Section 508 Acknowledgement

This document is being released prior to completion of Section 508 accessibility remediation due to a required publication timeline. If you need an accessible version of this document or assistance accessing the information it contains, please contact accessibility@dfc.gov.

Basal Consulting
Striving for Quality Service

An Updated Environmental and Social Impact Assessment (ESIA) Study Report for Roha Medical Campus, Bole Sub-City, Addis Ababa, Ethiopia

Consultant

Basal Consulting

Email: basalconsulting@gmail.com

Mobile: +251913436142

Address: Kirkos sub-city; Woreda 02, Wollo-Sefer, HMM Tower, 3rd floor, Office No.302, Addis Ababa, Ethiopia P.O Box 100707

Website: www.basalconsult.com.et;

Proponent: Roha Medical Campus, Bole Sub-City, Woreda 13, Addis Ababa, Ethiopia; Mobile: +251966027155

Submitted to: Ethiopian Environment, Protection Authority; Addis Ababa, Ethiopia

February 2024 Addis Ababa, Ethiopia

August 2024

EXECUTIVE SUMMARY

Introduction

Roha Medical Campus PLC has identified a need for high-quality, affordable healthcare in Ethiopia and intends to address this need by building Roha Medical Campus in Addis Ababa.

Roha Medical Campus (RMC) is a multi-disciplinary healthcare development in the middle of Addis Ababa. When complete, the campus is planned to include multiple hospitals, outpatient facilities, a research and innovation hub, a medical school, office park for science and healthcare companies, and related ancillary services. It is one of the largest healthcare developments in Africa and is expected to be completed in phases over the next 5-10 years. Roha Medical Campus PLC has acquired a large plot of land centrally located in Addis Ababa.

This document is an updated version of the ESIA approved by the Environment Protection Authority (EPA) (then Environment Forest and Climate Change Commission (EFCCC)) on 23rd December 2021 Ref. No. 9/1.1/6131/14. RMC has found that this update was crucial for the project's sustainability as it accounts for the expropriation of twenty-two (22) hectares of RMC land for other government projects. Thus, this updated version features the corresponding commitments to the current land holding of six (6) hectares. Additionally, since the project is at a more advanced stage detailed plans and budget are included in the updated ESIA, such as floor plans, waste management, and auxiliary services.

OVERVIEW OF THE PROJECT

Goals and Specific Objectives

Roha Medical Campus could grow to span five hospitals with 1,100 beds, including a range of advanced specialties and state of the art technology, as well as a medical school and many other service buildings. The total development for all phases is estimated to be USD 300 million.

The first phase ("Phase 1" or the "Project") of RMC's development includes opening an advanced multi-specialty hospital and completing a master plan for the entire campus. This first hospital will hold up to 350 beds, span approximately 38,000 square meters (375k square feet), and host a comprehensive range of specialties. The master planning process will involve global experts and create an implementation plan for the entire six (6) hectares site, over a multi-year development.

Currently the Advanced Multi-Specialty Hospital is under construction and operations planning is occurring in parallel, hospital operations are slated to commence in 2026.

Additionally, the project has implemented the resettlement action plan for the 28 hectares of land previously under its possession, as well as planted a forest of 12,000 indigenous trees with variety of thirty-five (35) species.

The objective of this Environmental and Social Impact Assessment (ESIA) study is to determine the major positive and negative consequences of the healthcare facility as well as devising mitigation measures associated with alternative analysis. Primary and secondary data were collected to compile the report. Consultations were held with the affected community and stakeholder offices in Woreda 13, Bole sub-city, and Addis Ababa City Administration.

Project Alternative

Several Project alternatives were examined to select a feasible alternative considering the biophysical, socioeconomic, and technical factors. The alternatives considered were:

- No project alternative
- Project site alternatives
- Project schedule alternatives
- Project design alternatives

After analyzing the above project alternatives based on technical feasibility, economic viability, and environmental impact the proposed project was deemed the best option at the current time. Considering the numerous advantages on the health, and economy of the city, and low and or manageable impact on the social and biophysical environment, the project has an overall positive impact.

Project Location

The project is located in Woreda 13 of Bole Sub-city in Addis Ababa, Ethiopia at the following GPS coordinates:

38.7990624554134, 8.99596804879402: 38.7968940841604, 8.99665577491354 38.7965150900542, 8.99591102525657: 38.7961102107737, 8.99476572934434: 38.7961142284343, 8.99475750148445: 38.7980780582021, 8.99419399722231: 38.7988368967273, 8.99452565776149: 38.7990624554134, 8.99596804879402.

The project is located close to the Bole international airport and can be accessed via the Ring Road that leads from the airport to diaspora square (See image below).



Institutional and Legal Frameworks

According to Ethiopia's Environmental Impact Assessment guideline published in 2000 G.C., the proposed hospital is categorized under schedule I and therefore needs a comprehensive Environmental and Social Impact Assessment before approval by the Environmental Protection Authority. Accordingly, Roha Medical Campus ("Proponent") recruited Basal Consulting firm to conduct the ESIA study.

The scope of the study was focused on the major environmental and socio-economic components which are determined based on professional judgment associated with site observation and literature review. Site observations testify that there are different natural and man-made environmental units potentially to be affected by the project. This includes public schools, residents, micro and small enterprises, and houses and concrete plants.

The institutional arrangements for the implementation of ESIA, the Ethiopian Environmental Authority (EPA) is mandated to formulate or initiate and coordinate the formulation of strategies, policies, laws, and standards as well as procedures and upon approval monitor and enforce their implementation. It is also responsible for the implementation and follow-up of international and regional environmental agreements. EPA is mandated to review and approve ESIA reports and issue environmental authorization. The EPA also undertakes the role of certifying ESIA practitioners. The EPA has its offices at regional levels as well as officers in Woredas, This Project is however registered at the federal Ethiopian Investment Commission and therefore can seek approval for the ESIA from the Federal Environment Protection Authority.

Numerous policies, proclamations, regulations, and guidelines issued by the government of Ethiopia and international financial institutions such as the International Finance Institution and African Development Bank were reviewed and incorporated into the ESIA.

Among the national legal documents reviewed are:

Constitution of the FDRE, the Environmental Policy of Ethiopia (1997), the Water Resources Management Policy, Environmental Impact Assessment (Proclamation No. 299/2002): Environmental Pollution Control (Proclamation No. 300/2002), Public Health Policy (Proclamation No. 200/2000).

Regarding the International Development Financial Institutions, the following guidelines reviewed and applied are:

African Development Bank Operational Safeguards:

- E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts
- E&S OS 2 (OS2): Labour and Working Conditions
- E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Management
- E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement
- E&S Operational Safeguard 10 (OS10): Stakeholder Engagement and Information Disclosure.

IFC performance Standards:

- Environmental and Social Assessment (PS 1)
- Labour and Working Conditions (PS 2)
- Resource Efficiency and Pollution Prevention (PS 3).
- Land Acquisition and Involuntary Resettlement (PS 5)
- Biodiversity Conservation and Sustainable Management of Living Natural Resources (PS 6)
- Stakeholder Engagement and Information Disclosure (PS 10)

Project Impacts

The assessment indicated that the proposed project has several socioeconomic benefits including creating employment opportunity for thousands (5000-7000 citizens). It will generate and save foreign currency through medical tourism. It will ensure the health and productivity of citizens as well as avoid traveling abroad of local patients looking for quality healthcare. It will have indirect contributions through increased business activity of the area such as transport services, food services, and consumable products.

The project could potentially result in a number of negative impacts. The major negative impact expected during the pre-construction stage is related to the resettlement of people currently living inside the project territory. The major operation

phase impacts are expected to be due to the solid and liquid wastes as well as air pollution impact from improper incineration. Proper consultation with the affected community, proper waste reduction and segregation, proper incineration procedures as well as proper siting (based on the direction of wind, aesthetic impact and affected environment) and design of incinerators are the major mitigation measures recommended for the project.

The scope of the study was focused on the major environmental and socioeconomic components which are determined based on professional judgment associated with site observation and literature review. Site observations testify that there are different natural and man-made environmental units potentially to be affected by the project. This includes public schools, residents, micro and small enterprises, and houses and concrete plants. The objective of this Environmental and Social Impact Assessment study is to determine the major positive and negative consequences of the healthcare facility as well as devising mitigation measures associated with alternative analysis. Primary and secondary data were collected to compile the report. Consultations were held with the affected community and stakeholder offices in Woreda 13, Bole sub-city, and Addis Ababa City Administration.

Public Consultation

A public consultation with over 100 participants was held on 15/05/2021. During the consultation, almost all the participants agreed that the medical campus offers many positive benefits for the local community and nationally; therefore, all participants welcomed the project. However, they expressed concerns that the government had not allotted sufficient time for them to adjust psychologically and economically, leading to a perception of forced displacement rather than a durable, timely solution. This situation adversely affects the livelihoods of many residents, including those from informal settlements and individuals living in rented houses. Most participants suggested that RMC should prioritize directly affected groups for job creation at different phases of the project, considering their educational background and experience. Furthermore, the already commenced Resettlement Action Plan (RAP) process should be transparent, accurate, and should communicate detailed information about the resettlement projects at an early stage to mitigate the risks of unnecessary impoverishment among affected households.

Environmental and Social Management Plan

The main mitigation and monitoring measures to minimize or reduce the environmental and social impacts will be implemented based on the project mitigation and management plans. Similarly, implementation of the mitigation measures will be verified through the environmental social monitoring plan using the specified budget.

This kind of monitoring must be carried out by the company's management on a regular basis. The company's management together with affiliated units of the City Environmental Protection Authority/or Sub-city and Woreda offices and representatives of the local community should carry out occasional monitoring on the performance of the environmental and social management plan.

Environmental and Social Management Plan (ESMP)

This ESIA seeks to address all potential impacts that the project may have and plan risk mitigation activities. The following table seeks to delineate which entity will be responsible for impacts and mitigation as well as associated costs.

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
Displacement	• The dwellers should be consulted about the resettlement process. • The RAP and LRP developed by RMC for 136 project affected households should be implemented while observing the Ethiopian law, and international norms. • The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 136 households. The project will make livelihood assistance payment to informal settlers, provide skill trainings and hire people from the locality during construction and operation of the medical campus. • Alternative resettlement sites should be immediately provided for displaced people, particularly for eight households. • Displaced people should be advised as to how to sustain livelihood activities.	• Public consultation • Preparation of RAP	• Owner of project (Roha Medical Campus) • AA Environmental Protection Office • Bole sub-city land administration office	Before construction of the project	First Consultation made on Jan 2021. RAP and LRP developed in April 2021. All Compensation payments to 38 Households and Livelihood improvement payments to 98 Households made. Alternative resettlement location provided to 38 Households as per the RAP.	28,000,000 (one-off)
Air Pollution	• Avoid unnecessary excessive vehicle movement and have proper schedule plan, • Limit vehicle speeds on	• Buffer zone marked and respected	• Roha Medical Campus • Contractor	During construction	Experienced Grade one Contractor (Elmi Olindo Contractors Plc) appointed.	400,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	non-surfaced roads, • Maintain equipment and vehicles in good working order to avoid excessive emissions. • Excavated surface should be sprayed with water from time to time to reduce dust emission during operations. • Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility, • Workers will be provided with PPE and the use of PPE shall be enforced, • Dumping of material from the heavy vehicles will be done from an appropriate height for less dust generation. • The heavy vehicles are the main sources for release of carbon monoxide and nitric oxide, so to avoid the increase of pollutant in the site; the vehicles will be maintained properly and regularly. • Provision of face mask to workers to minimize inhalation of dust particles. • Vehicles carrying construction material and debris should be covered with tarpaulin cover, • Raw materials excavated soil and other debris should be stored and transported under covered nets. • Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising dust. • Enclosing the structures	. • Complaint community • Formation of dust			Contractor provided with the ESIA to implement air pollution measures in the ESMP. No complaint forwarded	

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	under construction with dust proof nets. • Regular maintenance and services of machines and engines as per the Manual.					
Noise Pollution	• Routine timely maintenance of equipment as per the Manual. • Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents. • Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided, • Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above, • Acoustic enclosures should be provided with DG (Diesel generator) sets and machinery to control the noise levels at construction site, • Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment, • Construction works should be carried out only during	• Complaint • Physical observation	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement noise pollution measures in the ESMP. Regular inspection performed by contractor and project owner. No complaint forwarded	100,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	the specified period/schedule,					
Water resource Pollution	• Regular inspections at site to monitor leakages in water storage tanks, • Prevent piling up of excavated soil, raw material and construction debris at site by proper management and disposal. • Minimize run-off by using sprays for curing. • Construction of storm water drains along with sedimentation tanks with sandbags as partition to retain the soil particles from storm water drain, • Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies. • Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies, and • Construction vehicles and machinery should be regularly serviced and checked for any leakage of oil.	• Laboratory test, if necessary, site observation	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement noise pollution measures in the ESMP. Inspections in the form of river water tests performed and regular inspection performed by contractor and project owner.	385,000.00
Soil Impacts	• Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation, • Avoid spilling leaking of chemical. • Soil conservation measures must be applied to the stockpiles to prevent	• Site observation, Presence of topsoil stockpile	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement soil pollution measures in the ESMP. Regular inspection performed by contractor and project owner.	200,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	erosion. Prepare trenches around the borrow area to prevent runoff entering into a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages, • Fuel storage area should be paved • Construction debris should be stored under covered sheds and paved surfaces and should be disposed of regularly to designated sites. • Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the site • Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, and • There must be Proper solid waste management practice (Sorting, collection, transportation, reuse, recycle, recovery and disposal).					
Biodiversity Impacts	• The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize	• Presence of Rehabilitation strategies,	• Contractor, RMC	During construction	12,000 indigenous trees native to the area planted on project site by project owner. 8 trees transplanted to make way for construction.	10,260,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project, • Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. • Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible. • Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan. • Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. • Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.					
Utilities Impacts	• Employing water conservation techniques and only using the required amounts of water to prevent waste, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever	• Presence of borehole, presence of maintenance plan	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement utilities impact measures in the ESMP. Regular inspection performed by contractor and	600,000.00

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	possible, • Providing proper sanitary facilities for construction workers, • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency,				project owner.	
Traffic Impact	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations, • Making sure the construction does not occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	• Number of accidents	• Contractor, RMC	Construction	Contractor provided with the ESIA to implement traffic impact measures in the ESMP. Regular inspection performed by contractor and project owner. Traffic circulation plan devised, and Signs placed over the construction site. No accident occurred	500,000
EHS Risks	• Employing an ESH plan that will outline all ESH risks and provide a strategy for their management. • Regular provision of health and safety training for all workers. • Optimization of working schedule and work to minimize several material vehicle mobilizations trips. • Regular inspection and scheduled maintenance of all equipment • Ensuring all potential hazards such as movable machine parts are labeled. • Raising awareness and educating workers on the risks from equipment and ensuring they receive	• Number of accidents, presence of PPE, provision of training	• Contractor, RMC	Construction	Contractor provided with the ESIA to avoid EHS risks and implement measures in the ESMP. Regular inspection performed by contractor and project owner. ESH plan in place by the contractor and project owner. PPE present. Trainings provided	3,500,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	adequate training in the use of the equipment. • Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials on the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. • Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. • Labeling chemicals and material according to the risks they possess. • Creating safe and adequate fire and emergency assembly points and making sure they are well labeled. • Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbors. • Provision of first aid kit				regularly.	
Air	• Air pollution both indoor and	• Report,	• RMC	During		11,970,0

