH should ensure that all its personnel to be involved in implementation of this ESMP are adequately qualified and were appointed based on their qualification and suitability for respective roles. There is thus no training provided for them under this ESMP.

Oversight to ensure mitigation actions are implemented will rest with the Health Infrastructure Division (HID) at Ministry of Health but health workers at facility level, Project Coordination Unit, In-charge Officials of each facilities and Clerk of Works will have similar responsibility.

MOH shall require contractors to comply with this ESMP and where a contractor has an Environmental Officer she/he will undertake environmental supervision during construction. However, since construction duration is short (1 year) where a contactor does not have an Environmental Officer the supervising engineer or site manager/ contract manager should be given environmental orientation relevant to this ESMP so as to execute required environmental supervision roles. This might not be necessary if the supervising engineer has working environmental knowledge (most civil engineers do). Additionally a "Clerk of Works" should be employed to represent client's environmental objectives and interests during construction phase. As a hiring criterion, such a person should have a background in environmental issues, particularly associated with construction projects.

In each District is found a District Environmental officer (DEO) responsible for overseeing environmental protection on behalf of NEMA. However in town councils and municipalities, this role is undertaken by Town- and Municipal Environmental Officers respectively. These will have implementation and monitoring roles during execution of this ESMP. Usually, these officials lack adequate facilitation so the project will need to provide auxiliary financial assistance for them to have effective participation in this project. This has been provided in the ESMP (Sec 6.2.2.5). Based on their professional knowledge or recommendations in this ESIA, local environmental officers may have role in project design as advisors to engineering consultants on aspects such as location of onsite incineration units.

b) Monitoring and reporting arrangements

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ESIA are implemented and their effectiveness. Monitoring will also identify any unforeseen impacts that might arise from project implementation.

Who monitors and how: Monitoring will be undertaken by MOH (PCU) and Environmental Officers who represent NEMA at local administrative. Monitoring by NEMA in this case can be considered "third party monitoring" but this is its regulatory mandate according to Sections 6 and 7 of the National Environment Act (Cap 135).

Another government agency that may undertake "third party monitoring" is the Occupational Health & Safety Department in Ministry of Gender, Labour & Social Development (MGLSD). This unit has authority to inspect any facility for compliance with national requirements on safety in workplaces. The project shall make no funding to MGLSD since this is provided for in its annual budget.

Monitoring will be done through site inspection, review of grievances logged by stakeholders and *ad hoc* discussions with potentially affected persons (construction workers, residents near the hospital, patients and healthcare staff). At each monitoring, a discussion with a chairperson of environment committee of the area's local council (LC) could provide insight into views and grievances community has about the project.

Frequency: Monitoring will be undertaken monthly over the 1 year construction period.

Audits: Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement within 12 months and not more than 36 months after completion of construction, according to national EIA Regulations, 1998 Section 31(2).

Since construction duration is estimated to be 1 year, this ESMP has included a budget for **1 year's** construction audit and a separate provision so that from year 2 to 5th (4 audits) audits done are a full environmental audits as per Uganda requirements.

Both construction and post-construction audits can be conducted internally (by MOH) or by a consultant hired by MOH. If undertaken by a hired consultant, a budget has been proposed for both in this ESMP.

Reporting: Concise monthly monitoring reports should be compiled by MOH's Project Coordination Unit (PCU) and shared with IDA or other interested stakeholder.

Construction- and post-construction phase auditing should culminate in reports that MOH shall share with IDA, NEMA or other interested stakeholders. Note that while MOH is under no obligation to disclose construction phase audits, annual post-construction audits must be submitted to NEMA as a regulatory requirement as per Section 31(2) of National EIA Regulations, 1998.

8.2 GRIEVANCE MECHANISM

This section describes avenues for affected persons to lodge a complaint or express a grievance against the project, its staff or contractors during project implementation. It also describes the procedures, roles and responsibilities for addressing grievances and resolving disputes. Every aggrieved person shall be able to trigger this mechanism to quickly resolve their complaints.

The objectives of the grievance process are:

i) Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
ii) Verify that complaints are satisfied with outcomes of corrective actions;
iii) Avoid the need to resort to judicial proceedings.

The grievance mechanism at each healthcare facility will be fed from three main sources:

- Community residents, patients or health workers.
- Supervising engineer, clerk of works or contractor.
- Monitoring team who will forward issues/concerns identified in the field.

Steps of the grievance process are described below. A flow chart outlining the main actions and decision points is shown in Figure 8.1.

Step 1: Receipt of complaint

A verbal or in written complaint from a complainant will be received by the Clerk of Works and recorded in a complaints log s(he) keeps on site. The log will indicate grievances, date lodged, action taken to address complaint or reasons the grievance was not acted on; information provided to complainant and date the grievance was closed. Grievances should be lodged at any time, either directly to the Clerk of Works' office or through the Local Council Chairperson. The process for lodging a complaint is outlined below:

i) Clerk of Works receives complaint(s) from complainant and records it in log (in English).
ii) Clerk of Works reads the recorded complaint translating it into local language for the complainant to confirm correct detail of complaint has been documented.
iii) Complainant signs the log to confirm grievance was accurately recorded.

Step 2: Determination of corrective action

If in his/her view, a grievance can be solved at this stage, the Clerk of Works will determine a corrective action in consultation with the aggrieved person. Remedial action(s) and timeframe within which they must be accomplished has been described and the party responsible for implementing them will be recorded in the complaint log.

Grievances will be resolved and status reported back to complainants within 5 days. If more time is required this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed not more than 1 month from lodging a grievance.

Step 3: Meeting with the complainant

The proposed corrective action and the timeframe in which it is to be implemented will be discussed with the complainant within 5 days of receipt of the grievance. Consent to proceed with the corrective action will be sought from the complainant and witnessed by a local council chairperson (LC Chairman).

Step 4: Implementation of corrective action

Agreed corrective action will be undertaken by the project or its contractor within the agreed timeframe. The date of the completed action will be recorded in the log against the complainant's grievance.

Step 5: Verification of corrective action

To verify satisfaction, the aggrieved person will be asked to return if not satisfied with the corrective action.

Step 6: Action by MOH and project contractors

If the Clerk of Works cannot solve the grievance, he will refer it to MOH (and contractor) through the Supervising Engineer. It is believed all possible grievances can be solved at this level.

The grievance process to be followed is depicted in Figure 8.1.

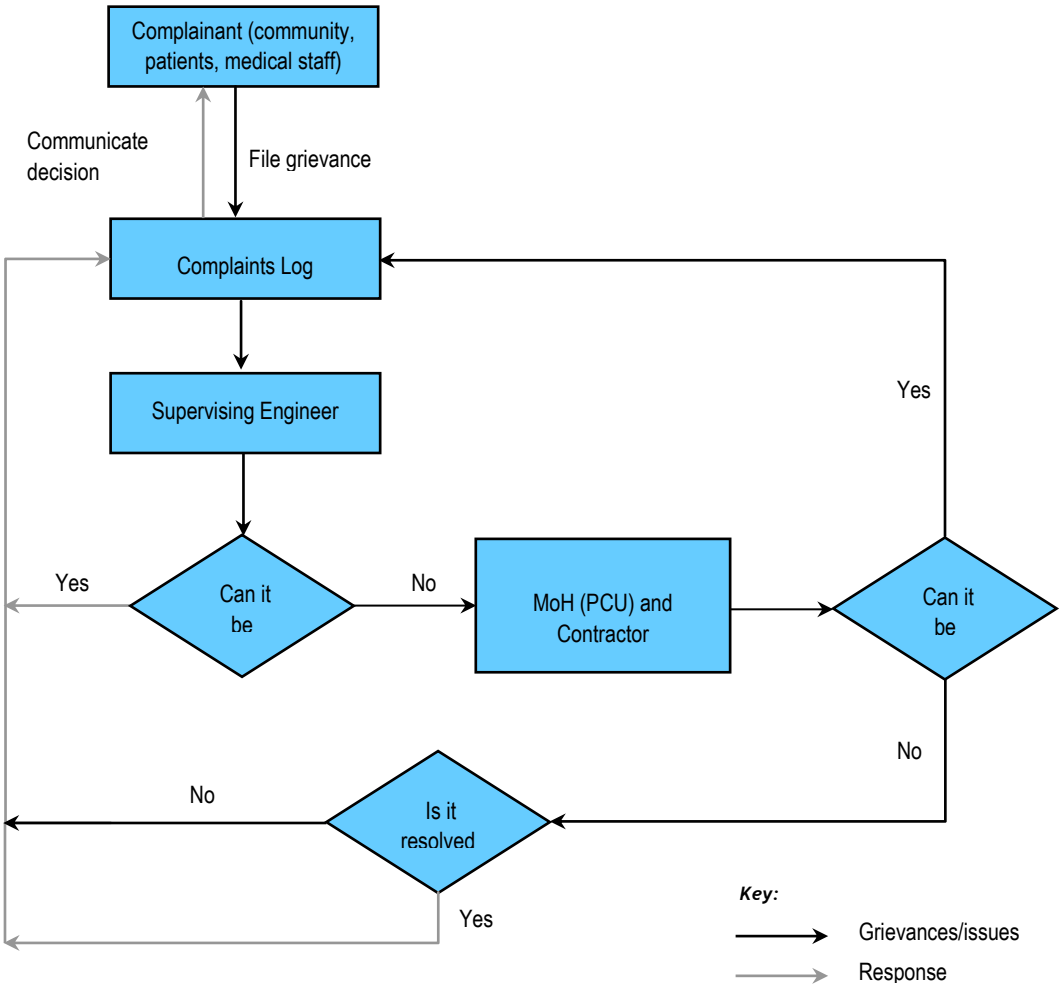


Figure 8.1 Grievance management mechanism

Table 8.1: Impact Monitoring & Management Plan.

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
6.2	**CONSTRUCTION PHASE**						
6.2.1	**Positive impact**						
6.2.1.1	**Income to equipment ad material suppliers**						
	Project will promote local procurement where technically or commercially reasonable and feasible.	Ensure that local communities and businesses benefit from procurement process	Number of local businesses benefiting from construction related procurement	Before and during commencement of construction	MOH; Contractor	Negligible	None
	For earth materials, procure from legitimate sources to avoid encouraging environmental degradation	Project's material demand does not encourage environmental degradation	All quarries from which materials (sand, stone) are obtained are licensed by the local authorities.	Before and during construction	MOH; Contractor	Negligible	None
6.2.1.2	**Employment**						
	Contractor will avail local communities with information leaflets in their local languages to create awareness about the proposed project activities	The participation of local community members in all project activities possible.	Local community awareness of project progress status	Before and during construction	MOH; Contractor	Negligible	None
	Unskilled labour will be recruited exclusively from local community, and semi-skilled labour will be recruited preferentially from such communities, provided that they have the requisite qualification, competence and desired experience.	The participation of local community members will be maximised during site preparation and construction activities.	Number of local people (unskilled and semi-skilled) employed during construction phase	Before and during construction	MOH; Contractor	Negligible	None
	Contractors will be encouraged to pay a "living wage" to all workers.	Improve livelihood of the local community	No complaints of poor remuneration	Before and during construction	MOH; Contractor	Negligible	None
	Contractors' employment activities on a monthly basis, including number of jobs created by employment type	Contractor has records of filled vacancies by; number of placement, level of skill, gender, type,	No complaints of inconsistencies in recruitment criteria and wages	Before and during construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	(skilled / semi-skilled / unskilled); number of jobs by gender, employment type and geographical area; total man hours and wages paid, by employment type, gender and geographical area; and rate of employee turnover by gender and area.	turnover, and man hours and wage.					
6.2.2	**Negative impacts**						
6.2.2.1	**Improper construction Waste management**						
	Contractor should seek guidance of local environmental officers to identify acceptable disposal sites	Contractor has records of proper waste disposal indicating quantities dumped and location of dumping site,	No report of illegal waste dumping in non-designated areas	Throughout construction	MOH ; Contractor; Local Environmental Officer.	Negligible	None
	Contractors should undertake waste segregation onset to separate hazardous waste from non-hazardous waste	Hazardous waste separated from non-hazardous waste on site and each waste stream disposed of according to NEMA requirements in designated sites.	Separate containers for hazardous waste and non-hazardous waste on site	Throughout construction	MOH ; Contractor; Local Environmental Officer.	Negligible	Likely hazardous and non-hazardous construction waste
	Waste (such as metal scrap or wood waste) that can be reused/ recycled may be given to local people.	Amount of waste disposed minimized by reuse, wherever feasible	Record of material types and estimated quantity diverted for reuse	Throughout construction	Contractor; local environment officer	Negligible	None
6.2.2.2	**Pressure on infrastructure**						
	Contractor should provide separate source and storage for to use for construction (use water bowsers for supply); should not connect	Uninterrupted water supplies to hospital community	No complaint of irregularities in water supply related to construction activities	Throughout construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	to hospital water supply system						
	Contractor should provide separate source power for construction (use generators); should not connect to hospital energy grid system	Uncompromised energy supply to hospital community	No complaint of irregularities in energy supply related to construction activities	Throughout construction	MOH; Contractor	Negligible	None
	Contractor should provide mobile onsite toilets and washrooms and washing water for workers.	Workers do not compete with hospital community for lavatory facilities.	Ablution facilities exist on site	During construction	MOH	Negligible (should be part of contractor's bid)	None
6.2.2.3	**Generation of noise**						
	Construction workers should be sensitised on the sensitive nature of workplace they are operating in and advised to limit verbal noise or other forms of noise. For example, metallic objects or tools can be passed on to a colleague rather than dropping or throwing them with loud bangs.	No excessive noise from workers	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Contractor should ensure that all equipment and machinery are in good and sound condition of old or damaged equipment with high level of noise emissions that would have a negative impact in the environment	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	All generators and heavy duty equipment should be insulated or placed in enclosures to minimize	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	disrupting ambient noise levels.						
	Contractor will ensure that equipment is properly maintained and fully functional.	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Contractors should cordon off areas under construction with noise absorbing materials, for example, plywood rather than iron sheets;	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Comprised in cost for control of flying debris	None
	The contractor should ensure that noise levels emanating from machinery, vehicles and noisy construction activities are kept at a minimum for the safety, health and protection of people in the nearby buildings.	Construction activities generate permissible levels of noise.	Patients and health workers do not complain about noise during construction	During construction	MOH; Contractor	Negligible	None
	Construction workers and drivers should be sensitised to switch off Equipment, machinery and vehicle engines when not in use and/or offloading materials.	Minimized noise and vibration at the project site.	Patients and health workers do not complain about noise and vibration during construction	During construction	MOH; Contractor	Negligible	None
	Construction activities should be carried out during the day	Afford hospital community noise-free night time to rest	No complaints of restless nights due to noise and vibration from project activities.	During construction	MOH; Contractor	Negligible	None
6.2.2.4	**Traffic and fugitive emissions**						
	The project area will be cordoned off to minimise on dust and emission migration to nearby facilities by wind;	No excessive dust emissions noted outside construction areas	No complaints of excessive dust from construction areas	During construction	MOH; Contractor	Comprised in cost for control of flying debris	None
	Truck drivers should be	Minimise dust and	No complaints of trucks ruthless	During	MOH;	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	sensitised on and ensure they observe speed limits on roads especially at business centres;	exhaust emissions	driving from communities along roads used by project vehicles	construction	Contractor		
	Trucks should be covered during haulage of construction materials;	No material spills on roads during haulage to sites	No accidents caused by construction material split on road	Throughout construction	MOH ; Contractor; Police	Negligible (this should be part of contractor's bid)	None
	Wherever dust suppression is necessary, water should be sprayed over dusty areas;	Minimise dust levels	Recognition of locales of contractor's efforts to minimise dust nuisance.	During construction	MOH; Contractor	Negligible	None
	Keep all construction equipment in good operating condition to reduce exhaust emissions;	Minimise air pollution levels	No complaints of excessive fumes	During construction	MOH; Contractor	Negligible	None
	All dust should be quickly swept away to avoid migration to other non-construction areas;	Reduce dust levels in off-site locations	No dust hips on-site	Throughout construction	MOH; Contractor	Negligible	None
	Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility;	Employment of best Construction practices to minimise adverse impacts	Implementation of proposed mitigation measures	Throughout construction	MOH; Contractor	Negligible	None
	Workers will be provided with PPE and the use of PPE shall be enforced;	Minimise OHS on workers from fugitive emissions	All workers on-set with appropriate PPE	Throughout construction	MOH; Contractor	Comprised in cost for provision of PPE	None
6.2.2.5	**Temporary scenic blight**						
	Contractor should ensure minimal footprint of construction activities.	Project workers and activities restricted to construction site	Workers and materials not found at locations away from construction site	Throughout construction	MOH; Contractor	Negligible	None
6.2.2.6	**Occupational health safety (OHS) for contractors**						
	Orient all construction workers on safe work	Reduce OHS on construction workers	Records of workers' orientation	Throughout construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	practices and guidelines and ensure that they adhere to them.						
	Training should be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency.	Reduce OHS on construction workers	Records of training and Impromptu interviews with workers on OHS emergency response	Throughout construction	MOH; Contractor	Negligible	None
	Regular drills should constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences.	Reduce OHS on construction workers	Records of drills on OHS emergency response	Throughout construction	MOH; Contractor	Negligible	None
	Use signage to warn staff and/ or visitors that are not involved in construction activities of dangerous places.	Reduce OHS on construction workers and the public	Presence of appropriate signage on-site	Throughout construction	MOH; Contractor	Negligible	None
	Supervision of works should be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices	Reduce OHS on construction workers	Presence of supervisor on-site	Throughout construction	MOH; Contractor	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	regarding safety at work equipment.						
	Develop evacuation procedures to handle emergency situations.	Reduce OHS on construction workers	Documented Emergency Response Preparedness Plan (ERPP)	Throughout construction	MOH; Contractor	Negligible	None
	Provide appropriate PPE to all workers not limited to; • Ear Muffs: One size fits all, comfortable, less ear infection risk • Ear Plugs: Small, lightweight, can get dirty and cause infection • Face/Eye (Working with any chemical or using any mechanical equipment) • Face Shield: Protect face from splashing and particles • Safety Glasses: Protection from solids (cutting, sanding, grinding) • Safety Goggles: Protects eyes from splashing • Hand (Use correct gloves for the job) • Chemical Gloves: (Nitrile, Latex, PVC) • Gloves for other use: special gloves for cutting, burning, abrasions/ blisters • Body • Overalls: Can protect	Reduce health and safety risks to construction workers	Zero injuries in any month of construction phase	Before construction commences	MOH; Contractor	**USD 2,000**	Application of various types of PPE and their proper use.