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
pollution	outdoor, monitoring should be carried out quarterly to check the air pollution level, • Incinerator filters would be tested annually and replaced as necessary. • Waste segregation for wastes with polychlorinated dibenzo-dioxins and polychlorinated dibenzo-furans PCDD/Fs would be done and these wastes would never be incinerated • Wastes would be introduced into the incinerator only after the optimum temperature is reached in the final combustion chamber • The waste charging system would be interlocked with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits. • A flue gas treatment system would be used for control of acid gases, particulate matter, and other air pollutants. • Proper waste reduction and segregation should be employed • Proper Siting of incinerator as per the recommendation • Proper Incinerator Design as per the recommendations	physical observation		incinerator operation,		00 includes CAPEX for incinerator filtration system
Noise Pollution	• The use of continuous insulation (CI) in building enclosures from the sources, • exterior walls and roofing system designs to decrease the impact of noise pollution from aircraft traffic. • Wall and roof-ceiling assemblies must have an	• Report, physical observation, number of compliant	• RMC	Operation		600,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	Outdoor-Indoor Transmission Class (OITC) rating of 40 or greater or an Sound Transmission Class (STC) rating of 50 or greater, and fenestration that is part of the building must have an OITC or STC rating of 30 or greater for buildings within 1000 ft. (300 m) of expressways and buildings within 5 mi (8 km) or less of airports serving more than 10,000 commercial jets per year. • Isolation of noise sources such as boilers, generator and the provision of ear protectors to employees working in areas where noise levels exceed noise limits, • Conducting all noisy activities during the day when permissible levels are higher. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Using equipment with low noise ratings or noise reduction technologies. • Regular maintenance of machines and equipment and generators as per the manual.					
Water Resource Impact	• Treatment of effluents (all medical liquid wastes) and sewage prior disposal into the environment, • Ensure that water exiting through the sink drains will be diverted to a retention tank where it would be disinfected before being sent to the sewer system. • Sludge is transported to Koebel treatment plant	• Laboratory test if required, report and physical observation	• RMC	Operation		35,000,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	using vacuum trucks, • Water quality testing at distribution point to monitor and detect contamination through any leakage, • Proper management of solid waste should be done to prevent any contact between the waste and storm water, • Incinerated ash should be properly disposed in secured areas, • Storm water drains should be separate from effluent drains, • Regular monitoring of the treatment plant as per the technical requirement, • Storm water system should be inspected & cleaned before heavy rain every year, • Adoption of best management practices to prevent water wastage and minimize water loss. • Installation of leakage detection system to minimize the water loss from the treatment plant, and • Regular monitoring of treated wastewater every six month to check the treatment efficiency and quality of treated water					
Soil Impacts	• Treatment of the effluents and sewage and ensuring proper disposal, • Ensure that water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system, • Proper management of solid and liquid wastes as	• Report, physical observation	• RMC	Operation		17,000,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	recommended in the document, • Chemical and biomedical waste generated should be managed as per guidelines of Ethiopia government.					
Utilities Impact	• Employing water conservation techniques and only using the required amounts of water to prevent waste, • Use of deep borehole as alternative source of water, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Using of solar power for minor operations, • Using only the required amounts of water during normal operations, • Placing signs of conservation of water and electricity. • Using machines and equipment with a high level of power efficiency and servicing them as often as required to maintain their efficiency and • Awareness creation about water and power saving techniques for the workers.	• Report	• RMC	Operation phase		8,550,000.00
Traffic Impact	• Placing visible and clear signs to control the movement of vehicles in and out of the site. • Having alternative entrances and exits for emergency operations and staffs rather than using the main gate, • Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site • Ensuring all drivers for the	• Report, physical observation	• RMC	operation		600,000

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	project comply to traffic regulations • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use					
OHS and Public Health Impacts	• Employing and EHS/OSH plan • Laboratory workers would be trained in equipment operating and handling techniques during operation, • HEPA filters at the RMC facility would be tested annually and replaced as necessary, • Training would be provided in sample and waste handling, transportation, and storage. • All material would be sterilized by autoclave or chemical disinfection. • Provide continuous occupational health and safety training to all workers • Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear • Placing readable signs and symbols as required • Providing firefighting equipment and maintaining them to ensure they are fully functional • Effective vaccines or therapeutic measures would be available for all risk groups • Personnel working in biobank Centre would receive specific training in handling pathogenic and potentially lethal agents and	• Report, physical observation	• RMC	Operation		No Major costs to reflect, it is included in the operations cost of the business model.

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
	would be supervised by competent staff in handling infectious agents and associated procedures • Ampoules containing infectious materials would never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal • Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use of maps on elevators, staircases etc. • Providing adequate storage for hazardous and flammable substances and controlling access to them. • Monitoring the movement, handling and management of healthcare wastes to ensure they are safely managed and do not present any EHS risks. • Establishment of Infection prevention committee. • Implementation infection prevention and patient safety standard • Establishment of Proper barriers or isolation for the protection of radiation from X-ray MRI, Ultrasound machines etc. • Regular checkup of X-ray, MRI, Ultrasound machines etc.					
Water resource impacts	• Nonhazardous waste would be sent to permitted disposal facilities. • Spill response plan. • Green belts with properly selected plant species • Develop decommissioning plan for impact mitigation	• Physical observation	• RMC, contractor	Decommission		300,000 Cost for developing a standalone decommissioning

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
Waste Generation impacts	• nonhazardous waste would be sent to permitted disposal facilities. • leveling of the project site • restoration of the project site • Develop decommissioning plan for impact mitigation	• Physical observation	• RMC, contractor	Decommission		plan
Occupational Health and Safety Risks	• The work environment should be healthy. • Employers should take steps to prevent the transmission of HIV and other blood-borne pathogens, • Appropriate health education should be given to workers. • Develop decommissioning plan for impact mitigation	• Physical observation	• RMC, contractor	Decommission		
	Total					**52,810,000**

Environmental and Social Management and Monitoring Plans (ESMMP)

ESMMP has been prepared to address all adverse impacts of implementing the Hospital project. The ESMMP presents in detail impact categories, their mitigation measures, institutional responsibility, and indicative budget.

Impact Description	Proposed mitigation Measures	Monitoring Indicators	Responsible parties	Reporting Frequency	Budget required/y., monitoring cost
I. Preconstruction and Construction					
Displacement	• The dwellers should be consulted about the resettlement process. • RAP and livelihood restoration should be prepared for eight households. • The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 129 households. The project will make livelihood assistance payment to informal settlers, provide skill training, and hire people from the locality during construction and operation of the medical campus. • Alternative resettlement sites should be immediately provided for displaced people, particularly for eight households. • Displaced people should be advised as to how to sustain livelihood activities: Specially the family to be resettled has shown interest towards livestock breeding,	• Public consultation	• Public consultation	Every six months	5,000
Air Pollution	• Avoid unnecessary excessive vehicle movement and have proper schedule plan, • Limit vehicle speeds on non-surfaced roads, • Maintain equipment and vehicles in good working order to avoid excessive emissions. • Excavated surface should be sprayed with water from time to time to reduce dust emission during operations. • Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility, • Workers will be provided with PPE and the use of PPE shall be enforced, • Dumping of material from the heavy vehicles will be done from an appropriate height for less dust generation. • The heavy vehicles are the main sources for release of carbon monoxide and nitric oxide, so to avoid the increase of pollutant in the site; the vehicles will be maintained properly and regularly.	• Buffer zone marked and respected. • Complaint community • Formation of dust	• Roha Medical Campus • Contractor	Every six months	5,000

	• Provision of face mask to workers to minimize inhalation of dust particles. • Low Sulphur diesel should be used for running construction equipment and vehicles. • Vehicles carrying construction material and debris should be covered with tarpaulin cover, • Raw materials excavated soil and other debris should be stored and transported under covered nets. • Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising dust. • Enclosing the structures under construction with dust proof nets. • Regular maintenance and services of machines and engines as per the Manual.				
Noise Pollution	• Routine timely maintenance of equipment as per the Manual. • Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents. • Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided, • Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above, • Acoustic enclosures should be provided with DG (Diesel generator) sets and machinery to control the noise levels at construction site, • Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment • Construction works should be carried out only during the specified period/schedule	• Complaint • Physical observation	• Contractor, RMC	Every six months	5,000
Water resource Pollution	• Regular inspections at site to monitor leakages in water storage tanks, • Prevent piling up of excavated soil, raw material, and construction debris at site by proper management and disposal, • Minimize run-off by using sprays for curing, • Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies. • Proper collection, management and disposal of construction and municipal waste from site to	• Laboratory test, if necessary, site observation	• Contractor, RMC	Every three month	10,000

	prevent mixing of the waste in run-off and entering the water bodies, and • Construction vehicles and machinery should be regularly serviced and checked for any leakage of oil.				
Soil Impacts	• Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation, • Avoid spilling leaking of chemical. • Soil conservation measures must be applied to the stockpiles to prevent erosion. Prepare trenches around the borrow area to prevent runoff entering into a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages, • Fuel storage area should be paved, • Construction debris should be stored under covered sheds and paved surfaces and should be disposed of regularly to designated sites. • Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the camp site, • Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, and • There must be Proper solid waste management practice (Sorting, collection, transportation, reuse, recycle, recovery and disposal).	• Site observation, Presence of topsoil stockpile	• Contractor, RMC	Every six months	4,000
Biodiversity Impacts	• The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project, • Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. • Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible. • Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per	• Presence of Rehabilitation strategies,	• Contractor, RMC	Every six months	3,000

	rehabilitation plan. • Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. • Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.				
Utilities Impacts	• Employing water conservation techniques and only using the required amounts of water to prevent waste, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Providing proper sanitary facilities for construction workers. • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency,	• Presence of borehole, presence of maintenance plan	• Contractor, RMC	Every six month	2,000
Traffic Impact	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations, • Making sure the construction does not occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	• Number of accidents	• Constrictor, RMC	Every three months	6,000
HSE Risks	• Employing an HSE plan that will outline all HSE risks and provide a strategy for their management. • Regular provision of health and safety training for all workers. • Optimization of working schedule and work to minimize several material vehicle mobilizations trips. • Regular inspection and scheduled maintenance of all equipment • Ensuring all potential hazards such as movable machine parts are labeled. • Raising awareness and educating workers on the risks from equipment and ensuring they receive adequate training in the use of the equipment. • Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials on the site. • Placing visible and readable signs to control the	• Number of accidents, presence of PPE, provision of training	• Contractor, RMC	Every three months	10,000

	movement of vehicles and notify motorists and pedestrians around the, and workers in the site. • Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. • Labeling chemicals and material according to the risks they possess. • Creating safe and adequate fire and emergency assembly points and making sure they are well labeled. • Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbors. • Provision of first aid kit				
II. Operation Phase Impacts					
Air pollution	• Air pollution both indoor and outdoor, monitoring should be carried out quarterly to check the air pollution level, • Incinerator filters would be tested annually and replaced as necessary, • Waste segregation for wastes with polychlorinated dibenzo-dioxins and polychlorinated dibenzo-furans PCDD/Fs would be done and these wastes would never be incinerated, • Wastes would be introduced into the incinerator only after the optimum temperature is reached in the final combustion chamber, • The waste charging system would be interlocked with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits. • A flue gas treatment system would be used for control of acid gases, particulate matter, and other air pollutants. • Proper waste reduction and segregation should be employed, • Proper Siting of incinerator as per the recommendation • Proper Incinerator Design as per the recommendations	• Report, physical observation	• RMC	Every six months	8,000
Noise Pollution	• The use of continuous insulation (CI) in building enclosures from the sources, • exterior walls and roofing system designs to decrease the impact of noise pollution from aircraft traffic. • Wall and roof-ceiling assemblies must have an Outdoor-Indoor Transmission Class (OITC) rating of 40 or greater or an Sound Transmission Class (STC)	• Report, physical observation, number of compliant	• RMC	Every six months	5,000

	rating of 50 or greater, and fenestration that is part of the building must have an OITC or STC rating of 30 or greater for buildings within 1000 ft. (300 m) of expressways and buildings within 5 mi (8 km) or less of airports serving more than 10,000 commercial jets per year. • Isolation of noise sources such as boilers, generator and the provision of ear protectors to employees working in areas where noise levels exceed noise limits, • Conducting all noisy activities during the day when permissible levels are higher. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Using equipment with low noise ratings or noise reduction technologies. • Regular maintenance of machines and equipment and generators as per the manual.				
Water Resource Impact	• Treatment of effluents (all medical liquid wastes) and sewage prior disposal into the environment, • Ensure that water exiting through the sink drains is diverted to a retention tank where it would be disinfected before being sent to the sewer system. • Sludge is transported to kotare treatment plant using vacuum trucks, • Water quality testing at distribution point to monitor and detect contamination through any leakage, • Proper management of solid waste should be done to prevent any contact between the waste and storm water, • Incinerated ash should be properly disposed in secured areas, • Storm water drains should be separate from effluent drains, • Regular monitoring of the treatment plant as per the technical requirement, • Storm water system should be inspected & cleaned before heavy rain every year, • Adoption of best management practices to prevent water wastage and minimize water loss. • Installation of leakage detection system to minimize the water loss from the treatment plant, and • Regular monitoring of treated wastewater every six month to check the treatment efficiency and quality of treated water	• Laboratory test if required, report and physical observation	• RMC	Every three months	80,000
Soil Impacts	• Treatment of the effluents and sewage and ensuring proper disposal, • Ensure that water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system,	• Report, physical observation	• RMC	Every six month	6,000

	• Proper management of solid and liquid wastes as recommended in the document, • Chemical and biomedical waste generated should be managed as per guidelines of Ethiopia government.				
Utilities Impact	• Employing water conservation techniques and only using the required amounts of water to prevent wastage, • Use of deep borehole as alternative source of water, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Using of solar power for minor operations, • Using only the required amounts of water during normal operations, • Placing signs of conservation of water and electricity. • Using machines and equipment with a high level of power efficiency and servicing them as often as required to maintain their efficiency and • Awareness creation about water and power saving techniques for the workers.	• Report	• RMC	Every six month	15,000
Traffic Impact	• Placing visible and clear signs to control the movement of vehicles in and out of the site. • Having alternative entrances and exits for emergency operations and staff rather than using the main gate, • Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site • Ensuring all drivers for the project comply to traffic regulations • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use	• Report, physical observation	• RMC	Every three month	6,000
EHS and Public Health Impacts	• Employing and EHS plan • Laboratory workers would be trained in equipment operating and handling techniques during operation • HEPA filters at the RMC facility would be tested annually and replaced as necessary • Training would be provided in sample and waste handling, transportation, and storage • All material would be sterilized by autoclave or chemical disinfection • Provide continuous occupational health and safety training to all workers • Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear • Placing readable signs and symbols as required • Providing firefighting equipment and maintaining them to ensure they are fully functional	• Report, physical observation	• RMC	Every three month	10,000

	• Effective vaccines or therapeutic measures would be available for all risk groups • Personnel working in biobank Centre would receive specific training in handling pathogenic and potentially lethal agents and would be supervised by competent staff in handling infectious agents and associated procedures • Ampoules containing infectious materials would never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal • Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use of maps on elevators, staircases etc. • Providing adequate storage for hazardous and flammable substances and controlling access to them • Monitoring the movement, handling, and management of healthcare wastes to ensure they are safely managed and do not present any EHS risks • Establishment of Infection prevention committee • Implementation infection prevention and patient safety standard • Establishment of Proper barriers or isolation for the protection of radiation from X-ray MRI, Ultrasound machines etc. • Regular checkup of X-ray, MRI, Ultrasound machines etc.				
III. Decommissioning Phase Impacts					
Water resource impacts	• Non-hazardous waste would be sent to permitted disposal facilities • Spill response plan. • Green belts with properly selected plant species	• Physical observation	• RMC, contractor	Every three months	3,000
Waste Generation impacts	• Non-hazardous waste would be sent to permitted disposal facilities • Leveling of the project site • Restoration of the project site	• Physical observation	• RMC, contractor	Every three months	5,000
Occupational Health and Safety Risks	• The work environment should be healthy. • Employers should take steps to prevent the transmission of HIV and other blood-borne pathogens, • Appropriate health education should be given for workers	• Physical observation	• RMC, contractor	Every three months	6000
	Total Monitoring Cost				**194,000**

Grievance Mechanism

It is expected that no major grievance issue will arise. However, to ensure that stakeholders have avenues for redressing their grievances related to any aspect that may result from the project, procedures of redress of grievances have been established. They are as follows:

The community will be informed of the procedures in their local language. All information about grievance mechanisms will be available in public areas and with the appointed community representatives.

The proponent/contractor will have a dedicated grievance office during the implementation of the Resettlement Action Plan and a dedicated phone line to hear grievances. The proponent /contractor will accept all comments and complaints associated with the project from any stakeholder either in person, via email, post, telephone, or any other appropriate communication channel. The client/contractor will then arrange for an officer to further listen to the complaints, then summarize the grievances in a complaints/comments logbook which would contain the name of the complaint lodger, date of receipt, brief description of issue, proposed corrective actions, and date of response sent to the complainant.

All grievances will be registered and acknowledged within 6 working days then responded to within 15 working days. All responses will be made either in writing or verbally, according to the preferred method of communication of the complainant.

Roles and responsibilities

Project proponent - manage and monitor the environmental, and social impacts.

Environmental Protection Agency - is responsible for evaluating and approving ESIA study reports as well as monitoring the implementation of the ESMP.

The estimated overall budget for the implementation of all environmental and social measures, including the cost for ESMP and ESMMP, is 53,004,000.00 ETB or 925,026.178 USD (at the exchange rate of 1 USD = 57.3 Birr).

Environmental and Social Performance

Based on the site observation and review of the ESMP, the company is operating as per the environmental and social impacts management plan. The construction activities were evaluated as compliance against air pollution, and preparation of spill response plan. RAP, preparation of emergency response plan, noise pollution, traffic impacts and OHS Risks. It was evaluated partial compliance against soil impacts and water resource impacts, Correction actions should be taken as per the mitigation measures proposed in the ESIA report.

Table of Contents

EXECUTIVE SUMMARY ii

OVERVIEW OF THE PROJECT ii

LIST OF ABBREVIATIONS xxxviii

LIST OF TABLES xl

1. INTRODUCTION 1

1.1 Background of the Project 2

1.2 Objectives of the ESIA 3

2. SCOPE 4

3. METHODOLOGY AND APPROACH OF ESIA 6

3.1 Study Area 6

3.2 Data Record Review 6

3.3 Field Visits and Observation 7

3.4 Stakeholder and Public Consultations 7

3.4.1 Stakeholder Consultation 7

3.4.2 Community Consultation 7

3.5 Documents and Guidelines Used 8

3.6 Methods for Impact Identification, Analysis, and Prediction 8

3.7 Methods for Developing ESMP 9

3.8 Reporting and Documentation 9

3.9 Study Team 10

4. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS 11

4.1 The FDRE Constitution, 1994 11

4.2 Environmental Policy of Ethiopia 11

4.3 Environmental Impact Assessment Proclamation No. 299/2002 12

4.4 Health Policy 13

4.5 National HIV/AIDS Policy 13

4.6 The Conservation Strategy of Ethiopia (CSE) 14

4.7 Water Resource Management Policy 14

4.8 Water Resources Management Proclamation No. 197/2000 15
4.9 Labour Proclamation No. 1156/2019..... 15
4.10 Expropriation of Landholdings for Public Purpose, Payments of Compensation and Resettlement Proclamation No. 1161/2019 15
4.11 Public Health Proclamation No. 200/2000 16
4.12 Environmental Pollution Control Proclamation No. 300/2002..... 16
4.13 Solid Waste Management Proclamation No. 513/2007 17
4.14 Solid Waste Management Standards in Ethiopia..... 18
4.15 Hazardous Waste Management and Disposal Control Proclamation No. 1090/2018 19
4.16 Medicines Waste Management and Disposal Directive (August 2011) 20
4.17 International Development Financial Institution Guidelines..... 20
4.17.1 African Development Bank's (AfDB's) Integrated Safeguards System (ISS) 21
4.17.2 International Finance Corporation..... 22
4.18 International Conventions, Protocols, and Standards..... 25
4.18.1 The United Nations Framework Convention on Climate Change (UNFCCC)..... 25
4.18.2 International Convention on Biodiversity..... 25
4.18.3 Basel Convention..... 26
4.18.4 Sustainable Development Goals (SDGs) 26
4.18.5 International Finance Corporation (IFC)..... 27
4.18.6 African Union Agenda 2063, Aspiration 1, Goal 3 (Healthy and Well-Nourished Citizens)..... 27
4.18.7 African Development Bank's (AfDB's) Integrated Safeguards System (ISS) 27
4.19 Institutional Roles and Responsibilities ESIA 28
4.19.1 Federal Environment, Forest, and Climate Change Commission (EFCCC)..... 28
4.19.2 Regional Environmental Protection Agencies..... 28

4.19.3 Ethiopian Food and Drug Authority (EFDA) 29
5. PROJECT DESCRIPTION 30
5.1 Project Location and Topography 30
5.2 Project Components 31
5.3 Progress of the Project 34
5.4 Project Design for Critical Areas 35
5.5 Operation and Verification Procedures of RMC lab 37
5.6 Laboratory Sample Arrival and Processing at RMC 38
5.7 Occupational Health and Safety Practices 39
5.8 Internal Controls and Management Procedures for Environmental Issues 40
5.8.1 Policy Development 40
5.8.2 Risk Assessment 40
5.8.3 EControl Activities 40
5.8.4 Monitoring and Reporting 41
5.8.5 Incident Reporting, Investigation, and Follow Up 41
5.9 Project Equipment Description 41
5.9.1 Construction Phases Process, Equipment, Materials, Wastes & Output Processes, Facility 41
5.9.2 Operational Phase Processes, Equipment, Materials, Wastes and Outputs Processes 43
5.10 Parking Spaces 44
5.11 Utilities 44
5.12 Sewerage 44
5.13 Storm Water Drainage 44
5.14 Waste Characteristics and Waste Management Approaches 45
5.14.1 Waste Characteristics 45
5.14.2 Waste Management Approaches 48
5.15 Project Activities 63
5.15.1 Construction Phase 63

5.15.2 Operation and Maintenance Phase 63
5.15.3 Decommissioning Phase..... 64
5.16 Environmental and Social Performance of RMC Project against ESIA 64
6. BASELINE INFORMATION OF THE PROJECT PROPOSAL 65
6.1. Biophysical and Environmental Baseline Information of the City 65
6.1.1 Geographical Location and Area 65
6.1.2 Soil and Geology 66
6.1.3 Climate of the City 66
6.1.4 Noise 67
6.1.5 Flora and Fauna..... 68
6.1.6 Surface and Ground Water Resources 70
6.2. Socio-Economic Baselines 72
6.2.1 Population and Demographic Characteristics 72
6.2.2 Health Service..... 72
6.2.3 Education 73
6.2.4 Water Supply and Sanitation 73
6.2.5 Waste Management Facilities 74
6.2.6 Water Treatment and Drainage 74
6.2.7 Electricity 75
6.2.8 Solid Waste Management 75
6.2.9 Environmental Protection 76
6.2.10 Culture 76
7. ANALYSIS OF PROJECT ALTERNATIVES 77
7.1 No Project Alternative 77
7.2 Alternative Site 77
7.3 Alternative Schedule 78
7.4 Alternative Designs..... 78
7.5 Utilities 78

7.5.1 Electricity 78
7.5.2 Water 79
7.5.3 Transport 79
7.5.4 Materials 79
7.5.5 Sewage Management Alternatives 79
7.5.6 Solid Waste Management Alternatives 81
8. GAPS AND/OR ASSUMPTIONS IN ESIA PROCESS 82
9. PROJECT IMPACT IDENTIFICATION AND ANALYSIS 83
9.1 Impact Analysis 83
9.2 Positive Impacts 87
9.2.1 Income Generation 87
9.2.2 Improving Growth of the Economy 87
9.2.3 Creation of Employment and Business Opportunities 88
9.2.4 Increase Economic Activities and Revenue 88
9.2.5 Access to Health Service 89
9.2.6 Environmental Conservation and Restoration 89
9.2.7 Increases Land and Utilities Value 89
9.2.8 Market for Goods and Services 89
9.3 Negative Impacts 90
9.3.1 Resettlement Impact 90
9.3.2 Impact on Air Quality 90
9.3.3 Impact on Noise Environment 92
9.3.4. Impact on Water Resources 93
9.3.5 Impact on Soil Quality 93
9.3.6 Impact on Biodiversity 94
9.3.7 Increased Pressure on Utilities 95
9.3.8 Traffic Impacts 95
9.3.9 Waste Impacts 96

9.3.10 Occupational Health and Safety Risks 97
10. IMPACT MITIGATION MEASURES 99
10.1 Pre-construction and Construction Phases 99
10.1.1 Mitigation Measures for Resettlement Impacts 99
10.1.2 Mitigation Measures for Air Pollution 99
10.1.3 Mitigation Measures for Noise Pollution 100
10.1.4 Mitigation Measures for Water Source Pollution 101
10.1.5 Mitigation Measures for Soil Contamination 102
10.1.6 Mitigation Measures for Biodiversity 102
10.1.7 Mitigation Measures for Increased Pressure on Utilities 103
10.1.8 Mitigation Measures for High Traffic Impact 103
10.1.9 Mitigation Measures for HSE Risks 103
10.2 Operational Phase Impact Mitigation Measures 104
10.2.1 Mitigation Measures for Air pollution 104
10.2.2 Mitigation Measures for Noise Pollution 106
10.2.3 Mitigation Measures for Water Source Pollution 107
10.2.4 Mitigation Measures for Soil Contamination 107
10.2.5 Mitigation Measures for Increased Pressure on Utilities 108
10.2.6 Mitigation Measures for Increased Traffic Impact 108
10.2.7 Mitigation Measures for OHS and Public Health Risks 108
10.3 Decommission phase Impact Mitigation Measures 109
10.3.1 Waste Generation Impact Mitigation Measures 109
10.3.2 Occupational Health and Safety Risks Mitigation Measures 110
11. PROJECT RELATED RISKS 111
11.1 Risks Associated with Handling and Storage of Infectious Materials 111
11.2 Risks Related to Improper Use of Equipment 111
11.3 Risk of Fire Outbreak 112
11.4 Chemical Hazard 112

11.5 Risks associated with Waste Transportation 112
11.6 Risks associated with Covid-19 113
12. ENVIRONMENTAL AND SOCIAL IMPACTS MANAGEMENT PLAN.....114
13. ENVIRONMENTAL AND SOCIAL MONITORING PLAN.....127
14. PUBLIC AND STAKEHOLDER CONSULTATION 138
14.1 Stakeholder Consultation.....138
14.2 Public Consultation 139
15. CONCLUSION AND RECOMMENDATION.....142
15.1 Conclusion 142
15.2 Recommendation 142
REFERENCES 144
ANNEX I: LEGAL DOCUMENTS OF THE CONSULTANT xl
ANNEX II: CV AND COMPETENCY CERTIFICATE OF CONSULTANTS xlv
ANNEX III: LEGAL DOCUMENTS OF THE PROPONENT.....lii
ANNEX IV: STAKEHOLDER CONSULTATION.....liii
ANNEX V: NATIONAL EMISSION STANDARD.....lxi
ANNEX VI: ENVIRONMENTAL AND SOCIAL PERFORMANCE OF RMC..... lxiii

LIST OF ABBREVIATIONS

AA	Addis Ababa
AAWSA	Addis Ababa Water and Sewerage Authority
AfDB	African Development Bank
BOD	Biological Oxygen Demand
CDC	Chronic Disease Control
CSE	Conservation Strategy of Ethiopia
CST	Cement Solidification Technology
ECA	Economic Commission for Africa
EFCCC	Environment, Forest and Climate Change Commission
EFDA	Ethiopia Food and Drug Authority
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FASC	Federation of African Societies of Chemistry
FDRE	Federal Democratic Republic of Ethiopia
HAPI	Horn of Africa Press Institute
HCWs	Health Care Workers
HW	Healthcare Waste
HDA	Health Development Army
HEP	Health Extension Program

HSDP	Health Sector Development Program
IEC	Information, Education and Communication
IFC	International Finance Corporation
ISS	Integrated Safeguards System
OHS	Occupational Health and Safety
PCDD	Polychlorinated Dibenzo-P-Dioxins
PCDF	Polychlorinated Dibenzo furans
PS	Performance Standards
PTFE	Polyte Tra Flour-Ethylene
RMC	Roha Medical Campus
SDG	Sustainable Development Goals
TOR	Term of Reference
UNDP	United Nations Development Program
WHO	World Health Organization

LIST OF TABLES

Table 1: Ethiopian Healthcare System 1
Table 2: Study team composition and responsibility 10
Table 3: Breakdown of Solid Waste Management Proclamation No. 513 and the Environmental Pollution Control Proclamation 18
Table 4: IFC standard on noise levels 24
Table 5: Utility requirements of RMC 44
Table 6: Waste generated from RMC with estimated average quantity, type and source. 46
Table 7: Waste segregation and waste colour coding as recommended by WHO 50
Table 8: Distribution of Health Institutions in Bole Sub-City 72
Table 9: Educational Institutions in Bole sub-city 73
Table 10: Impact Classification Matrix 83
Table 11: Total Impact Analysis of the Proposed Project 84
Table 12 Project Affected Persons Entitlement and compensation. 90
Table 13 Environmental and Social Management Plan 115
Table 14: Environmental and Social Monitoring Plan 128

List of Figures

Figure 1: The geographical location of Roha Medical Campus 6
Figure 2: Key steps of ESIA, Adopted UNDP 2016 9
Figure 3: Site plan of the Hospital 30
Figure 4: North and South Elevation of the Hospital 32
Figure 5: East and West Elevation of the Hospital 32
Figure 6: The Hospital's Rendering North facing. 33
Figure 7: The Hospital's Rendering South facing 33
Figure 8: Utility building layout 34
Figure 9: Progress of the construction of RMC 35
Figure 10: Safety signs (left) Workers with adequate PPE (middle) and OSH team(right) at construction site of RMC 40
Figure 11: Indicative layout of waste treatment building containing HTI and AT 58
Figure 12: Project Location and nearby landmarks 66
Figure 13: Scattered Eucalyptus within the project site. 69
Figure 14: Acacia trees within the project site. 69
Figure 15: Different bird species of the area surrounding the project. 70
Figure 16: Unplanned sewage line flowing into the wetland area outside the boundary of the Hospital. 71

Figure 17: The lower part of the Kersa-Agoza River in south – eastern direction from the project site. 71
Figure 18: Stakeholder consultation with bole sub-city environmental protection officer. 138
Figure 19: Stakeholder consultation with school administrator. 138
Figure 20: Stakeholder consultation with woreda labour and social affairs office.....138
Figure 21: RMC representative at the public consultation.....140
Figure 22: Woreda social affairs officer.....140
Figure 23: Community members who participated in the public consultation.....140

1. INTRODUCTION

In general, Ethiopia is at a pivotal moment in its efforts to improve the health status of its people and transition into a new phase of social and economic development. As a result, various reforms, plans, and strategies, Ethiopia now has a decentralized three-tier healthcare system, comprising primary, secondary, and tertiary levels of care.

Table 1: Ethiopian Healthcare System

Healthcare Tier	Type of Health Facilities	Population to be served
Primary	Health Posts	3,000 - 5,000
	Health Centers	25,000 - 40,000
	Primary Hospital	1 - 1.5 million
Secondary	General Hospital	1.5 - 3.5 million
Tertiary	Specialized Hospital	3.5 - 5 million

To improve the delivery of quality health service, the sector has been investing in improving the health sector blood line.

Health extension program (HEP), Health Development Army (HDA): The training and development of health extension workers (HEWs) has been a top priority on which the government has been working. The cumulative number of HEWs has consistently increased during Health Sector Development Program: HSDP-III, from 2,737 in 2004/05 24,571 in 2007/08. By the end of 2009, this number reached 31,831, exceeding the target of 30,789.
Supply chain management, regulatory system, harmonization, and alignment.
Healthcare Financing, Human Resource Development, Health Information System, continuous quality improvement program and referral system.

Among the tier systems indicated above, the proposed project, Roha Medical Campus, is categorized under specialized hospital which is expected to serve more than 3 million people in Ethiopia and serve as referral center for both local and international patients.

Although tangible progress has been made in improving healthcare for the provision of quality services in Ethiopia, many gaps and challenges are yet to be addressed through further efforts over the years to come. By considering this, Roha Medical Campus (RMC) is investing in Ethiopia to build a Health Campus that will bring global medical excellence to Ethiopia in a park-like setting.

1.1 Background of the Project

Roha Medical Campus ("RMC") is a multi-phase, integrated healthcare development located in the heart of Addis Ababa, Ethiopia, being undertaken by Roha Health BV ("Roha"). The RMC development is the landmark development of Roha Health, a subsidiary of the Roha Group which is an investment firm focused on building sustainable companies within Africa.

Roha was established with the aim of addressing Africa's healthcare needs by building medical infrastructure and providers across the continent, to provide high quality, affordable care for patients through world-class facilities, partnerships with international market leaders and the latest technology.

The RMC development comprises multiple phases, including multiple internationally accredited hospitals with approximately 1,000 beds, outpatient and other healthcare facilities and mixed-use areas.

The first phase of the RMC development, the focus of this document, comprises the Roha Health Advanced Multi-Specialty Hospital (the "Facility", "Hospital or "Project"), an advanced, multi-specialty facility with 350 beds. Construction of the Project has begun, and the project team aims to begin operations in 2026. The project, which involves the construction of an Advanced Multi-Specialty Hospital, is now underway, with approximately 35% of the construction work completed. This milestone indicates significant progress since the project's inception.

According to Ethiopian EIA Guideline (2000) large-scale and greenfield hospital development such as the proposed one are expected to have adverse and significant environmental and social impacts, and may, therefore, require comprehensive ESIA. The proposed tertiary care and teaching hospital is therefore categorized under schedule I and therefore needs full Environmental and Social Impact Assessment (ESIA) before approval by the relevant Environmental Protection Authority.

This Environmental and Social Impact Assessment (ESIA) is an updated version of the ESIA approved by the then Environment Forest and Climate Change Commission (EFCCC) on December 23, 2021, Ref. No. 9/1.1/6131/14. The update is deemed essential by RMC for the project's sustainability, accounting for the expropriation of twenty-two (22) hectares of RMC land for other government projects. Consequently, this updated version outlines commitments based on the current land holding of six (6) hectares and considers also the current status of the project and its performance against the ESMP.

Additionally, with the project now at a more advanced stage, the updated ESIA includes detailed plans and budget allocations, such as floor plans, waste management strategies, and auxiliary services.

1.2 Objectives of the ESIA

The overall objective of this Environmental and Social Impact Assessment (ESIA) study is to provide decision-makers and project proponents with information on potentially significant environmental and social impacts and risks associated with the Roha Medical Campus Project.

Specifically, this ESIA study was conducted to:

- Assess the baseline condition of the environment and social nature of the project;
- Describe the legal requirement associated with the project;
- Explain how the construction and operation phases of the medical campus could result in social and environmental consequences;
- Describe the strategies for containing the negative impact and enhance the positive impact of the project;
- Suggest mitigation and enhancement measures for the identified significant adverse and beneficial impacts; to provide management and monitoring plans;
- Ensure that the proposed project complies with the national environmental and social regulations and African Development Bank's integrated safeguards system.

2. SCOPE

From a sustainable development standpoint, the Ethiopian government policy on all new projects, programs or activities requires that an environmental and social impact assessment be carried out in planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation, and decommissioning of the facility.