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	against dust, vapours, splashes • Foot Protection • If electrical hazard present ensure boots offer protection • Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists • Water/Chemical Resistant Boots: Use in a spill situation • Non-slip boots for working on wet/slippery floors.						
6.2.2.7	**Accidents**						
	Adopt best transport safety practices with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public	No road accident by project traffic	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	Contractor needs road safety awareness to project personnel and the public
	Ensure drivers respect speed limits through built areas and urban centres.	No road accident by project traffic	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	Contractor needs speed awareness through built areas and urban areas
	Ensure that vehicles are regularly maintained to minimize potentially serious accidents such as those caused by brake failure commonly associated with loaded construction trucks	No road accident due to poor mechanical conditions of project vehicles.	No accident occurs in each month of construction duration	During construction	MOH; Contractor	Negligible	None
	Employ safe traffic control measures, including	No road accident by project traffic	No accident occurs in each month of construction duration	During construction	MOH; Contractor	**USD 500**	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	temporary road signs and flag persons to warn of dangerous conditions and children crossings						
	Contractors should cordon off areas under construction and provide signage to warn of on-going construction works.	Construction works do not cause injury to patients and health workers	Zero injuries in any month of construction phase	During construction	MOH; Contractor	Negligible	None
	Contractors should use screens or nets to avoid flying debris and dust	No debris noted outside construction areas	No complaints about flying debris from construction areas (this should be verified by perusal of records in complaints log)	During construction	MOH; Contractor	**USD 1,500**	None
6.2.2.8	**Social misdemeanour by construction workers**						
	As a contractual obligation, contractors should be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement it during project execution.	No illicit sexual relationships among construction workers and local community	All construction workers living in a camp adhere to a "No fraternization" and comply with latest entry time into camp (6PM) set to avoid prostitution.	Throughout construction	MOH; contractor	Negligible	None
	All construction workers should be orientated, trained and sensitized about responsible sexual behaviour and HIV/AIDS	No aggravated spread of HIV/AIDS due to project implementation	All construction workers are aware of HIV/AIDS risk and responsible living.	Throughout construction	MOH; contractor	**USD 1,000** for HIV/AIDS posters/fliers and free condoms	None
6.2 (all sub-sections)	Impact of construction activities	Construction activities do not cause adverse socio-environmental impacts	Annual construction audits do not indicate adverse impacts not mitigated	1 time per year *(NB. Estimated construction duration = 1 year per lot, see Table.20)*	MOH (construction audit may be undertaken by MOH or consultant it hires)	**USD 4,000**	Environmental auditing of construction projects