The scope of this work includes:

- To identify, predict, evaluate, and mitigate the significant environmental and social impacts (positive and negative);
- To identify key social issues relevant to the project objectives, and specify the project's social development outcomes;
- To determine the magnitude of adverse environmental and social impacts;
- To assess the impacts on any physical, biological, and socio-economic environment;
- To establish the mitigation measures that are necessary to avoid, minimize or offset predicted adverse impacts and, where appropriate, incorporate these into Environmental and Social Management Plan (ESMP);
- To identify stakeholders who are directly affected, interested parties, and carry out a stakeholder analysis to determine their role in achieving social development outcomes;
- To inform, consult and carry out dialogues with stakeholders on matters regarding project design alternatives, implementation of environmental, and social mitigation measures, and to provide recommendations on project design that may require adjustments in project design;
- To provide an environmental and socio-economic profile of the population and available infrastructure facilities for services and community resources;
- To assess the national legal and institutional framework related to environmental and social impact assessment as a result of project activities, and;
- To assess the performance of the project activities against ESMP.

The detail scope or Terms of Reference (ToR) of the ESIA study was primarily outlined by a panel discussion of participating experts. The outline of the ESIA study proposal was then modified in consultation with the pre-identified stakeholders and recommendations of the Addis Ababa City Administration. The scope was decided based on the likelihood of impacts related to description of the proposed project (medical campus). The study of impacts is planned under the pre-construction, construction, and operation phases of the project lifecycle.

The major focus of the study is to identify and understand the impact of the proposed project on the environment and identify possible measures which should be taken to safeguard society and the environment. To this end, to fully address impacts and risks of project, alternative strategies and techniques were devised throughout the entire study period. Few from among were review of policy and legal environmental frameworks of Ethiopia. As much as possible, the study document tries to identify, analyze, and address the real impact and risk of the proposed project, and this would enable planners to consider and inculcate findings of this study for similar projects development in the future.

Detail study of the vegetation cover was not required for the ESIA as the project site is covered mostly with grass and only a few acacia and eucalyptus trees. The type and nature of the soil, climatic conditions as well as the landscape of the project were studied further. There are two polluted streams that flow close to the project area and enter the main river called Kersa-Agoza River. The streams are polluted by household and commercial wastes from the upstream and the natural flow of these streams are diverted during the construction of the national stadium. Due to slope of the land, the stream found on the southern part of the project site overflows into an ecologically sensitive wetland area to the south east. The city administration's environmental protection office is responsible for monitoring and controlling the disposal of waste to these streams and river Kersa-Agoza to prevent surface water pollution.

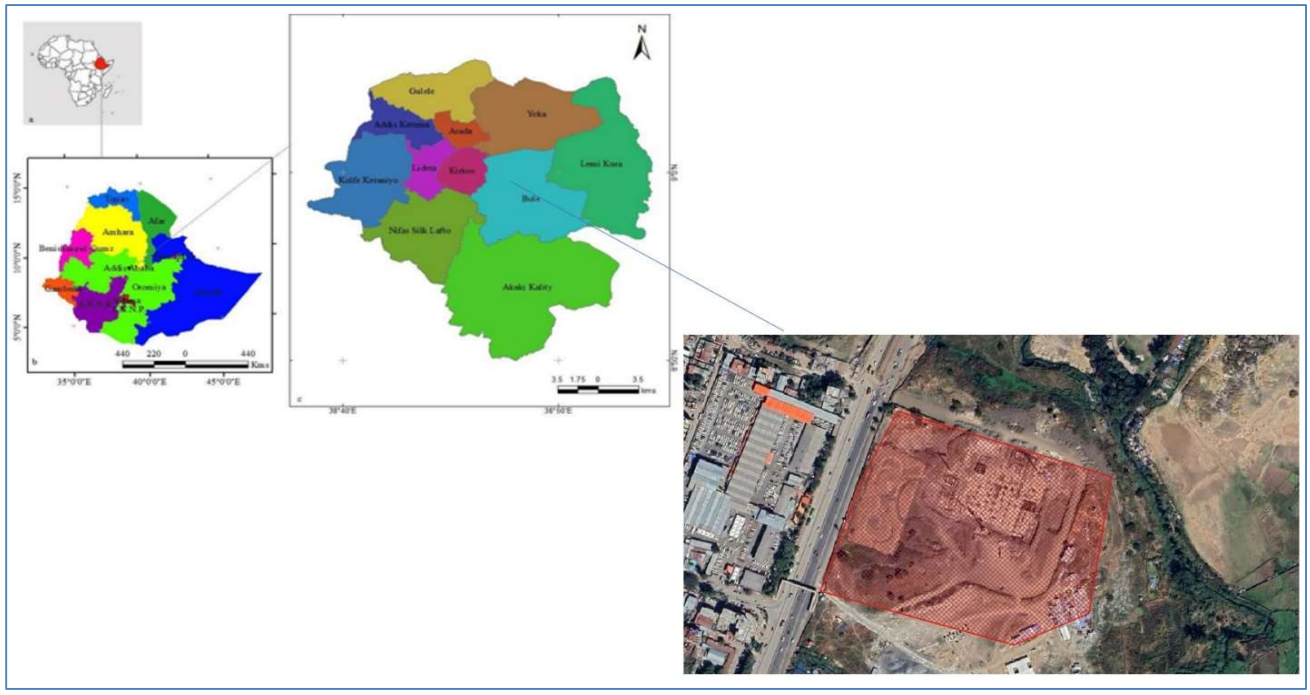
3. METHODOLOGY AND APPROACH OF ESIA

The ESIA approach of Roha Medical Campus was structured to cover the requirements under the EIA Proclamation № 299/ 2002. To this end, previous published and unpublished literature and other information were reviewed to gain a complete understanding of existing environmental conditions in the area.

3.1 Study Area

The study area is located in Woreda 13, Bole Sub-city, Addis Ababa, Ethiopia where the intended project will be implemented (Figure 1). Most of the primary and secondary data were collected from Bole Sub-city, Woreda 13 and project sites.

Figure 1: The geographical location of Roha Medical Campus



3.2 Data Record Review

Based on the checklists prepared by the consultancy firm to identify the major information sources and relevant data needed from each relevant source, the detailed description of the project with respect to design (site plan and architectural drawings), construction, operations were reviewed. Additionally, relevant documents to obtain necessary baseline information on demographic trends, land use practices, climate condition, soil condition, hydrology, education coverage, health service provisions, local and national development strategies and plans as well as the policy and legal issues were also reviewed.

3.3 Field Visits and Observation

The field visits and observations were mainly focused on physical evaluation of the project area (landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations, presence of houses, properties, and other assets such as farm and grazing lands). This was also focused on the observation of socio-cultural and socio-economic activities. Additionally, the field visits were planned to enable determination of the exact physical environmental features to be affected within the proximity of the project site and identify the potential positive and negative impacts. The field visit was conducted during the update to assess the performance of the construction activities against the ESMP.

3.4 Stakeholder and Public Consultations

3.4.1 Stakeholder Consultation

Information regarding the project was provided to stakeholders to enable them to understand project risks, impacts, and opportunities. The aim of the stakeholder consultation was to create an understanding of the project, to understand local expectations of the project, to identify potential environmental and socio-economic impacts, and to gather consensus on mitigation options. Interviews and consultation discussions were held with Bole sub-city Woreda 13 administrators and sub-city administrators, on 13/05/2021 and 14/05/2021 respectively including technical experts involved with environmental and social impact assessment and management in the health sector. Specifically, formal interviews were conducted with relevant personnel in the Woreda Labour and Social Affairs Office, Bole Sub-City Health Office, Bole Sub-City Land Management Office and Environmental Protection Office to assess strengths and gaps in effectively managing environmental and social effects in the sector at the city administration and local level.

3.4.2 Community Consultation

Community participation and consultation is an important step in the ESIA methodological process. Public consultation is instrumental in assessing the socio-economic impacts of the project. Community consultation meetings have been convened to draw together the issues and concerns of the resident communities found in the vicinity of the Roha Medical Campus, directly affected, and interested parties in the presence of proponent and experts from labour and social affair office and environmental protection office. More than 100 participants were consulted on 15/05/2021. The consultation was conducted in local language, and it was conducted free of external manipulation, interference, coercion, or intimidation; and it enabled meaningful participation for women, men, elderly, as well as stakeholders from Addis

Ababa Environmental Protection and Green Development Commission, Woreda 13 Labour and Social Affairs Office.

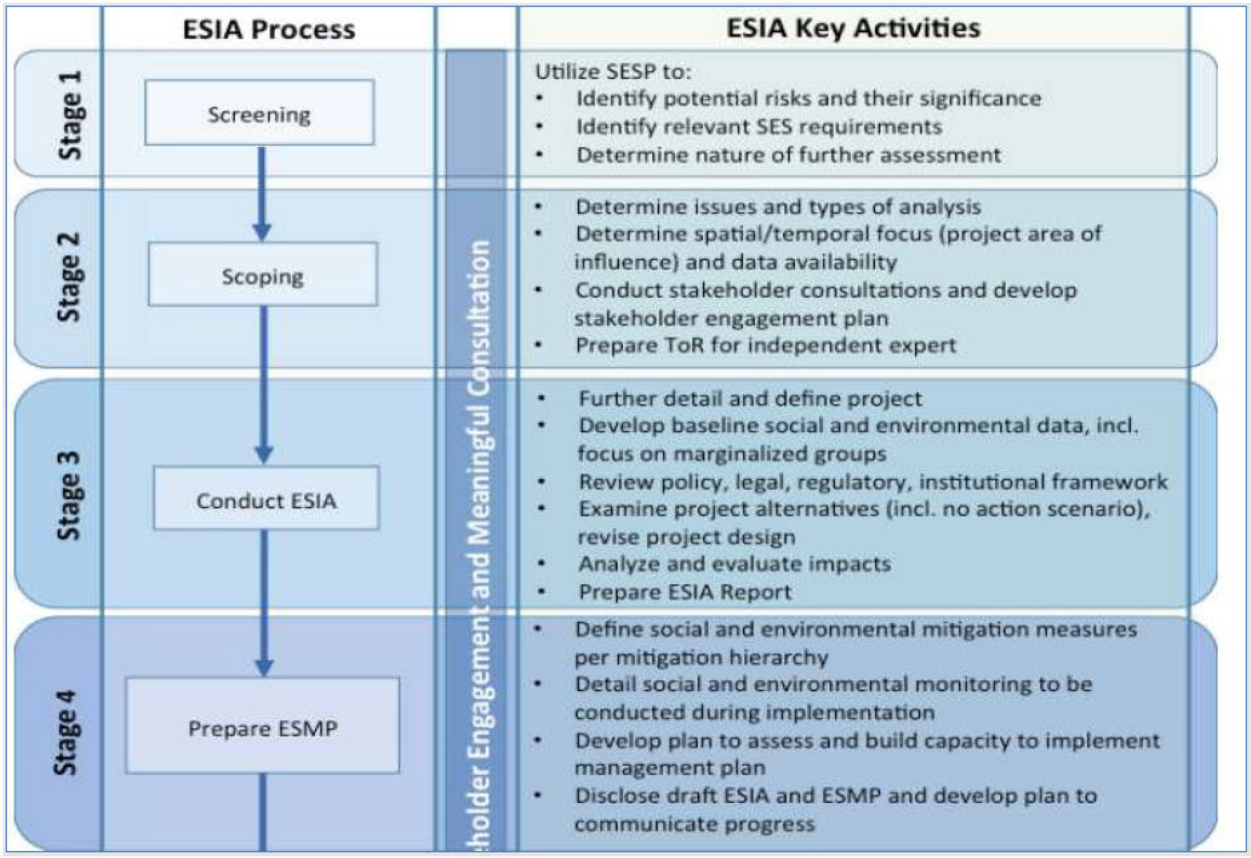
3.5 Documents and Guidelines Used

The Federal Democratic Republic of Ethiopia (FDRE) Environmental Protection Authority and Addis Ababa City Administration Environmental Protection Authority (EPA) Environmental Impact Assessment (EIA) guideline documents were followed to guide step by step activities of this study. These documents were helpful in deciding the extent of ESIA study for this specific project. The contents of the ESIA report and ways of impact prediction were decided through reviewing these documents. Two internationally recognized guidelines were used for his study – the African Development Bank's Integrated Safeguards System and applicable operational safeguards and the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability. Policy documents describing the possible impacts of a hospital project on physical, biological, chemical, social, and economic environment were also reviewed.

3.6 Methods for Impact Identification, Analysis, and Prediction

For this study, the consulting team adopted UNDP's social and environmental assessment conceptual framework (Figure 2) because UNDP's social and environmental assessment conceptual framework is well-established, recognized by different stakeholders, and aligned with a commitment to conducting a robust, credible, and transparent assessment that adheres to international standards and best practices, thereby enhancing the quality and legitimacy of the study's findings and recommendations by different stakeholders. This alignment includes adherence to principles outlined in the Sustainable Development Goals, and multilateral environmental agreements, such as the United Nations Framework Convention on Climate Change (UNFCCC), and internal development financial institution guidelines of the African Development Bank's Integrated Safeguards System, and the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability. The ESIA will further identify and assess social and environmental impacts of the project and design appropriate avoidance, mitigation, management, and monitoring measures. Every identified aspect was assessed in terms of its potential to cause an impact on natural and/or socio-economic receptors and subsequently ranked in terms of consequence and likelihood, thus enabling the determination of the overall significance of the impact.

Figure 2: Key steps of ESIA, Adopted UNDP 2016



3.7 Methods for Developing ESMP

Effective and efficient environmental and social monitoring and auditing are put into exert if and only if mitigation/enhancement measures are well-pinpointed within the Environmental and Social Management Plan (ESMP). Thus, possible measures indicated in this report were scrutinized after in-depth review of various literatures in the context of Ethiopia's economic, social, ecological, political, and legal policy framework bases. The steps include identifying environmental and social problems and concerns throughout the project`s lifecycle, identifying project alternatives and options, and simultaneously selecting the best alternatives and options. The concerns raised during the public consultation and stakeholder meetings were taken into consideration for devising ESMP.

3.8 Reporting and Documentation

A comprehensive ESIA report containing the findings has been compiled by the Consultant in accordance with the Ethiopian Environment Protection Authority's EIA guideline and submitted for consideration and approval.

The ESIA report outline is as follows:

Executive Summary

Chapter 1: Introduction
Chapter 2: Scope
Chapter 3: Methodology and Approach of ESIA
Chapter 4: Policy, Legal and Institutional Frameworks
Chapter 5: Project Description
Chapter 6: Baseline Information of the Project Proposal
Chapter 7: Analysis of Project Alternatives
Chapter 8: Gaps and/or Assumptions in ESIA Process
Chapter 9: Project Impact Analysis and Mitigation Measures
Chapter 10: Impact Mitigation Measures
Chapter 11: Project Related Risks
Chapter 12: Environmental and Social Impacts Management Plan
Chapter 13: Environmental and Social Monitoring Plan
Chapter 14: Public and Stakeholder Consultation
Chapter 15: Conclusion and Recommendation
References
Annexes

3.9 Study Team

Table 2: Study team composition and responsibility

No.	Name of Consultant	Responsibility
1	[redacted]	Environmental Health: Analysis of impacts, mitigation measures and management plan, stakeholder consultation, biophysical description of the project area, health impacts
2	[redacted]	Green House Gas Emission Analyst: Identification of social impacts of the project, Analysis of impacts, mitigation measures, and management plan
3	[redacted]	Biodiversity & Eco-system analyst: Identification of biodiversity and eco-system impacts, Analysis of impacts, mitigation measures and management plan
4	[redacted]	Economic Analyst: Socio-economic data collection, impact identification, analysis, and proposed mitigation measures
5	[redacted]	Environmental Pollution Expert
6	[redacted]	Water resource use expert; data collection, prediction, identification, and analysis of water resource impacts
7	[redacted]	Social affairs analyst expert; data collection, prediction, identification, and analysis of social impacts

4. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS

This part provides a comprehensive review of the Ethiopian legal and institutional framework that is of relevance to the Roha Medical Campus project. The main aim is to ensure the compliance of the project with the national environmental legislation as well as international conventions, treaties, and guidelines. This section presents the international policy, national policy, proclamations, and regulations applicable to the project under assessment. The ESIA investigation also considers the African Development Bank's Integrated Safeguards System and relevant Policies.

4.1 The FDRE Constitution, 1994

The Constitution has enshrined clearly in article 44 that all citizens have the right to live in a clean and healthy environment. It also states that citizens who are affected or displaced due to any development programme have the right to commensurate alternative compensation. In addition, article 92 of the Constitution states that people have the right to full consultation and to the expression of views in the planning and implementation of environmental policies and projects that affect them directly. It is also the duty and responsibility of government and citizens to protect the environment. All local rules and regulation emanate from the Constitution which give direction to enactment of environmental legal frameworks.

4.2 Environmental Policy of Ethiopia

The Environmental Policy of Ethiopia which was approved by the Council of Ministers in 1997 is aimed at guiding sustainable social and economic development of the country through the conservation and sustainable utilization of the natural, man-made and cultural resources and the environment at large without compromising the needs and ability of future generation.

The goal of the Environmental Policy of Ethiopia is to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through sound management of the environment and use of resources so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.

The policy lists specific objectives encompassing a wide range of environmental issues to be addressed through the adoption of the policy. It also provides overarching environmental guiding principles to be adopted to harmonize the environmental elements in sectoral and cross sectoral policies. The policy includes ten sectoral environmental policies ((i) Soil Husbandry and Sustainable Agriculture; (ii) Forests, Woodlands and Trees; (iii) Genetic, Species and Ecosystem Biodiversity; (iv) Water

Resources; (v) Energy Resources; (vi) Human Settlement, Urban Environment and Environmental Health; (vii) Control Of Hazardous Materials and Pollution from Industrial Waste; (viii) Atmospheric Pollution and Climate Change; and (ix) Cultural and Natural Heritage); and ten cross-sectoral environmental policies (such as Pollution and the Environment; Community Participation and the Environment; Social and Gender Issues; and Environmental Impact Assessment).

4.3 Environmental Impact Assessment Proclamation No. 299/2002

According to the Environmental Impact Assessment Proclamation No. 299/2002, major development programs, plans and projects of the private or public enterprises shall be subject to Environmental Impact Assessment study before their approval for implementation. This means that Environmental and Social Impact Assessment is a proactive (not reactive) tool used to predict and manage the environmental and social effects of a proposed development activity during its design, construction, operation and decommission.

The Proclamation provides a number of guiding principles that require adherence to the general principles of sustainable development. In particular, as per the policy, a comprehensive Environmental and Social Impact Assessment (ESIA) study needs to ensure the broad scope, baseline data collection, extensive stakeholder engagement, and sufficient time and resources, monitoring plan and is legally binding, described as follows:

- Scope: A comprehensive ESIA is a detailed and extensive assessment that thoroughly evaluates the potential environmental and social impacts of a proposed project. It involves an in-depth analysis of the project's potential effects on the natural environment, human health, socio-economic conditions, cultural resources, and other relevant factors.
- Data Collection and Analysis: Comprehensive ESIA involves the gathering and analysis of comprehensive data over an extended period, often including baseline studies to establish the current environmental and social conditions in the project area.
- Stakeholder Engagement: Comprehensive ESIA often entails extensive stakeholder engagement, including consultations with affected communities, indigenous groups, and other relevant stakeholders to gather input and address concerns.
- Time and Resources: Given the comprehensive nature of the assessment, a comprehensive ESIA typically requires a longer timeframe to complete and involves substantial resources, including funding, technical expertise, and personnel.

Auditing and monitoring plan: Comprehensive ESIA includes an audit and monitoring plan with objectives, legal framework, key aspects, monitoring procedures, risk assessment, community engagement, reporting and continual engagement.

The Proclamation also provides a legal base for the effective means of harmonizing and integrating environmental, economic, and social considerations into the planning and decision-making processes thereby promoting sustainable development. The objective of undertaking the assessment study is to ensure the impacts of a development project, mitigating measures and policy programs are adequately considered before implementing decisions.

4.4 Health Policy

Ethiopia's health policy was issued in 1993, with the aim of giving special attention to women and children, to neglected regions and segments of the population, and to victims of man-made disasters. The priority areas of the policy are in the fields of Information, Education and Communication (IEC) of health to create awareness and behavioral change of the society towards health issues.

Therefore, emphasis is placed on:

- Control of communicable diseases, epidemics, and diseases that are related to malnutrition and poor living condition;
- Promotion of occupational health and safety;
- Development of environmental health;
- Rehabilitation of health infrastructure;
- Appropriate health service management systems;
- Provision of essential medicines;
- Expansion of frontline and middle level health professionals.

4.5 National HIV/AIDS Policy

Ethiopia is one of the countries in the world that is facing HIV/AIDS pandemic. Having understood the magnitude of the HIV/AIDS pandemic and its paramount impacts on the socio-economic development of the country, the FDRE issued a Policy on HIV/AIDS in 1998, which calls for an integrated effort of multi-sectoral response to control the epidemic. The National HIV/AIDS Policy urges communities at large, including government ministries, local governments, and civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns. The general objective of the policy is to provide an enabling environment for the prevention and control of HIV/AIDS in the country. In order to address the problem and coordinate the prevention and control activities at national level, in 2000 National AIDS Council was

established under the Chairmanship of the country's President, and in 2002 HIV/AIDS Prevention and Control Office was established. Project implementers are required to execute measures that would help to minimize the risk of infection by HIV/AIDS and other sexually transmitted infections.

4.6 The Conservation Strategy of Ethiopia (CSE)

The CSE, approved by the Council of Ministers in 1996, provides a comprehensive and rational approach to environmental management in a very broad sense, covering national and regional strategies, sectoral and cross sectoral policies, action plans and programs as well as providing the basis for development of appropriate institutional and legal frameworks for the implementation (EPA/Ministry of Economic Development and Co-operation 1996, MoEDAC). It also deals with providing a strategic framework for integrating environmental planning into new and existing policies and projects.

It mainly recognizes the importance of incorporating environmental factors into development activities from the beginning so that planners may take into account environmental protection as an essential component of economic, social and cultural development.

4.7 Water Resource Management Policy

The overall goal of Water Resources Management Policy is to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available water resources of Ethiopia for significant socioeconomic development on sustainable basis. The specific objectives of the policy are:

- Development of the water resources of the country for economic and social benefits of the people, on equitable and sustainable basis,
- Allocation and apportionment of water, based on comprehensive and integrated plans and optimum allocation principles that incorporate efficiency of use, equity of access, and sustainability of the resource,
- Managing and combating drought as well as other associated slow on-set disasters through among others, efficient allocation, redistribution, transfer, storage, and efficient use of water resources.
- Combating and regulating floods through sustainable mitigation, prevention, rehabilitation, and other practical measures, and
- Conserving, protecting, and enhancing water resources and the overall aquatic environment on sustainable basis.

4.8 Water Resources Management Proclamation No. 197/2000

The purpose of the Proclamation is to ensure that the water resources of the country are protected and utilized for the highest social and economic benefits of the people of Ethiopia, to follow up and supervise that they are duly conserved, ensure that harmful effects of water are prevented, and that the management of water resources is carried out properly. This Proclamation protects water bodies from improper disposal of medical waste.

4.9 Labour Proclamation No. 1156/2019

It is essential to ensure worker-employer relations are governed by basic principles of rights and obligations with a view to enabling workers and employers to secure durable industrial peace, sustainable productivity and competitiveness through cooperative engagement towards the all-round development of the country. It has been found necessary to lay down a working system that guarantees the rights of workers and employers to freely establish their respective associations and to engage, through their duly authorized representatives, in social dialogue and collective bargaining, as well as to draw up procedures for the expeditious settlement of labour disputes, which arise between them.

There is a need to create favorable environment for investment and achievement of national economic goals without sacrificing fundamental workplace rights by laying down well considered labour administration; and determining the duties and responsibilities of governmental organs entrusted with the power to monitor labour conditions; occupational health and safety; and environmental protection together with bilateral and tripartite social dialogue mechanisms.

4.10 Expropriation of Landholdings for Public Purpose, Payments of Compensation and Resettlement Proclamation No. 1161/2019

This Proclamation is a legal framework that aims to facilitate the expropriation of land for public purposes while ensuring fair compensation for the affected landholders. The proclamation establishes the authority of the government to acquire land for public use, such as infrastructure development, urban renewal, and other public projects. It outlines the process for identification, valuation, and compensation of the expropriated land, as well as the rights of the affected landholders.

The proclamation emphasizes the necessity of public consultation and transparency throughout the expropriation process, aiming to balance the rights of the government to acquire land for public benefit with the protection of the rights of the affected landholders. It also highlights the importance of providing prompt and just

compensation to the landholders, considering the market value of the land, the improvements on the land, and any disturbance costs incurred under Article 40(8), and provide support to resettle displaced people under Article 44 (2).

Article 51(5) states the necessity to enact detailed laws to implement the general powers given to the federal government under the Constitution of the Federal Democratic Republic of Ethiopia to enact laws regarding land use. Overall, the Proclamation seeks to provide a legal framework that enables the government to efficiently acquire land for public projects while safeguarding the rights and interests of the affected landholders.

4.11 Public Health Proclamation No. 200/2000

As stated in its preambles the purpose of this Proclamation is to implement the health policy of the country and for promotion of public health and creation of a healthy environment for the future generation thereby enabling it to assume its responsibilities.

The Proclamation states that any employer shall ensure availability of occupational health service to its employees for the health and safety of the work environment. It is also prohibited according to the law to use machinery which generates excessive noise. This Proclamation makes provision for the protection of public health. It establishes a Public Advisory Board at the Federal and Regional level for the purpose of advising the appropriate health authority in the proper implementation of this Proclamation. "Public Health Authority" shall be the Ministry of Health, or the Health Bureau of a Regional State or of a City accountable to the Federal Government. The Public Health Authority shall appoint qualified inspectors to implement the provisions.

The Proclamation states that collection of waste should be in a designated place which does not affect the health of the public, and disposition of waste shall be made in a manner that will not affect the environment or human health. Furthermore, the Proclamation clearly states in its penalty clause that failure to abide by this Proclamation on public health shall result in both civil and criminal liability.

4.12 Environmental Pollution Control Proclamation No. 300/2002

This Proclamation is mainly based on the right of each citizen to have a healthy environment, as well as on the obligation to protect the environment of the country. Its primary objective is to provide the basis from which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the violation of these standards a punishable act. The Proclamation states that the "polluter pays" principle will be applied to all persons. There are also penalties for

offences in environmental pollution. A juridical person is liable on conviction to a fine of Birr 10,000 to 20,000. The Proclamation under its penalty clause states that the officer who is in charge and who should have known the commission of the offence and who failed to fulfill his/her duty shall be liable to Birr 5,000 to 10,000 fine or up to two years imprisonment.

Based on this Proclamation the council of ministers has issued a Prevention of Industrial Pollution Regulation No. 159/2008. The Regulation states the following as a general obligation to prevent industrial pollution.

- A facility shall prevent or if that is not possible shall minimize the generation of every pollutant to an amount not exceeding the limit set by the relevant environmental standard and dispose of it in an environmentally sound manner;
- Every factory shall have the obligation to handle equipment inputs and products in a manner that prevents damage to the environment and to human and animal health;
- Every factory shall notify the competent environmental organ any potentially pollutant, input or product under its possession.

Regarding monitoring and environmental safety, the Regulation under its article 9 states that a factory is required with a view to ensuring its compliance with the regulation to prepare and implement its own internal environmental monitoring system. Furthermore, the Regulation states on reporting and information that any facility shall keep written information describing the equipment and input it has used, the product it has produced, the pollutant it has generated, and the disposal mechanism it has used to dispose of pollutant and other related matters. It shall submit an annual report to the competent environmental organ describing how it is complying with the provision of this regulation.

The provision of this Regulation applies to factories/facilities which are listed in the industrial sector. The regulation states that a factory shall prevent or if that is not possible shall minimize the generation of every pollution to an amount not exceeding the limit set by relevant environmental standards and expected to dispose in an environmentally sound manner.

4.13 Solid Waste Management Proclamation No. 513/2007

This Proclamation aims to prevent environmental damage from solid waste while harnessing its potential economic benefits. It defines solid waste management as the collection, transportation, storage, recycling or disposal of solid waste. The Proclamation states that solid waste management action plans designed by, and implemented at, the lowest administrative units of urban administrations can ensure

community participation, and it is essential to promote community participation in order to prevent the adverse effects and enhance the benefits resulting from solid waste.

As is clearly indicated all project activities must make sure their waste meets environmental standards and obtain a permit before discharging any liquid waste in any case. On the other hand, project stakeholders must monitor the composition of its waste, keep records and report periodically to the Environmental Protection Authority where the project is under implementation.

Solid wastes can be transported from one regional state or urban administration to another regional state or urban administration only if the recipient regional state or urban administration has notified the sender in writing of its capacity to recycle or dispose of it in an environmentally sound manner. The Proclamation has also listed the management of different solid wastes such as glass containers and tin cans, plastic bags, used tires, food related solid wastes, construction debris and demolition wastes.

4.14 Solid Waste Management Standards in Ethiopia

There is a Solid Waste Management Standard developed by the Ministry of Urban Development and Construction but was not adopted by the cities until recently. We also have examined the legal system that governs waste such as Solid Waste Management Proclamation, and Environmental Pollution Control Proclamation (Table 3).

Table 3: Breakdown of Solid Waste Management Proclamation No. 513 and the Environmental Pollution Control Proclamation

Solid Waste Management Activity	Law or Act	Description
Source reduction/segregation	Solid Waste Management Proclamation, Article 11.1	Households shall ensure that recyclable solid wastes are segregated
Collection and storage	Solid Waste Management Proclamation, Article 11.2	Urban administration shall ensure that adequate household solid waste collection facilities are in place to ensure the installation of marked waste bins by streets and in other public places guaranteeing the collections of solid waste from bins with sufficient frequency
Transportation	Solid Waste Management Proclamation, Article 13.2	Urban administration shall set the standards to determine the skills of drivers and equipment operators and prevent overloads of solid waste
Treatment	Environmental Pollution Control Proclamation, Article 5.1	All urban administrations shall ensure the collections, transportation, and, as appropriate, the recycling, treatments, or safe disposal of municipal waste through the institution of an integrated municipal waste management system
Disposal/Landfill	Solid Waste Management	Construction of solid waste disposal sites and auditing

	Proclamation, Article 14,15	existing solid waste disposal waste
Recycling and reuse	Solid Waste Management Proclamation, Article 7.1	Manufacturer or importer of glass container or tin cans shall...collect and recycle glass or tins
Hazardous waste	Environmental Pollution Control Proclamation, Article 4.2	Any person engaged in the collection, recycling, transportation, treatment, or disposal of any hazardous waste shall take appropriate precaution to prevent any damage to the environment or to human health or well-being.

4.15 Hazardous Waste Management and Disposal Control Proclamation No. 1090/2018

The purpose of this Proclamation is to prevent and control problems of environmental pollution caused by the mismanagement and disposal of hazardous waste. It is also to control the generation, storage, treatment, recycling, and reuse of hazardous waste to prevent harm to human and animal health as well as the environment.

The Proclamation applies to a legal person who generates, reuses, recycles, stores, transports or disposes hazardous waste at large in the country.

Regarding the management of waste, the Proclamation directs that the waste producer has to minimize the release of hazardous waste by reducing hazardous substances in raw materials during production. The Proclamation clearly stipulates the responsibility of the waste generator as follows:

- Collect, segregate, and dispose or to be disposed of hazardous waste by authorized body;
- Ensure that the container of hazardous waste is properly packed and carefully labeled with Amharic and English language;
- Keep record of the type of hazardous waste that exist in the temporary container and show at any time when requested by appropriate inspector;
- Not to store hazardous waste for more than one month.

The Proclamation states that reuse of hazardous waste is allowed provided it does not do harm to the human, animal health and environment. However hazardous waste must be removed properly if it is proved it is impossible to recycle after treatment.

In accordance with this Proclamation, the movement of hazardous waste is illegal if it is carried out without the permission of an authorized body. It is also deemed to be illegal if it contravenes the Basel convention ratified by Ethiopia and other national laws related with hazardous waste.

In its penalty clause the Proclamation clearly put that the authorized ministry may suspend a person trading license for 15 days if it fails to comply with requirements and conditions of transportation, storage and recycling of hazardous waste. It also states

that storing, transporting and recycling of hazardous waste without obtaining authorization from pertinent government body shall be punished with rigorous imprisonment of 5 years and a fine of birr 500,000. The same penalty applies for releasing untreated hazardous waste into the environment.

4.16 Medicines Waste Management and Disposal Directive (August 2011)

The objective of the directive is to protect the public and the environment from health risks and hazards of medicines waste by ensuring safe management and disposal practice.

The major components of the directive are:

- Medicines which are unfit for use shall not be stored for more than six months,
- Approval and authorizing of disposal of medicines shall be sought from the appropriate organ,
- Any medicines waste disposal practice, including diluting and flushing of liquid medicines into sewers and burning of packaging materials, shall be attended by an inspector of the appropriate organ,
- After disposal of medicines waste have been carried out, disposal certificates shall be issued by the appropriate organ,
- Disposal sites shall be environment and society friendly and shall be approved by appropriate organ in accordance with the Environmental and Social Impact Assessment (ESIA),
- Re-use of any medicines waste including re-packing and re-labeling is prohibited,
- Scavenging of medicines is prohibited and security measures to prevent scavenging shall be in place at disposal sites and temporary storage areas,
- Any health institution which does not have a disposal facility approved by the appropriate organ shall not carry out medicines waste disposal,
- Without prejudice to sub-article (8) of this article, any health institution which does not have an approved disposal facility shall use disposal referral system of licensed disposal firms, respective medicines suppliers or central disposal sites, and
- Custom and Revenue Authorities and police officers shall adhere to this directive for proper disposal of confiscated medicines.

4.17 International Development Financial Institution Guidelines

4.17.1 African Development Bank's (AfDB's) Integrated Safeguards System (ISS)

AfDB's ISS provides a comprehensive framework for managing environmental and social risks associated with development projects. By incorporating ISS principles and requirements into project planning, design, and implementation, the AfDB aims to ensure that projects contribute to sustainable development, respect human rights, and safeguard the interests of affected communities and stakeholders. Compliance with the AfDB's ISS policy, Operational Safeguards (OS), and associated procedures and guidelines ensures that project impacts are identified, assessed, and mitigated effectively, minimizing adverse effects, and promoting environmental and social responsibility.