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
6.3	**OPERATION PHASE**						
6.3.1	**Positive**						
6.3.1.1	**Improved medical surveillance services**						
	Construction of laboratory facilities should be matched with commensurate staffing with laboratory personnel adequately trained in use of newly installed equipment	Installed laboratory equipment fully utilised to enhance laboratory services at the hospital.	laboratory has trained staff to properly and safely operated provided laboratory equipment	1 month after equipment installation	MOH and supplier	None (procurement cost assumed to include training)	Staff training in operation of newly installed laboratory equipment
	Reduced public risks due to improvement in laboratory waste management	Environmental audits show that medical waste and incinerator emissions do not cause onsite/ offsite public health risk	Annual environmental audits find no plume downwash from incinerators. Incinerators stacks designed based on GIIP / WBG EHS guidelines No un-incinerated medical solid waste on premises or waste dumps	Undertake full environmental audit once per year	MOH	Environmental audit cost: **USD 10,000**.	Operation of incineration units; Decontamination procedure in the laboratory
6.3.1.2	**Employment opportunities**						
	Operation of the laboratory will create additional long-term technical and non-technical job opportunities for laboratory professionals, janitors, etc.	Improve laboratory services	Laboratory has adequate trained staff.	Daily	MOH	Negligible	None
6.3.2	**Negative**						
6.3.2.1	**Improper waste management**						
	Ensure proper waste management practices as recommended in the study on improvement of laboratory waste management.	No community health risk due to improper waste management	No raw medical waste is dumped at public dumps	Daily	Healthcare facility administrator/ Superintend	Negligible	None
	The collection of waste	No accumulation of waste	No smell or accumulated waste in	Daily	Hospital	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	should be made at least once in 24 hours, and it should be done in such a way to minimize nuisance of smell and dust during collection and all the waste collected must be carried away from the storage site to an approved disposal point.	in and around laboratory facility	and around the laboratory		administrator/ Superintend		
	Provide appropriate waste bins for the different types of waste generated in the laboratory to allow segregation and collection at the point of generation.	Waste segregation and no litter.	Presence of adequate waste bins in and around the laboratory facility	Daily	Hospital administrator/ Superintend	Negligible	None
	Hospital/ Laboratory staff should be trained or educated on the importance and means of waste management and handling during operation.	Proper waste handling and management	Presence of labelled waste bins on-site	Daily	Hospital administrator/ Superintend	Negligible	None
	The hospital administration should work together with a private refuse handlers and the Municipal Council to facilitate sound waste handling and disposal from the site noting that hazardous waste must not be mixed with municipal waste.	Proper waste disposal	Documentation of formal engagement of refuse handlers	Monthly	Hospital administrator/ Superintend	Negligible	None
	Laboratory should have standard operation and decontamination procedure manuals and clearly displayed at appropriate	Efficient containment of pathogens	Display at appropriate point(s)	Daily	Hospital administrator/ Superintend	Negligible	None

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	point(s) with the laboratory						
6.3.2.2	**Air pollution due to incineration of waste**						
	Ensure incinerator stacks designed according to GIIP or WBG guidelines	No offsite air pollution from incineration (such as due to plume downwash).	Visual observation reveal no plume downwash of stack emissions	From start of use of new incinerators	MOH; Hospital administrator	Negligible	None
	Ensure Training of Incinerator operators for efficient and proper incineration units operations.	Incineration does not generate dioxins	Incinerator operator complete training course	1 month before commissioning incinerator	MOH	**USD 1,000**	Operation of incineration unit/ facility
	The laboratory should provide bio-safety areas equipped with all necessary equipment and have ventilation system that fulfils standards of biosafety;	Pathogen containment	Presence of bio-safety areas	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Ensure that all exhaust air from the laboratory should pass through high efficiency particulate air filters;	Pathogen containment	Presence of air filters	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
6.3.2.3	**Occupational health and safety risks**						
	All workers to be Provided with appropriate PPE against exposure to infectious pathogens, hazardous chemicals and ionizing radiation in accordance with recognized international safety standards and guidelines.	Minimal work-related injuries or infections	All healthcare staff have necessary PPE.	Daily	Healthcare facility administrator/ Superintend	Negligible since all requisite PPE to be provided as part of by equipment supplier bid.	None
	Orient all staff on safe work practices and guidelines and ensure that they adhere to them.	Reduce staff OHS	Records of staff orientation on safety practices and guidelines	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	Safety practices and guidelines
	Training should be conducted on how to prevent	Reduce incidences in and around laboratory facility	Records of staff training on prevention of incidences	Throughout laboratory	Hospital administrator/	Negligible	Prevention and manage incidences.

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences			operational life	Superintend		
	Regular drills should constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences.	Staff preparedness to combat possible incidences	Records of incidence prevention drills	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places	Public and other staff safety	Presence of appropriate and clear signage in and around laboratory facility	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
	Develop evacuation procedures to handle emergency situations.	Public and other staff safety	Evacuation procedure document	Throughout laboratory operational life	Hospital administrator/ Superintend	Negligible	None
6.3.2.4	**Risk of fire outbreak**						
	Ensure Provision of fire extinguishers at strategic locations within the laboratory and ensure that all fire-fighting equipment are regularly maintained and serviced.	Laboratory has basic capacity to fend off a small or average fire outbreak	Laboratory has a minimum of 2 medium-size fire extinguishers (one of which should be for electrical fires) .	During equipment installation upon completion of construction/ renovation works	MOH	**USD 1,000** (100 per extinguisher)	Basic firefighting skills

Text Reference	Impact and Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing	Responsibility	Incremental Costs (USD) for all HCFs sites	Capacity Building and Training Requirements
	Ensure that Key laboratory staff have basic training in fire control.	Laboratory has basic capacity to fend off a small or average fire outbreak	At least 2 medical staff have certificate of basic firefighting.	During equipment installation upon completion of construction/ renovation works	MOH	To be provided as part of by equipment supplier bid.	Fire drills
	Fire emergency telephone numbers should be displaced in communal areas.	Laboratory has capacity to contact fire department in case of major fire outbreak	Fire emergency telephone numbers displaced in at least 2 communal areas	Throughout operation life of laboratory	MOH	Negligible	None
	Install an automatic fire alarm system for the entire laboratory and provide enough water hose reel around the property with a fire reserve water tank attached with an automatic booster pump for hose reel.	Laboratory has basic capacity to fend off a small or average fire outbreak	Presence of automatic fire alarm system, adequate water hose reel and reverse water tank equipped with automatic booster pump	Throughout operation life of laboratory	MOH	Negligible	None
	Laboratory facility should have a fire emergency management plan. And should undertake fire drills at a minimum once a year.	Laboratory has basic capacity to fend off a small or average fire outbreak	A documented fire emergency plan. A documented fire drill.	Throughout operation life of laboratory	MOH	Negligible	None
	Provide fire hazard signs such as 'No Smoking' signs. Directions to exit in case of any fire incidence and emergency contact numbers should be provided.	Laboratory has basic capacity to fend off a small or average fire outbreak	Presence of fire hazard signs and exit in appropriate points	Throughout operation life of laboratory	MOH	Negligible	None
TOTAL COST						**USD 21,000**	

9 CONCLUSION

The proposed project has potential to significantly improve quality of laboratory services and efficiency of service provision in the Arua region with socio-environmental benefits such as reduced morbidity and increased productivity of labour hence higher household incomes; opportunity to have access to laboratory services hitherto unavailable at Arua Regional Referral Hospital due to lack of equipment or facilities. Besides, project development and operation will provide considerable economic opportunity for material/ equipment suppliers, construction contractors and medical professionals.

Key significant negative impacts will arise from laboratory waste handling and management, especially within the laboratory facilities and incineration. When incinerator stacks adopt a standard height irrespective of density of habitation and nature of nearby buildings, there is a risk of chronic exposure to incineration emissions due to plume downwash. Likewise, when laboratory management adopt standard pathogen containment and decontamination protocols, there is a risk of infection from residual pathogens. Where raw medical waste continues to be improperly dumped at public dumps the project would aggravate public health risk when children or people rummage through potentially infectious waste. These impacts would be accelerated by inadequately trained incinerator operators, laboratory staff and poor laboratory practices. Therefore, in order to avert such impacts during operation of the laboratory facilities, the recommended mitigation measures should be adhered to.

All potential adverse impacts are litigable when measures proposed (Chapter 6) are implemented, in which case benefits of this project to the nation would by far outweigh potential negative effects.

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26. UBOS (2012). Arua District Socio Economic Report, Volume II.
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APPENDIX A: STAKEHOLDER ENGAGEMENT

Meeting 1: Arua Regional Referral Hospital **Date: 25/04/2013**

Meeting with:	**Name**	**Designation**
	Mr. Kikama Christopher Otika Mr. Angurini Kabaka Dr. Adaku Alex Mr. Michael Odur Ms. Sheila Okocli Ms. Mary Amanziru Mr. Lazarus Wadribo Mr. S. Obiru Mr. Godfrey Oyo	Laboratory Technician Laboratory Technician Hospital Director Senior Hospital Administrator Hospital Administrator Principal Laboratory Technologist Senior Laboratory Technician Human Resource Officer
Present:	Dr. Herbert Kalibbala (AWE),Team Leader Dr. John Baptist Kirabira (AWE) Ms. Sharifah Nakigozi (AWE) Mr. Ivan Kibuuka Kiguli (AWE)	
Issues arising	▪ The site is located at Arua hospital which is approximately 439 km by road, northwest of Kampala, Uganda's capital ▪ Laboratory activities at the time of the visit were being undertaken in the OPD ward ▪ As the hospital expands there will be need for a training centre since the Government plans to construct a University. This means if a one-floor structure is being planned at the moment, it should have a strong foundation for future expansion upwards. ▪ The Laboratory should have three floors which will include pathology, general laboratory and offices. ▪ The hospital power is more stable and they have back- up batteries in case of grid power is not available. However, there is a need for stand by generator to supply other units of the hospital. ▪ Domestic waste is managed by the municipal council; clinical waste is treated using an incinerator at the hospital site. ▪ The Laboratory will have to manage its own waste after sterilization though this was not being done due to lack of equipment and space. ▪ The hospital recently sent a list of equipment which will include an auto cave. ▪ Arua town is supplied by National Water and Sewerage Corporation. The hospital has a storage tank but it's not big enough to sustain the hospital. ▪ The labs do not have a back-up since the pump broke down. ▪ Regarding water for use in the laboratory, the hospital has a distillation and de-ionising unit but in cases of shortage, supply is obtained from National stores. ▪ It was noted that the construction of the proposed laboratory at the proposed site behind the existing laboratory may not be appropriate because of the small space and the narrow path ways for movement of construction materials. ▪ Drainage and lagoons should be taken into consideration when designing or planning such facilities ▪ The contractor should add humps to reduce on accidents risks associated with construction vehicles. ▪ The contractor's personnel at the site should be very sensitive to the patients because the hospital works 24hours. ▪ The new project must observe proper waste management on site; during and after construction. ▪ The proposed site is close to X-Ray laboratory and Surgical ward which makes the patients more prone to impacts of the project construction and operation.	

Stakeholder consultation record:

Name of agency/stakeholder/community: Arua Referral Hospital					
Purpose of consultation (*tick appropriate box*):	**Scoping:**	☐		**ESIA:**	☐
	Sensitisation:	☐		**RAP:**	☐
	Environmental Audit:	☐		**Other (specify):**	
Date: 25th-April-2013					
Project name:					
Proponent:					
Name of person/ official met:	**Designation**		**Contact (Tel/email)**		**Sign/ initial**
KILAMA CHRISTOPHER OJIKA	LAB TECH.		0772630103 ckotika@gmail.com		
ANGURINI KABAKA	LAB TECH		0782002789 angurinikabaka@yahoo.co		
Dr Adaku Alex	Ag Hosp. Director		0772 666 175 alex.adaku@yahoo.com		
Michael Odur	Sen. Hosp Admin		0782-913139 odurm22@yahoo.ca		
Okodi Sheila	Hospital Admin		0750-628252 Sokodisheila@yahoo.com		
AMANZURU MARY	PRINC. LAB. TECHNOLOGIST		0772573315 amanzirumary@yahoo.com		
WABIRO LAZARUS	SEN. LABS. TECHNICIANS		0772 69 69 30		
Obiru Sally	AG SPWO		0772375766/0741		
Oyo Godfrey	Human Resource Office		0772548435 oroggodfrey@yahoo.co.uk		

Meeting 2: Arua District Offices **Date: 25th /04 /2013**

Meeting with:	**Name**	**Designation**
	Ms. Monica Edemachu	CAO
	Mr. Shaphan Andeku	District Planner
Present:	Dr. Herbert Kalibbala (AWE),Team Leader Dr. John Baptist Kirabira (AWE) Ms. Sharifah Nakigozi (AWE) Mr. Ivan Kibuuka Kiguli (AWE)	
Issues arising	▪ There have been challenges with facilities at various locations within the district especially planning for such facilities without consulting the relevant authorities. ▪ During construction of the proposed laboratory, Arua district engineers should be included on the team that will supervisor the works. The contractor should work together with Aura district officials during construction, these include: District Environmental Officer and Health Officer. ▪ Since Arua district is visited by many people for trade, it has often suffered many disease outbreaks. Arua regional Referral Hospital caters for Arua population and people from the neighbouring districts and countries (DRC and Southern Sudan). Therefore construction of the laboratory is welcome and should commence in the shortest time possible. ▪ Given its location, a lot of cross border trade can lead to disease outbreaks, and personnel sometimes have to move to neighbouring districts to address such challenges including an increase in demand for laboratory services. Therefore training of personnel should also be provided. ▪ Arua municipality is also a busy town with many motorcyclists, motorists, bicycles and pedestrians and therefore the contractor should exercise caution when transporting materials to the site.	

Stakeholder consultation record:

Name of agency/stakeholder/community: District Headquater Arua					
Purpose of consultation-(*tick appropriate box*):	**Scoping:**	✓		**ESIA:**	
	Sensitisation:			**RAP:**	
	Environmental Audit:			**Other (specify):**	
Date: 25th/04/2013					
Project name: Construction/Rehabilitation & Equipping of the National TB Reference laboratory & 5 Sabelite Labs in Arua, Gulu, Mbale, Mbarara & Mulago					
Proponent: MOH					
Name of person/ official met:	**Designation**		**Contact (Tel/email)**		**Sign/ initial**
Edemachu Monica Eva	ACMO		0706543259/0772515561		
Shaphan Anderu	Dir of Planning		0772-394429		

Meeting 3: Arua Municipal Council Offices **Date: 25th /04 /2013**

Meeting with:	**Name**	**Designation**
	Mr. Cornelius Jobile Fuathom Nosal	Ag Town clerk; email;jobile2004@yahoo.co.uk Principal hospital inspector; email: fuathom@yahoo.com
Present:	Dr. Herbert Kabenge (AWE),Team Leader Dr. John Baptist Kirabira (AWE) Ms. Sharifah Nakigozi (AWE) Mr. Ivan Kibuuka Kiguli (AWE)	
Issues arising	▪ Welcomed the project. However, municipal authorities should be involved at the beginning of the project and not remembered when it comes to approval stage of the plans and when the contractor wants an approval certificate on completion of construction works. ▪ During construction of the laboratories social issues should be given serious attention, this comes at the time when the community living close to the hospital rejected the lagoon since they were not consulted and part of their land was taken during construction. ▪ During construction, care should be taken during transportation of materials like sand, stones that may fall off or the trucks causing road accident and dust that may be serious issues to local communities. The Ag town clerk suggested that contractors should at least cover the trucks after loading of construction materials to avoid any accidents as may rise from stones falling and dust from sand and soil being transported ▪ The construction should conform to the construction already taking place in the area ▪ Domestic solid waste is managed by the municipal council which has a composite site outside the municipal council. ▪ Arua municipal council does not have a sewer system but private operators are hired to empty septic tanks ▪ The new project must observe proper waste management on site; during and after construction and they recommended involvement of local Authority to oversee waste management. ▪ Risk of accidents, noise and dust may arise during construction of the proposed laboratories.	