Compliance with the AfDB Integrated Safeguards System Policy, Operational Safeguards, and associated Procedures and Guidance Materials

E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts encompasses the assessment and management of environmental and social risks and impacts associated with its projects. These guidelines aim to ensure that projects funded by the bank are developed and implemented in a manner that minimizes negative environmental and social impacts, while maximizing positive outcomes. The assessment process involves identifying potential risks and impacts, as well as evaluating the significance of these effects. It also includes an analysis of potential cumulative impacts and the formulation of mitigation and management measures to address identified risks. Throughout the project cycle, the bank requires ongoing monitoring and reporting to ensure compliance with environmental and social standards. This framework is designed to promote sustainable development and to safeguard the well-being of communities affected by the bank's projects.

E&S OS 2 (OS2): Labour and Working Conditions: Focuses on labour and working conditions in projects it funds. This includes promoting fair treatment, safe workplaces, and adequate compensation for workers. The safeguard aims to ensure that projects adhere to international labour standards, respect human rights, and prioritize worker safety and well-being.

E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Management Addresses resource efficiency, pollution prevention, and management in its projects. It is geared towards enhancing sustainable resource usage, minimizing pollution, and incorporating environmentally friendly technologies. The safeguard aims to ensure that projects reduce environmental impact and promote sustainable practices throughout their lifecycle.

E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement pertains to land acquisition, restrictions on land use, and involuntary resettlement in funded projects. It seeks to minimize adverse impacts associated with land acquisition and involuntary resettlement, emphasizing the importance of avoiding or minimizing displacement. The safeguard requires adherence to a comprehensive set of criteria aimed at ensuring fair compensation, livelihood restoration, and sustainable resettlement for affected communities. It aims to promote responsible and transparent land acquisition and use while prioritizing the rights and well-being of those impacted by the bank's projects.

E&S Operational Safeguard 10 (OS10): Stakeholder Engagement and Information Disclosure. AFDB's Operational Safeguards 10 (OS10) centers on stakeholder engagement and information disclosure throughout project cycles. It mandates the active involvement of all relevant stakeholders in the decision-making process, ensuring their concerns are heard and incorporated. The safeguard emphasizes transparent and timely disclosure of project-related information to affected communities, promoting active participation and informed decision-making. It also underscores the importance of fostering constructive dialogue and maintaining open channels of communication among stakeholders. By prioritizing inclusive engagement and transparent information sharing, OS10 aims to enhance the accountability, sustainability, and success of the projects funded by the African Development Bank.

4.17.2 International Finance Corporation (IFC)

Environmental and Social Assessment (PS 1): PS 1 requires the assessment and management of environmental and social risks throughout the project lifecycle. For hospital construction, this involves conducting environmental and social impact assessments (ESIAs) to identify potential impacts on surrounding communities, ecosystems, and cultural heritage. For hospital operation, ongoing monitoring and management of environmental and social risks are necessary to ensure compliance with regulatory requirements and international standards.

Labour and Working Conditions (PS 2): PS 2 focuses on promoting fair labour practices and safe working conditions. In the context of hospital construction, this includes ensuring the health and safety of workers involved in the construction process, providing adequate training and protective equipment, and complying with labour laws and regulations. For hospital operations, maintaining fair employment practices, preventing discrimination, and addressing occupational health and safety concerns among healthcare staff are essential.

Resource Efficiency and Pollution Prevention (PS 3): PS 3 emphasizes resource efficiency and pollution prevention to minimize adverse environmental impacts. In hospital construction, this may involve incorporating green building principles, using

energy-efficient materials, and implementing waste management strategies to reduce construction-related pollution. For hospital operation, energy and water conservation measures, waste segregation, and pollution control technologies can help minimize environmental footprints.

Land Acquisition and Involuntary Resettlement (PS 5): PS 5 addresses the risks associated with land acquisition and involuntary resettlement. While hospital construction may require land acquisition, it is typically limited compared to large-scale infrastructure projects. Nevertheless, adherence to PS 5 principles is essential to minimize adverse impacts on affected communities and ensure fair compensation and livelihood restoration measures if displacement occurs.

Biodiversity Conservation and Sustainable Management of Living Natural Resources (PS 6): PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems."

The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1.Based on the risks and impacts identification process, the requirements of this Performance Standard are applied to projects (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry).

Stakeholder Engagement and Information Disclosure (PS 10): PS 10 emphasizes the importance of engaging with stakeholders, including affected communities, throughout the project lifecycle. Hospital construction and operation require ongoing communication and consultation with patients, healthcare staff, local communities, and other stakeholders to address concerns, gather feedback, and promote transparency.

- IFC Environmental Health and Safety Guidelines on Noise Management

  The IFC guideline provides that the preferred method for noise reduction is from stationary sources. It has indicated the reduction option to be considered like

selecting equipment with lower sound levels, installing silencers for fans, installing suitable mufflers on engine exhaust and compressor components, improving the acoustic performance of constructed building, apply sound installation, relocating noise sources to less sensitive areas and reducing project traffic routing through community areas where possible.

According to IFC standard on noise level in the industrial and commercial areas the dB level should not exceed 70dB as indicated below.

Table 4: IFC standard on noise levels

	One hour (dBA)	
Receptor	**Daytime**	**Night-time**
Residential, institutional, and educational areas	55	45
Industrial and commercial areas	70	70

IFC Environmental Health and Safety Guidelines on Waste Management

Waste management should be addressed through a Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring. Facilities that generate waste should characterize their waste according to composition, source, types of waste produced, generation rates, or according to local regulatory requirements.

Hazardous waste should be stored so as to prevent or control accidental releases to air, soil, and water resources. On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.

Vehicles and other equipment used for collection industrial non-hazardous wastes should not be used for collection of MSW without prior cleaning to remove waste residues.

In the absence of qualified commercial or government-owned waste vendors (taking into consideration proximity and transportation requirements), facilities generating waste should have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment.

4.18 International Conventions, Protocols, and Standards

4.18.1 The United Nations Framework Convention on Climate Change (UNFCCC)

To further strengthen the commitments of countries to implement the Convention on Climate Change there was a need for a refined protocol that helps in implementing and elaborating polices and measures in accordance with national circumstances.

The Kyoto Protocol promotes sustainable development through protection and enhancement of sinks and reservoirs of greenhouse gases.

Ethiopia has ratified the Protocol through proclamation, and it provides for the ratification of the Kyoto Protocol to the UNFCCC and authorizes the EPA to take actions necessary to implement the Protocol, in cooperation with the appropriate federal, regional and city administration government organs.

The Paris Agreement the latest agreement under the Convention promotes a global response to climate change and pursues efforts to limit temperature increase. Ethiopia has ratified the Agreement by pledging to reduce greenhouse gas emissions, enhance resilience to climate impacts, and contribute to global efforts to combat climate change. RMC is committed to achieving low-carbon, climate-resilient development throughout the pre-construction, construction, and operation phase of the project.

4.18.2 International Convention on Biodiversity

The objective of this convention is the conservation of biological diversity. The sustainable use of its components and the fair equitable sharing of the benefits arising out of the utilization of genetic resources, including appropriate access to genetic resources and appropriate transfer of relevant technologies.

The principles of the convention point out that states have, in accordance with the charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction.

4.18.3 Basel Convention

The Basel Convention aims to control the transboundary movements of hazardous wastes and other wastes, including their disposal and treatment, to prevent adverse effects on human health and the environment. The convention's principles and guidelines can inform and support efforts to manage hazardous wastes generated by the project in a manner that protects human health and the environment. Compliance with the convention's provisions can contribute to improving waste management practices and promoting sustainability in the healthcare sector. This project is not expected to produce hazardous waste nor transport across international boundaries during construction, it however may produce hazardous waste during operation.

4.18.4 Sustainable Development Goals (SDGs)

Hospital construction and operation are closely linked to several SDGs, particularly SDG 3 (Good Health and Well-being), SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 17 (Partnerships for the Goals). By aligning the RMC project with these goals, stakeholders can contribute to improving healthcare access, promoting sustainability, and advancing overall progress towards the SDGs.

4.18.4.1 SDG 3 - Good Health and Well-being

This goal directly relates to hospital construction and operation as it aims to ensure healthy lives and promote well-being for all at all ages. Hospitals play a critical role in providing healthcare services, treating illnesses, and improving health outcomes for individuals and communities.

4.18.4.2 SDG 9 - Industry, Innovation, and Infrastructure

SDG 9 emphasizes the importance of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. Hospital construction contributes to achieving this goal by creating modern healthcare facilities with advanced medical technologies and infrastructure that can withstand environmental hazards.

4.18.4.3 SDG 11 - Sustainable Cities and Communities

Hospitals are integral components of urban infrastructure and contribute to creating sustainable cities and communities. SDG 11 emphasizes the importance of making cities and human settlements inclusive, safe, resilient, and sustainable, which includes ensuring access to quality healthcare facilities for all residents.

4.18.4.4 SDG 12 - Responsible Consumption and Production

Hospital operation involves the consumption of resources such as energy, water, and materials. SDG 12 encourages responsible consumption and production patterns, which can be applied to hospital operations by promoting energy efficiency, waste reduction, recycling, and sustainable procurement practices.

4.18.4.5 SDG 17 - Partnerships for the Goals

Achieving sustainable healthcare infrastructure requires collabouration and partnerships among governments, private sector entities, civil society organizations, and communities. SDG 17 emphasizes the importance of strengthening global partnerships to support the implementation of sustainable development initiatives, including hospital construction and operation projects.

4.18.5 International Finance Corporation (IFC)

IFC Performance Standards (PS) as well as Environmental, Health, and Safety (EHS) guidelines provide valuable guidance for managing environmental and social risks in large-scale infrastructure projects like RMC's. Adherence to the IFC PS and guidelines helps ensure that the project is developed and operated in a socially responsible and environmentally sustainable manner, benefiting all stakeholders.

4.18.6 African Union Agenda 2063, Aspiration 1, Goal 3 (Healthy and Well-Nourished Citizens)

Agenda 2063 primarily focuses on broader developmental goals for Africa. Aspiration 1 of Agenda 2063 focuses on "A Prosperous Africa based on Inclusive Growth and Sustainable Development" and within this aspiration, Goal 3 specifically aims to ensure "Healthy and Well-nourished Citizens." Agenda 2063's Goal 3 of Aspiration 1 is directly related to promoting healthcare infrastructure, services, and access across the continent. RMC's project focuses on healthcare infrastructure development, healthcare system strengthening, healthcare innovation and technology adoption, human capital development, and community engagement and empowerment which improve health outcomes and well-being of Africans. The project's alignment with the objectives of Agenda 2063, Aspiration 1, Goal 3 will contribute to advancing Africa's health agenda and achieving sustainable development outcomes for the continent.

4.18.7 African Development Bank's (AfDB's) Integrated Safeguards System (ISS)

AfDB's ISS provides a comprehensive framework for managing environmental and social risks associated with development projects. By incorporating ISS principles and requirements into project planning, design, and implementation, the AfDB aims to

ensure that projects contribute to sustainable development, respect human rights, and safeguard the interests of affected communities and stakeholders. Compliance with the AfDB's ISS policy, Operational Safeguards (OS), and associated procedures and guidelines ensures that project impacts are identified, assessed, and mitigated effectively, minimizing adverse effects and promoting environmental and social responsibility.

4.19 Institutional Roles and Responsibilities ESIA

The relevant institutions responsible for the regulation of ESIA include the Federal Environmental Forest Climate Change Commission (EFCCC) and the Regional Environmental Protection Authorities, in this case, the Addis Ababa Environment Protection Authority.

4.19.1 Federal Environment, Forest, and Climate Change Commission (EFCCC)

EFCCC is the lead agency responsible for formulating policies, strategies, laws, and standards to ensure social and economic development activities sustainably enhance human welfare and safety of the environment (Article 6, Proclamation 295/2002). The regulation of EIA is one of the key responsibilities entrusted to EFCCC. In this respect, the EFCCC is responsible for establishing a system for undertaking EIA in public and private sector projects. The EFCCC is responsible for developing a directive that identifies categories of projects likely to generate adverse impacts and require a full EIA, and for issuing guidelines that direct preparation and evaluation of EIA reports (Proclamation 299/2002, Articles 5 and 8).

In addition, the EFCCC is responsible for evaluating EIA reports of projects that need to be licensed and executed by the federal government and projects that are likely to generate inter-regional impacts. The EFCCC is also responsible for monitoring, auditing, and regulating implementation and performance of such projects. The EFCCC holds primary responsibility for providing technical support on environmental protection and management to regional states and sector institutions.

4.19.2 Regional Environmental Protection Agencies

Proclamation 295/2002 requires regional states to establish or designate their own regional environmental protection agencies. The regional environmental protection agencies are responsible for coordination formulation, implementation, review and revision of regional conservation strategies as well as environmental monitoring, protection and regulation (Article 15). Relating to EIA specifically, Proclamation

299/2002 gives regional environmental protection agencies the responsibility to evaluate EIA reports of projects that are licensed, executed, or supervised by regional states and that are not likely to generate inter-regional impacts. Regional environmental protection agencies are also responsible for monitoring, auditing, and regulating implementation of such projects. In the case of Addis Ababa, the City Administration established the *Addis Ababa Environmental Protection and Green Development Commission* in the early 1990s. The Addis Ababa regional EPA has also promulgated regulations that include "AACG Environmental Impact Assessment Regulation 21/2006".

4.19.3 Ethiopian Food and Drug Authority (EFDA)

EFDA is an autonomous entity under the Ministry of Health. The EFDA has the mandate, as per Proclamation 661/2009, to regulate:

- Healthcare practices;
- Healthcare premises, including healthcare facilities, food establishments, medicine facilities, health-related facilities, and port inspection sites;
- All health professionals;
- Healthcare products from production to consumption including medicines, medical equipment and devices, food and food supplements, herbal products, cosmetics, and complimentary and traditional medicines.

These regulatory activities are decentralized and function throughout all regions and woredas of Ethiopia. At the regional, zone, and woreda levels, these regulatory activities are implemented through the Health and Health-Related Services and Product Regulation Core Process.

5. PROJECT DESCRIPTION

5.1 Project Location and Topography

The proposed site for the Roha Medical Campus is in what is commonly known as Adwa Park, within Woreda 13 of Bole Sub-city, Addis Ababa, Ethiopia. The specific GPS coordinates for the hospital are as follows: 38.7990624554134, 8.99596804879402; 38.7968940841604, 8.99665577491354; 38.7965150900542, 8.99591102525657; 38.7961102107737, 8.99476572934434; 38.7961142284343, 8.99475750148445; 38.7980780582021, 8.99419399722231; 38.7988368967273, 8.99452565776149; and 38.7990624554134, 8.99596804879402.

Originally reserved for Adwa Park, the hospital location and its surrounding area had been misused as an illegal dumping site for solid waste, including earth from early-stage construction projects. The project proponent has secured a six-hectare land parcel through a 99-year lease agreement with the government, paying the lease upfront.

The site features a mix of plain and undulating terrain. It is surrounded by the Windows of Africa project to the north, east, and south, while the western boundary is marked by the Ring Road, which connects Bole Airport to diaspora square in Megenagna (refer to Figures 1 & 4 for details). Within a two-kilometer radius of the site, two permanent rivers flanking the hospital exhibit pollution signs from solid waste and sewage. Additional nearby landmarks include Bole International Airport, a sports stadium currently under construction, two churches, Hayat Hospital, Skylight Hotel, and several residential buildings.

Figure 3: Site plan of the Hospital



5.2 Project Components

The RMC development comprises multiple phases, including multiple internationally accredited hospitals with approximately 1,000 beds, outpatient and other healthcare facilities and mixed-use areas.

The first phase of the RMC development, the focus of this document, comprises the Roha Health Advanced Multi-Specialty Hospital (the "Facility", "Hospital or "Project"), an advanced, multi-specialty facility with 350 beds. The project team aims to begin operations in 2026.

The hospitals will offer comprehensive services, including many treatments that are not available in Ethiopia, such as advanced scoliosis surgery, oncology, neurosurgery, IVF, cardiac surgery, and specialty medical and surgical services. The campus will be built according to green principles and pursue green building certification. The total size of the campus is six (6) hectares, including a beautiful green park that is open to the public. This park will recreate a native dense biodiverse forest over one (1) hectare, providing multiple ecosystem services in Addis Ababa, and particularly to the campus surroundings. Solar energy, waste treatment recycling, and water treatment all make the campus sustainable and environmentally friendly. The campus will have parking for over 700 cars, including a solar-covered parking lot, providing ample space for patients, staff, and the public.

With the exception of the basement level, which has a floor to ceiling height of 3.8 meters, the building has a 2.76-meter floor to ceiling height. See figures 5&6. There are three entry and exits to the building Figure 4 shows the main entrance, the service road and the emergency road. The storm water reticulation for the hospital has been planned to have runoff from building roof, open parking, and roads with a discharge at three exit points, which is into the municipal storm water line on the Ring road. Sewer reticulation network has been designed to discharg into a packaged waste treatment plant North of the hospital building with an estimated average daily sewer flow of 175m3 see Figure 8.