Stakeholder consultation record:

Name of agency/stakeholder/community: Arua Municipal Council (Town clerk)					
Purpose of consultation (*tick appropriate box*):	**Scoping:**	✓		**ESIA:**	
	Sensitisation:			**RAP:**	
	Environmental Audit:			**Other (specify):**	
Date: 25th/04/2013					
Project name: Construction/Rehabilitation and equipping of National TB reference Laboratory & five Satellite laboratories in Arua, Gulu, Mbale, Mbarara & Mulago					
Proponent: MOH					
Name of person/ official met:	**Designation**		**Contact (Tel/email)**		**Sign/ Initial**
Tobile Cornelius	Ag. Town Clerk		tobile2004@yahoo.co.uk		
Fruathum Nasal	Principal H/Inspector		fruathums@yahoo.com		

APPENDIX B: ASSESSMENT REPORT ON INCINERATORS

ASSESSMENT OF INCINERATORS TO BE INSTALLED ON-SITE

WASTE CATEGORIES

Waste Category	Estimated Percentage of Total Composition	Remarks
Bandages, linen and other infectious waste and related pathological waste.	25 – 30%	Should be incinerated
Plastics	7 – 10%	Should be incinerated
Sharps: Needles, infusion sets, blades	0.5 – 1%	Should be incinerated
Glass, vials, etc.	3 – 5%	Should be incinerated
General waste (domestic waste)	40 – 50%	A municipal damping site could be used for disposing.

TREATMENT TECHNOLOGIES AND DISPOSAL ISSUES

a) **Low-technology combustion:** Some fractions of healthcare wastes, and in particular used injection equipment, are burned in the open air or in simple (and sometimes improvised) units such as pits, burners (made out of brick or cement), and in drums. The units obviously are relatively inexpensive, are easy to build, and require little or no maintenance. Because of the relatively uncontrolled conditions under which the combustion takes place, the process reaches only what is considered to be low temperatures (about 400 °C or below). Combustion at these temperatures does not completely burn all of the wastes, particularly if the wastes contain relatively high moisture content.

   As can be seen from Figures 2 and 3, some glassware and needles may remain relatively unchanged at the completion of the combustion process. Furthermore, the uncontrolled process may not destroy all of the pathogens. This type of combustion does not control any type of emissions (particulate matter, heavy metals, and others) and, in fact, may lead to the production of relatively high concentrations of toxic organic compounds. Whole vaccine vials and similar glass containers have the tendency to explode and thus pose an additional risk to the person tending to the combustion process.

b) Incinerators were not properly operated; in one case a lot of carbon was evident confirming incomplete combustion.
   - Lack of close monitoring and inadequate maintenance creating threat to general public

c) The common collection points are badly managed and are insecure due to lack of proper cordoning and surveillance. Some animal also come to feed from the site.
d) The incinerators are of low capacity. The waste generation stands at an average of 2 kg/bed/day. Hospitals like Mbale have over 400 beds, thus generate over 800 kg of waste per day of which 400 kg (50% hazardous) should be incinerated every day.
e) Incinerator operated more like a back-yard burner, do not reach required temperature, and lack control equipment to capture targeted pollutants such as dioxins, mercury, cytotoxic emissions
f) Inadequate ash treatment and handling (disposed in municipal dumpsite). See Figure 3.
g) Open dumps: At the present time, the most common method of land disposal of solid wastes is the open dump. Because of the uncontrolled nature of disposal, this method obviously is the least costly option, but at the same time, it is the one that causes the most negative impacts to the public and to the environment.

h) Wastes not segregated and disposed of together with municipal/domestic solid waste. Mixing of hospital wastes with general
    - Lack of segregation is making whole waste stream hazardous
    - No regulated disposal sites for medical Waste
    - Open burning in hospital compounds (some burning sites are close to wards and in the hospital periphery they are markets, schools, and farms.

i) Residues from maternity wards (placenta) and immunization (primarily needles and syringes) generally are managed through burial in specific pits with a cover.

RECOMMENDATIONS

Medium- and high-technology combustion recommended for incineration

Medium-technology combustion is defined as that which in some manner attempts to control the combustion process and, therefore, provides slightly better air pollutant control than that achieved by the low-technology options. There are some relatively simple and not excessively expensive units available in the marketplace that fit into this category. In essence, the units generally have a small capacity, are operated in batches, and do not include any type of air pollution control equipment.

High-technology combustion is defined as the combustion of healthcare waste under controlled conditions, using equipment that operates at temperatures on the order of 900 – 1010 °C, and that includes air pollution control equipment as well as other components to manage the emissions from the unit. These units generally include a second chamber (known as secondary chamber) in which the off (byproduct) gases from the first chamber are treated at high temperatures by means of an ancillary burner. High-technology combustion essentially provides the necessary conditions (temperature, time, and turbulence) to achieve complete combustion and to keep the concentration of undesirable compounds to a minimum. These types of incinerators operating in developing countries do not usually have post-combustion air pollution control systems.

Incineration Capacity

The Current incinerators are of low capacity. A bigger capacity incinerator of at least 500 kg/day is recommended for individual hospitals.

Open Dumping and burning discouraged

Consequently, open dumping should be discontinued as soon as possible and in particular should not be used for the disposition of untreated healthcare wastes because of the potential risks to the public and to the environment. Open dumps, at the very least, should be upgraded as soon as possible to controlled landfills and eventually to sanitary landfills.

Segregation and handling of generated waste

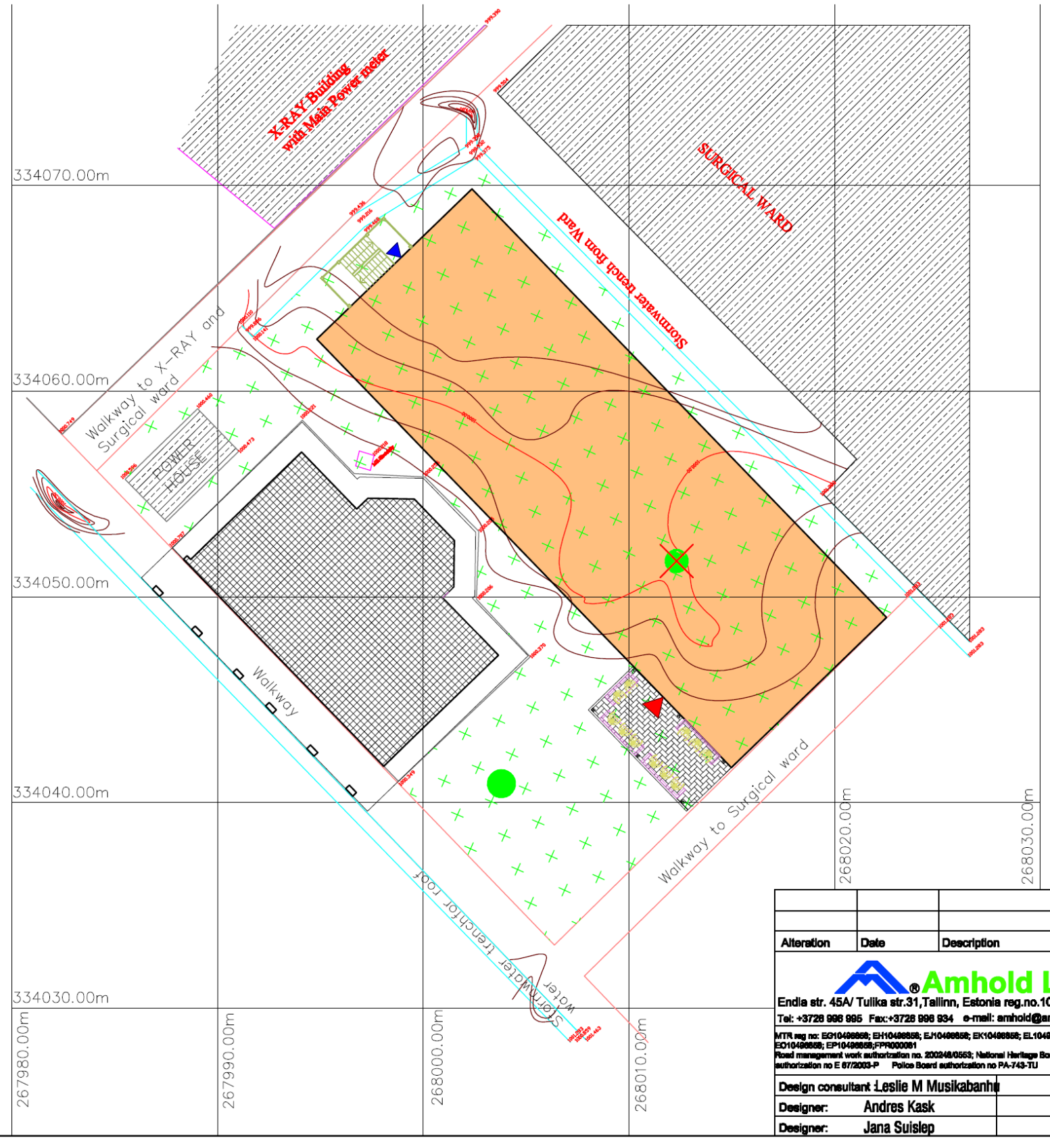
- Reducing the toxicity of waste reduces the threat to the general public from medical waste
- Segregation reduces the volume and toxicity of waste stream;
- Increasing awareness of hospital staffs, employee training in hazardous materials management and waste minimization
- Establishment of better communication and sharing information about the risks from medical waste among all shareholders (hospitals, other medical facilities, community and public) is very important

Figure 1: Open air burning. Smoke can be see all over and there are hospital wards and other activities as can be seen in the background of this image.

Figure 2: The bottles and vials are not burned completely

Figure 3: Incomplete combustion as exhibited in the ash content and the soot on the incinerator door.

APPENDIX C: PROJECT ARCHITECTURAL DRAWINGS



General Notes

1. All levels and measurements in m (Ref:datum
2. For site location see Topo map

LEGEND

- Grasses
- Manhole–Electric wires joint
- Tree
- Stormwater trench
- Pavement–walkway
- Major Contours
- Minor Contours

contour interval: 0.1m

- PROPOSED LABORATORY
- EXISTING LABORATORY
- EXISTING BUILDINGS
- PROPOSED PAVEMENT
- PROPOSED MAIN ENTRANCE
- PROPOSED EMERGENCY EXIT
- PROPOSED REMOVABLE TREE

Alteration	Date	Description	Designer

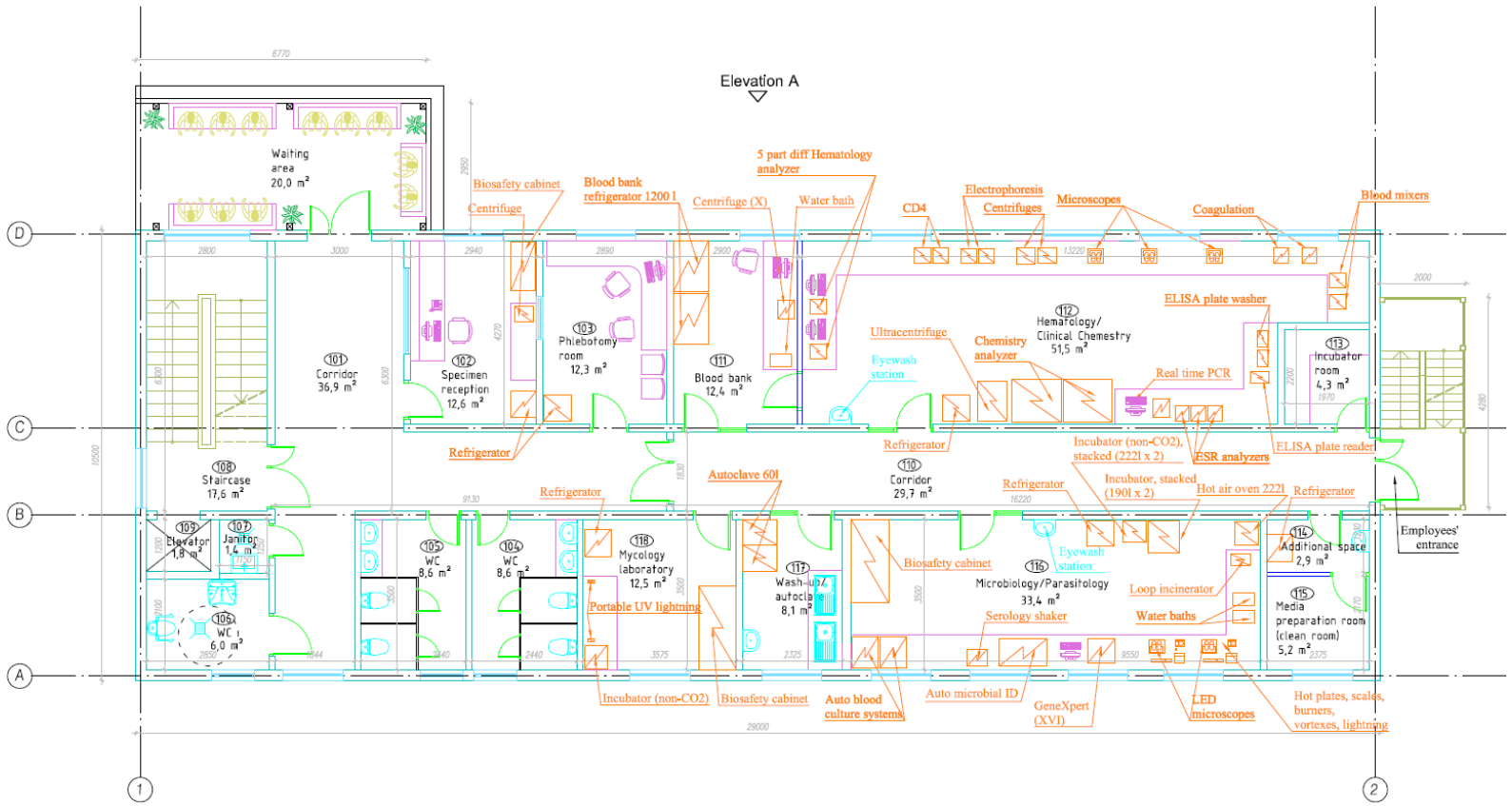
Amhold Ltd.
Endla str. 45A/ Tulika str.31,Tallinn, Estonia reg.no.10496858
Tel: +3726 996 995 Fax:+3726 996 934 e-mail: amhold@amhold.eu