Figure 4: North and South Elevation of the Hospital

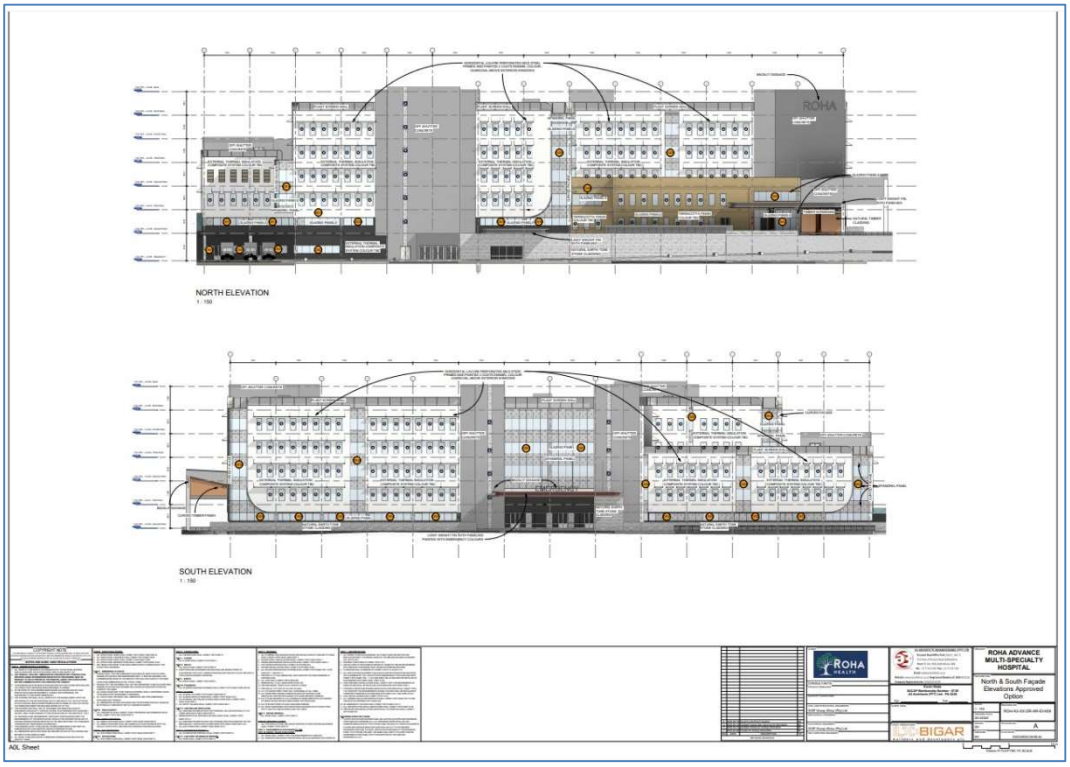


Figure 5: East and West Elevation of the Hospital

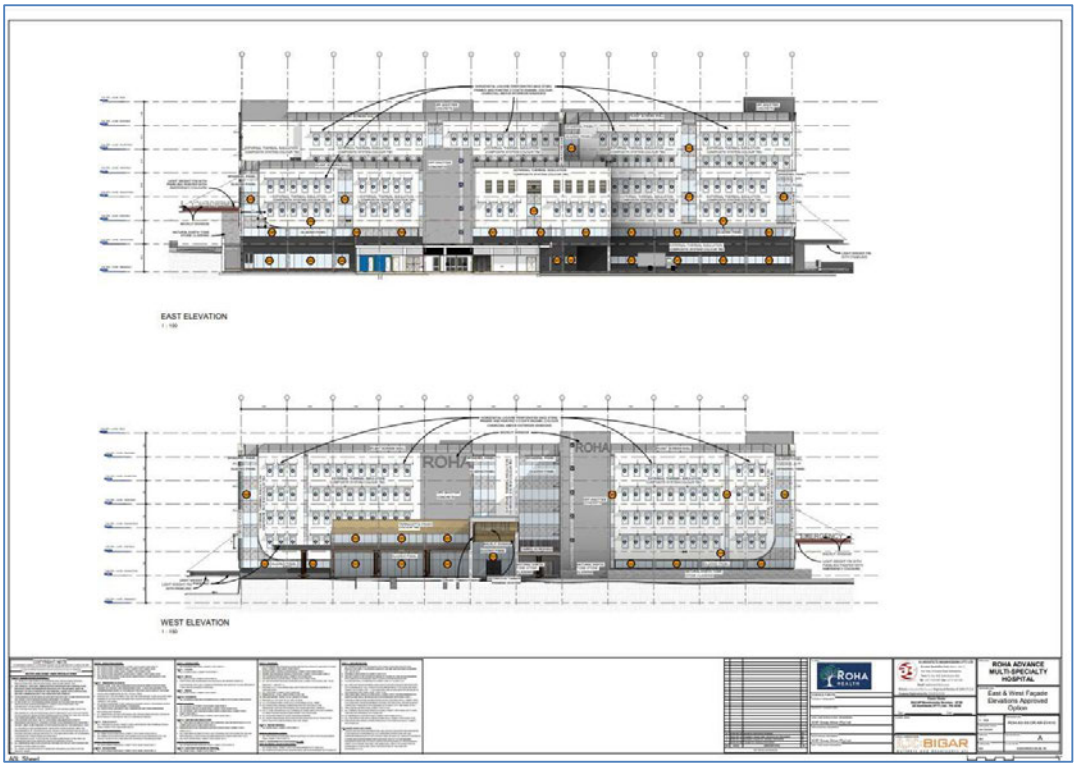


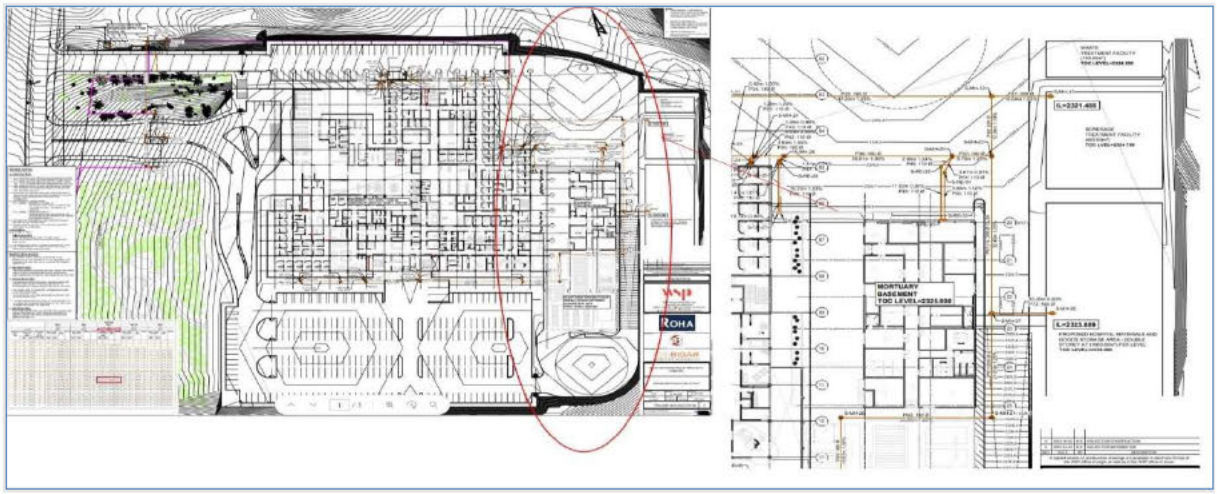
Figure 6: The Hospital's Rendering North facing.



Figure 7: The Hospital's Rendering South facing



Figure 8: Utility building layout



5.3 Progress of the Project

The construction of the hospital has reached a significant milestone, achieving 35%completion. This marks a critical phase in the project, reflecting steady progress and successful implementation of key construction activities. Here's a detailed overview of the completed work and the upcoming phases:

Completed Work:

1. **Site Preparation and Foundation:**
    - Site clearing and grading completed.
    - Foundation work, including excavation and laying of concrete footings, finished.
2. **Structural Framework:**
    - Erection of steel framework for the main building structure.
    - Initial concrete pour for the ground, first, and second floor slabs.
3. **Utility Installation:**
    - Installation of underground utilities, including plumbing and electrical conduits.
    - Setup of temporary power and water supply for construction purposes.
4. **Preliminary Work for Superstructure:**
    - Delivery and staging of construction materials.
    - Initial work on columns and beams for the first and second floors and upper floors.

Work in Progress:

1. **Completion of Superstructure:**

- Continued erection of the steel framework and concrete pouring for upper floors.
- Installation of load-bearing walls and support structures.

Figure 9: Progress of the construction of the Advanced Multi-Specialty Hospital



5.4 Project Design for Critical Areas

The Hospital design will contain all the necessary facilities which are expected from a particular tertiary care level hospital. This includes emergency units, wards, outpatient service areas, laboratory units, pharmacy, and administrative units. It will also include solid and liquid waste management facilities such as incinerators, and drainage systems. The Hospitals laboratories will consist of an anteroom and laboratory rooms. It will have gas-impermeable walls, ceilings and floors. Air gaps under doors would be acceptable for directional airflow. If door gaps are sealed, the laboratory must not leak gaseous decontamination materials. The laboratory will be designed for ease of maintenance, so that access to critical mechanical equipment (ventilation ducts, fans, piping, etc.) is outside containment. The laboratory will consist of high-quality room construction with special consideration given to joints, finishes and penetrations. There will be a room for large equipment decontamination.

Specifications for floors, walls and ceilings of laboratories: Due to the highly pathogenic nature of the microorganisms frequently encountered in BSL (biological safety laboratories) laboratories, the efficacy of disinfection and decontamination procedures must be ensured without compromising the integrity of the facility.

The labs at RMC will be constructed using concrete footing and stem walls with concrete slab-on-grade floors. Walls would be steel stud framed and roof construction

would consist of metal decking over steel bar joists. The exterior walls would have an application of stucco and the painting of the building would be visually consistent with surrounding structures.

The lab floors will be impermeable to liquids, monolithic/seamless, or have welded seams. Floors must be easily cleaned, with chemical-resistant flooring (vinyl, or epoxy with fiberglass reinforcement) with a slip-resistant, smooth, hard finish. For monolithic floors, either a 100-mm-high, readily cleanable, integrally coved sheet flooring base, or a readily cleanable, 100-mm-high, vinyl or rubber base should be used. For epoxy floors, if silicone sealants are used for penetration, the silicone must be applied after the epoxy has been installed. Floors would be monolithic and slip resistant.

The walls of the lab must be durable, washable, and resistant to detergents/disinfectants (masonry, gypsum board, fiberglass-reinforced plastic, etc.). Walls will also be painted with durable glossy acrylic or epoxy paint. For epoxy paint, if silicone sealants are used for penetrations, the silicone must be applied after the epoxy has been installed. Wall/ceiling penetrations will be kept to a minimum and sealed with non-rigid, non-shrinking silicone or latex sealant. For fire rated walls, sealant will be applied before stopping.

The ceiling of the labs must be washable and resistant to detergents/disinfectants. The ceiling has to be painted with durable glossy acrylic or epoxy paint. If silicone sealants are used, the silicone will be applied after the epoxy. The ceiling must be of monolithic construction (i.e., gypsum board, not removable tiles). The ceiling must be high enough over Class II biological safety cabinets (BSCs) to allow a canopy/thimble connection or the opening of canopy/thimble door(s). Ceiling height would be at least 10 feet to allow 14 inches of clearance above BSCs. All penetrations in floors, walls and ceiling surfaces would be sealed, or capable of being sealed to facilitate disinfection, to aid in maintaining appropriate ventilation system air pressures and to keep pests out.

Eyewash/Safety Shower: Numerous microorganisms are infectious if exposed to the mucous membranes around the eye. Therefore, eyes shall be flushed thoroughly after splashes and exposures to the eyes. Emergency eyewash will be in each laboratory room. A combination emergency eyewash/safety shower unit must be in near proximity to places if personnel are exposed to splash hazards (determined during programming). Emergency eyewash and emergency eyewash/safety shower units would be sited and installed**.**

Plumbing: All penetrations must be perpendicular to the surface and must be sealed to be airtight. Penetrations must also be sealed with non-rigid, non-shrinking, silicone or latex sealant. For fire-rated walls, sealant will be applied before stopping. All pipes into the hospital facilities would be secured to prevent movement. Fixtures must be

resistant to corrosion of bleach and other disinfectants. Back-flow prevention devices will be installed on all faucets (including wastewater). All pipes will be identified by using labels and tags. Water supply control will be located outside the containment area. Plumbing should discharge directly to a sanitary sewer and treatment plant.

Sinks: Hand washing sinks in the hospital will be available in each room near the exits. Sinks will be hands-free. Infrared sensors are preferable but may not be suitable for all laboratories. In cases where infrared sensors cannot be used, knee-operated sinks are preferable to foot-operated. Each sink will have chemical-resistant traps (for disinfectants), a covered backsplash, hot-cold water and pre-mixing faucet. Hand washing sink will be accompanied by a paper-towel dispenser and a hands-free soap dispenser mounted within easy reach.

Fire Safety and alarms: Fire alarms must be clearly audible above ambient noise. A wall-mounted ABC Dry Chemical fire extinguisher must be mounted near the exit door of the hospitals and anteroom. Laboratory-safe refrigerators or EN 14470-1 certified cabinets will be used to store flammable/combustible materials. Alarms are provided for: fire hazard, ventilation failure, differential pressures below 0.05" wg, -80°C ultra-cold freezers and intrusion detection systems. Alarms will be connected to the building control system and to campus public safety department. Alarms should be audible and visible throughout the laboratory. Alarms would be differentiated from each other so that each can be easily identified. Alarms will be on UPS power.

5.5 Operation and Verification Procedures of RMC lab

The RMC lab would be operated according to all guidance and requirements established by the CDC (CDC 1999), and WHO (WHO, 2004). Prior to operating the lab using select agents, the lab would be assessed by pertinent Ethiopian environmental regulatory organs at Ministry of Health and Environment Commission of Ethiopia to verify that the lab meets biosafety level requirements for working with the biological agent. The lab will be functional only if it meets the minimum standards set by CDC. Microorganisms that are not select agents would also be used in the RMC laboratories but would still be handled according to CDC, and WHO guidance and requirements. Risk analysis will be performed before any infectious microorganisms are handled in the RMC lab in accordance with CDC, WHO guidance. Besides, the local medical community would be informed of the microorganisms to be handled in the RMC laboratory and would be aware of the methods of identification and control of associated diseases.

Lab work associated with infectious microorganisms will be approved and authorized by EFDA based on the following:

- Work Smart Standards, which include adopted standards from CDC (CDC 1999) and WHO,
- The lab would undergo a readiness review prior to start up to ensure that the infrastructure for safe operation is implemented and that the health and safety of workers, public and the environment is protected.
- Compliance of lab operation with a variety of non-governmental organizations that provide guidance for transportation of infectious agents including the Dangerous Goods Regulations, the Infectious Substances Shipping Guidelines of the International Air Transport Association and the Guidelines for Safe Transport of Infectious Substances and Diagnostic Specimens of the World Health Organization (WHO) (WHO 1997).

5.6 Laboratory Sample Arrival and Processing at RMC

Sample shipments would only be received at the RMC facility operating within the parameters specified in all established guidelines and requirements. The protocol for receiving and handling of samples would be worked out prior to receipt and reviewed and approved by the RMC Biosafety Committee. All incoming packages (regardless of origination point) containing infectious agents would be packaged in DOT-approved packages. These packages could be about 6 to 8 inches (15 to 20 cm) in height and about 3-4 inches (8 to 10 cm) in cylinder diameter. All shipping containers would be made of plastic and samples would be double or triple contained. Transportation and interstate shipment of biomedical materials and import of select agents would be subject to the requirements of Ethiopian Environmental and Public Health regulations as well as best international practices. Strict chain-of-custody procedures for samples arriving at the RMC lab receiving site would be followed. Due to the perishable nature of the samples at the lab facility, receiving and shipping of samples normally would only occur during weekday daylight hours and samples must be opened and used or restored (put in growth media) within 8 hours of arrival.

External packaging material from packages received at the lab would be inspected, removed, autoclaved, and disposed of according to waste handling procedures specified below. Samples would be stored in the RMC laboratory within a locked freezer or refrigerator, according to the needs of the sample for preservation. Inventories of all samples and cultures would be kept. Samples and cultures would be identified by a numeric or alpha-numeric code rather than by the name of the microorganism or source. Sensitive information about samples and results would be maintained elsewhere at RMC in a safe and secure manner in accordance with security requirements. The samples could also be immediately processed, in which case the

materials would be placed directly into culture media (such as a liquid or semi-solid nutrient material or media). All preparations and manipulations of cultures or samples would only occur within a fully operating BSC.