MTR reg no: EG10496858; EH10496858; EJ10496858; EK10496858; EL10496858; EO10496858; EP10496858;FP10000001
Road management work authorization no. 200348/0563; National Heritage Board authorization no E 67/2003-P Police Board authorization no PA-743-TU

Object title:	Arua Regional Referral Hospital Clinical Labaratory Arua, Uganda
Drawing no.:	SP-01
Drawing title:	Siteplan
Scale:	1:200
Design consultant	Leslie M Musikabanha
Client:	Ministry of Health of Uganda
Designer:	Andres Kask
Date:	06.05.13
Designer:	Jana Suislep
Job no.:	T-I-KT-X/01/12.09.12
Design stage:	SD
Arch. no.:	

Site Layout

Ground floor



GROUND FLOOR ROOM LIST		
ROOM NO.	ROOM NAME	m²
101	Corridor	36,9
102	Specimen reception	12,6
103	Phlebotomy room	12,3
104	WC	8,6
105	WC	8,6
106	WC	6,0
107	Janitor	1,4
108	Staircase	17,6
109	Elevator	1,8
110	Corridor	29,7
111	Blood bank	12,4
112	Hemotclogy/Clinical Chemestry	51,5
113	Incubator room	4,3
114	Additional space	2,9
115	Media preparation room	5,2
116	Microbiology/Parasitology	33,4
117	Wash-up/autoclave	8,1
118	Mycology laboratory	12,5
	Waiting area	20,0
	SUM TOTAL	265,8

B	26.06.2013	Changed according to customer's drawings suggestions	Jana Suislep
A	23.05.2013	Changed according to customer's drawings suggestions	Kaidi Org
Alteration	Date	Description	Designer

Amhold Ltd.
Endla str. 45A/ Tulika str.31,Tallinn, Estonia reg.no.10496858
Tel: +3726 996 995 Fax:+3726 996 934 e-mail: amhold@amhold.eu

MTR reg nr.c EE10496858; EH10496858; EJ10496858; EK10496858; EL10496858; EO10496858; EP10496858;FPR000081
Road management work authorization no. 200246/0553; National Heritage Board authorization no E 67/2003-P Police Board authorization no PA-743-TU

Object title:	Arua Regional Referral Hospital Clinical Labaratory, Arua, Uganda	Drawing no.:	A-01
Drawing title:	Ground floor plan_option6	Scale:	1:100
Design consultant:	Leslie M Musikabanhu	Client:	Ministry of Health of Uganda
Designer:	Andres Kask	Date:	06.05.13
Designer:	Jana Suislep	Job no.:	T-I-KT-X/01/12.09.12
		Design stage:	SD
		Arch. no.:	

APPENDIX D: TERMS OF REFERENCE FOR THE ESIA

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17,19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.

Tel: 256-414- 251064, 251065, 251068
342758, 342759, 342717
Fax: 256-414-257521 / 232680
E-mail: info@nemaug.org
Website: www.nemaug.org

NEMA/4.5

16th January, 2014

The Permanent Secretary,
Ministry of Health,
Plot 6/7 Lourdel Road, Kampala,
P. O. Box 7272,
KAMPALA.

Tel: +256 (0)414 340872

RE: REVIEW OF SCOPING REPORT AND TERMS OF REFERENCE PERTAINING TO THE PROPOSED NATIONAL TUBERCULOSIS REFERENCE LABORATORY, AT BUTABIKA, KAMPALA

This is in reference to the letter this Authority received on 28th November, 2013, submitting the Scoping Report and Terms of Reference (TOR) for carrying out an environment impact assessment (EIA) for the proposed construction/rehabilitation of the National Tuberculosis Reference Laboratory, on Plot 2, Block 237-2383, in Butabika Hospital Village (LC-1), Butabika Parish, Nakawa Division, Kampala District, for review and consideration for approval. This Authority has finalised the review and grants formal **APPROVAL** of the said Scoping Report and TOR.

Please, note that approval of the Scoping Report and TOR DOES NOT give you permission to start implementing any of the proposed project activities.

In addition, you advised to be mindful of the need to consider some of the key aspects highlighted below, during the conduct of the EIA and preparation of the EIA report, respectively.

(i) Carry out comprehensive consultations with all the relevant key stakeholders including the Kampala Capital City Authority, the Ministry of Works and Transport, and the local communities in the neighbourhood; and, ensure that the **views of the aforementioned categories of stakeholders are well documented and appended to the EIA report.**

(ii) Provide **comprehensive baseline data/information** relating to the project sites/areas and its immediate surroundings, and a **set of coloured photographs** showing the current state of the proposed project site.

(iii) **Outline the proposed phases of development** of the said project area in relation to the proposed five satellite laboratories, and indicate what phase(s) the proposed EIA is focusing on – *that is, whether only the Butabika site, or Butabika site plus other five sites (note that separate EIAs will be required for the proposed five satellite laboratory sites)*

(iv) Provide comprehensive description of the proposed **project components, activities, and size of the workforce.**

1 of 2

16/1/14

(v) Ensure that soil and air quality as well noise level analyses are carried out relating to the project area, and that the baseline soil and air quality, and noise level **analyses results are appended to the EIA report.**

(vi) Provide **coloured, well-labelled and legible location and google maps** *(preferably each covering A-4 or larger paper size)* that are clear, and a **set of GPS coordinates.**

(vii) Include in the EIA report **clear, well-labelled and legible copy of the proposed site lay-out plan** *(preferably covering A-3 or larger paper size)*, that shows clearly the boundaries of the project site and set up of the project infrastructure.

(viii) Provide **comprehensive analyses of alternatives** – in terms of project design, location, technology, among other aspects.

(ix) Provide **detailed evaluation of the potential environmental impacts and risks** associated with the proposed project components and activities.

(x) Provide **comprehensive mitigation and environmental monitoring plans** (*preferably in table matrix format*), respectively, that relate to the identified potential environmental impacts associated with the proposed project.

(xi) Consider any other critical environmental aspects/concerns not initially foreseen during the preparation of the Scoping Report and TOR, and include an evaluation of such aspects/concerns in the EIA report.

(xii) Append to the EIA report copies of the **authentic land acquisition/ownership documents.**

(xiii) Ensure that the total project (investment) cost is included in the appropriate section of the EIA report as well as in the letter that will be used to submit copies of the EIA report to this Authority for review.

This is, therefore, to recommend that you proceed with carrying out the EIA for the proposed project. We look forward to your cooperation and receipt of copies of a comprehensive EIA report, for our further action.

(NOTE: THIS IS NOT A CERTIFICATE OF APPROVAL)

Waiswa–Ayazika
FOR: EXECUTIVE DIRECTOR

c.c Eng. Lammeck Kajubi,
Air, Water Earth (AWE) Ltd.,
27, Binayomba Road, Bugolobi
P.O. Box 22428,
KAMPALA.

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