Culture Samples: For culturing, samples would be removed from their primary containers in a BSC tube and flask. Plate containing a specific nutrient media would be inoculated with the sample to create a culture. All culture work would be completed and cleaned up within one work-shift (8 hours) except for materials being incubated. Culture and culture-storage containers would typically be made of plastic and always be double-contained. The culture container would be transferred to a temperature-controlled incubation chamber to grow the organisms (multiply the number of microorganisms) for a period lasting up to several days. Centrifugation of live, intact microorganisms would be conducted in sealed containers placed inside sealed tubes to minimize the potential for aero solmization of microbes or, if appropriate, centrifugation could be conducted inside a BSC. Cultured materials, which are sources for diagnosis and educational materials could be "lysed" (broken open) or killed (inactivated) by the addition of a variety of chemicals such as detergents or by using a chemical phenol. The lysed or killed cells and the culture media could be processed into biological material that would later be analyzed by established methods at RMC laboratories, and potentially at other laboratories off-site. Following incubation (hours to days), all cultured materials would be cleaned up within one work-shift (8 hours). Many cultures would be archived in small quantity and maintained in the ultra-freezers in each laboratory.

5.7 Occupational Health and Safety Practices

RMC has been taking significant steps to ensure the safety and well-being of its employees and construction workers by implementing robust systems and processes. The hiring of a safety officer to oversee daily construction activities according to IFC and Africa Development Bank standards highlights the commitment to maintaining a safe working environment. This approach is crucial for minimizing risks and ensuring that employees have access to necessary care.

RMC has been also providing Personal Protective Equipment (PPE) tailored to specific construction activities. Ensuring workers are equipped with the right PPE, posting safety signs, and offering adequate training are all critical measures to enhance workplace safety.

Figure 10: Safety signs (left) Workers with adequate PPE (middle) and OSH team(right) at construction site of RMC



5.8 Internal Controls and Management Procedures for Environmental Issues

Implementing adequate internal controls and management procedures for environmental issues at Roha Medical Campus involves several key steps. These can be categorized into the following areas:

5.8.1 Policy Development

Roha Medical Campus is committed to fostering a sustainable environment and minimizing the ecological footprint of its construction and operations activities. RMC established a comprehensive environmental policy that outlines the campus' commitment to environmental protection, compliance with legal requirements, and continual improvement.

5.8.2 Risk Assessment

RMC has been conducting regular environmental risk assessments to identify potential sources of environmental harm, such as chemical spills, waste management issues, and energy consumption, and physical hazards and other construction related occupational hazards. Addressing spills from used oils, proper storage of used oils and treatment of wastewater from a concrete batching plant are essential corrective measures from maintaining environmental standard.

5.8.3 Control Activities

- **Waste Management**: Implement robust waste management protocols, including segregation, recycling, and proper disposal of medical and hazardous waste.
- **Water Conservation**: Implementing a water conservation strategy through daily monitoring and checking for leaks as a proactive approach.

- **Pollution Prevention**: Develop procedures to minimize air, water, and soil pollution from campus activities.

5.8.4 Monitoring and Reporting

- **Regular Audit:** Regular environmental audits are crucial for maintaining compliance with national and international standards. By adhering to the requirements of the International Finance Corporation (IFC) and the African Development Bank (AfDB), RMC demonstrates a commitment to environmental responsibility and sustainable development.
- **Continuous Monitoring**: Continuous monitoring system are highly effective for tracking key environmental and social metrics. By continuously assessing OSH risks, water consumption, and waste generation, RMC can promptly address issues, ensure compliance, and promote sustainability.
- **Reporting**: RMC ensures transparency by communicating environmental performance through monthly health and safety statistics reports. Detailed records of any incidents or accidents, including their causes, consequences, and corrective actions are done at RMC.

5.8.5 Incident Reporting, Investigation, and Follow Up

RMC has an accident report form that contains a list of the body parts affected, the effect on the person, actions taken by the employer to prevent the recurrence of a similar incident, the person responsible for reporting, and related actions.

Contingency Plan and Emergency Procedures

RMC has emergency response procedures for fire and simulations of emergency circumstances to train individuals to respond in real-life scenarios. After a drill, participants and organizers review the drill's effectiveness, identify areas for improvement, and make necessary adjustments to the emergency plan as stated in the safety manual. The emergency procedures are designed for handling emergencies such as fire/explosion, spillages, and splashes. The fire prevention system comprises portable fire extinguishers (CO_2, dry powder, foam) mounted at various points at the facility, but the extinguishers need to be refilled.

5.9 Project Equipment Description

5.9.1 Construction Phases Process, Equipment, Materials, Wastes & Output Processes, Facility

Site Preparation, land clearing and decommissioning the existing structures | Digging trenches for the perimeter wall | Erecting the perimeter wall, access gates and

constructing a security office/post |Soil compaction for the parking, loading areas and Paths | Building the site foreman's office | Digging the internal sewerage network trenches and laying the network pipes | Building a materials' storage |Soil Excavation for the foundations | Digging trenches for the sewerage network and installing it to connect | Filling the foundations | Lining the foundation with PVC |Erecting Construction pillars | Erecting the walls for the buildings |Constructing the roofs and water tanks| Fitting and plumbing the water network around the buildings |Electrical fittings in the buildings and around the site with switchboard, transformers etc. |Plumbing and piping the office and storage units | Installing Emergency Generators and Water pumps| Installing elevators and escalators | Establishing Sewerage Facilities and connections | Erecting a fence around the site | Landscaping the site and facilities | Installing in house amenities such as lights, doors, windows floors, carpets etc. and interior decoration |Installing Facility waste management equipment e.g. bins | Installing Perimeter and internal site lights i.e. streetlights | Painting the internal roads and placing signs around the site | .

Equipment

Chainsaw | Compactor | Spades | Wheelbarrow | Hammers and bolt and nut fasteners | Handsaw | Bolts, nut, screws and nails | Ropes | Ladders | Electric and Gas Welders | Electric saws and grinders | Gas cutters | Spirit Level | Road Roller | Trucks | Hand drills and drill bits | Glass cutters | Wire cutters | Shears | Cranes | Mobile Electric Power Generators | Concrete mixer trucks | Wheel loader | Fork lift & Telescopic Fork lift | Tractor | Excavator | Asphalt Paver | Dump truck |mixer, concrete batching plant.

Materials & Energy

Sand | Fuel and Oil | Electricity | Water | Cement and ceramic Tiles | Concrete |Polythene |Bricks and Gravel |Water | Steel |Concrete pipes | Steel pipes | PVC pipes | Polyfilla, Adhesives and paints | Ceramics tiles |Copper wires | Plastic | Electricity | Gas (acetylene & oxygen) | Cardboard | PVC | Glass | Bricks |Asphalt | Bitumen, soundproofing, and waterproofing materials.

Expected Waste

Solid waste: (paper, polythene, metal shavings, cement, concrete, welding particles, plastics, sand, grey water, adhesives, paints, soil, plants, cloth, rubber). Excavated soil, Air emissions: from vehicles engines and burning and friction operations (Cox and Sox). Oil and fuel spills from vehicles and storage of oil and fuel. Dust from movement of vehicles and excavation activities, liquid wastes from concrete batching plant. Sewerage and domestic/municipal waste are also expected wastes.

Outputs

Primary and Ancillary Project Facilities (Advanced Multi-Specialty Hospital, Cardiac Hospital, Women & Children's Hospital, Neuro-Spinal Hospital, and a Rehabilitation Center, Common Area, Perimeter Wall, Security Posts and Access gates, green area for student dormitories etc.).

Access Gates

RMC will have two access gates. The main gate is on the ring road that connects Bole airport to Megenagna. This gate will give access to construction workers and machinery during construction. The remaining gates are found to the south of the project site that can be used for staff access. During the operation, the main gate can be used for the access of patients and other guests.

Site Facility

Temporary facilities and the necessary controls for the project including utilities, Fencing, Site offices, car parking, cafeteria, resting room, material storage area, workshops, telephone, sanitary facilities, field office, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, disposal of trash, debris, and excavated material, pest and rodent control, water runoff and erosion control.

5.9.2 Operational Phase Processes, Equipment, Materials, Wastes and Outputs Processes

The major facility includes an Advanced Multi-Specialty Hospital, Cardiac Hospital, Women & Children's Hospital, Neuro-Spinal Hospital, and a Rehabilitation Center. The Advanced Multi-Specialty Hospital comprises 350 beds, nine operation theatres, two Cath labs, endoscopy suites, multiple in-suite procedure rooms, nuclear medicine facilities, and two external radiation and one brachy bunker. These facilities will be equipped with the latest technology to ensure accurate diagnoses and effective treatments. Once operational, our campus will offer a comprehensive range of advanced medical, surgical, and rehabilitation services. These include oncology, cardiovascular care, neuro-spinal treatments, nephrology services, pulmonology expertise, critical and emergency care, maternal and child health services and more. In addition to its medical services, the hospital will also feature cutting-edge diagnostic imaging, pathology & laboratory services.

The expected categories of wastes that will be generated with in the Hospital are: - Hazardous wastes which are Sharp waste, Infectious waste, pathological and anatomical waste, pharmaceutical waste, chemical waste, cytotoxic, radioactive waste, non-hazardous general waste, and non-hazardous recyclable wastes.

5.10 Parking Spaces

The project will have ample above ground parking spaces for over 700 cars. The project will also include internal roads for vehicles that will be used for ambulances, customer vehicles, services and ancillary operations, disabled patients. There will also be paved paths for human movement within the facilities.

5.11 Utilities

In order for the project to achieve its objectives varying quantities of utilities will be necessary as ancillary and primary inputs. These utilities and facilities, whose sources are described in this subsection, include Water, Electricity, Sewerage and Storm Water Drainage, waste stabilization ponds and incinerators.

RMC will have its own water supply borehole in addition to the municipal supply and will need to meter extraction from borehole and monitor impact vis-a-vis recharge after assessing the municipal water supply and borehole capacity.

Table 5: Utility requirements of RMC

Utility	Unit	Qty/year	Unit price	Total price	Remark
Water from municipal supply	M3	138,600	3.25	450,450	
Electricity	KW/h	200,960	0.6	120,579	
Fuel	Lit	60,000	24	1,440,000	

5.12 Sewerage

There is not an existing sewerage system in nearby site. There for the project will have its own wastewater treatment system as indicated in Figure 11. Therefore, the sewerage discharge from the hospital will be managed on site in a self-contained wastewater treatment facility.

5.13 Storm Water Drainage

The site runoff will be discharged into an off-site municipal stormwater system. Therefore, there will be construction of drainage system based on calculations to determine the quantity of runoff from the site. In the preliminary calculations, it has been assumed that only certain areas of the development site will be impermeable, whether through building development or hard landscape areas and roads. Stormwater will be directed to the municipal system outside the project site.

5.14 Waste Characteristics and Waste Management Approaches

5.14.1 Waste Characteristics

RMC's waste management plan follows the guiding principles of Ethiopian legislation and international best practice. It has provided an estimate for the types and quantities of waste produced at the hospital. In year eight the hospital is expected to be fully operational. It is expected that a total of 4,394 kg/day will be generated, of which 3,469 kg will be non-hazardous waste and 925 kg of hazardous waste. It is proposed that waste be segregated into nine categories, namely: hazardous healthcare waste; sharps, infectious, pathological, pharmaceutical, cytotoxic, chemical and radioactive waste, non-hazardous non-recyclable healthcare waste, and non-hazardous recyclable healthcare waste. To assist with day-to-day operations the waste plan identifies a colour coding scheme compliant with the Ethiopian legislation to aid segregation of the waste at source into dedicated bins.

The estimated waste composition of the hospital will be 50% general non-hazardous waste, 29% will be recyclable, 12% infectious waste and 4% Chemical, 2% pathological waste, 1% pharmaceutical waste, and 2% will be sharps.

Waste Category

- Hazardous Health-care waste
  - Sharps waste
    - Used or unused sharps (e.g. hypodermic, intravenous or other needles, auto- disable syringes, syringes with attached needles, infusion sets, scalpels, scissors, pipettes, knives, blades, broken glass)
  - Infectious Waste
    - Waste is suspected to contain pathogens and that poses a risk of disease transmission.
    - Waste contaminated with blood and other body fluids (e.g. – from discarded diagnostic samples),
    - Cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories),
    - Waste from patients with infections (e.g. swabs, bandages, and disposable medical devices)
  - Pathological waste
    - Human tissues, organs or fluids, body parts, fetuses, unused blood products, contaminated animal carcasses.
  - Pharmaceutical Wastes

        - Pharmaceuticals that are expired, unused, or no longer needed.
        - Items contaminated by or containing drugs and vaccines.
    - Cytotoxic Waste
        - Wastes containing substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic, or carcinogenic), such as cytotoxic drugs used in cancer therapy and their metabolites. and genotoxic chemicals)
    - Chemical Waste
        - Waste containing chemical substances (e.g. Laboratory reagents, film developer; disinfectants that are expired or no longer needed; solvents; waste with a high content of heavy metals, e.g. batteries; mercury in broken thermometers and blood-pressure gauges)
    - Radioactive waste
        - Waste containing radioactive diagnostic material or radio-therapeutic materials (e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources)
- Non-Hazardous or general health-care waste
    - Waste that does not pose any particular biological, chemical, radioactive or physical hazard but which still need attention as in the general waste management.

Table 6: Waste generated from RMC with estimated average quantity, type and source.

Type of Waste	Waste description	Source facility	Quantity of waste generated per day	Treatment method

Infection waste	Items contaminated with blood and body fluids, including cotton, infected blood, patient samples and specimens, Cultures; stocks and microorganisms; dishes and devices used for culture	Microbiology laboratories, TB culture and molecular laboratory, Hematology laboratory, clinical chemistry laboratory, molecular laboratory, Parasitology, Virology (Polio, measles & influenza) laboratories, blood Refrigerator,	548Kg/Day	Infectious wastes are disinfected / sterilized using autoclave at the laboratory; finally incinerated in electric powered high temperature in RMC compound. The resulting ash will be transported to a landfill site designated by the city.
Pathological waste	Human tissues, fluids, body parts, unused blood products	Microbiology laboratories, TB culture and molecular laboratory, Hematology laboratory, clinical chemistry laboratory, molecular laboratory, Virology (Polio, measles & influenza) laboratories, Vaccine products, and hospital pharmacy	78Kg/Day	Chemical disinfection, / sterilized using autoclave at the laboratory; finally incinerated in high temperature in RMC compound
Sharps	Needles; syringes; scalpels; blades; glass, etc.	Microbiology laboratories, TB culture and molecular laboratory, Hematology laboratory, clinical chemistry laboratory, HIV molecular laboratory, Parasitology, Virology (Polio, measles & influenza) laboratories, food microbiology laboratory, Vaccine production and diagnostic laboratory, Environmental and zoonosis laboratories, specimen collection section.	78Kg/Day	Needles; syringes; scalpels; blades; glass, etc.

Chemical Waste	Waste containing chemical substances (e.g. laboratory developer; disinfectants that are expired or no longer needed; solvents; waste with a high content of heavy metals, e.g. batteries; mercury in broken thermometers and blood pressure gauges)	Laboratory, Pharmacy, OPDs, Inpatient ward, ICU, OR CSSD, Laundry,	170Kg/Day	Must be collected in strong leak-proof containers that resist reaction hosts, labelled accordingly, never mixed with other chemicals, high temperature incineration.
Pharmaceutical Waste	Pharmaceuticals that are expired, unused, or no longer needed; items Contaminated by or containing drugs and vaccines	Pharmacy, Store, Compounding room, wards, ICU, ORs, Injection rooms	50Kg/Day	high temperature incineration,
Liquid waste	Sanitary liquid waste		55,440 M3	Sanitary liquid waste is drained into the self-contained wastewater treatment plant for treatment on site.

5.14.2 Waste Management Approaches

A central waste storage area is located in the basement of the building. This is indicated on layout plans showing how and where all the waste types will be stored. The standalone waste management plan of the Hospital utilizes these details to evaluate the total storage required per day. It is estimated that 58m2 will be required, based on the types of bins used to store the waste. This also includes an allowance for an additional 50% area for safe movement of the bins. The wastes from the wards / areas of the hospital are to be moved to the central waste storage area using the dirty lifts at least twice a day in addition to on-call requests from high foot traffic parts of the Hospital such as wards.

With insufficient waste treatment capacity in Addis Ababa, a waste treatment technology appraisal has been undertaken to identify the treatment types to safely and economically treat waste that cannot be treated elsewhere.

Roha has allocated a separate plot of land, adjacent to the hospital building to locate the waste treatment facility. While in the process of making decisions on the treatment

technology types, the waste management plan includes an indicative layout. By the means of this waste management plan and its proposed arrangements, RMC would be able to ensure that all non-hazardous and hazardous healthcare waste is segregated, classified, appropriately colour coded, handled, stored, and disposed of through a registered waste carrier in accordance with environmental legislation. The operator will, by this waste management plan and its arrangements, identify opportunities to improve waste minimization and reduce the associated environmental impacts of managing waste.

All waste from RMC laboratories, compounding room, operation room are decontaminated and marked as "treated hazardous waste" prior to disposal in designated containers for treated infectious waste. Decontamination and disposal are the responsibility of the person generating the waste. RMC will have waste disposal locations, pickup procedures, safety manual for waste management and RMC mobile laboratory waste management procedure. The proposed project will have procedures for compliance with all applicable regulations for collecting, storing, processing, and disposing of sanitary liquid wastes, solid wastes and hazardous wastes generated from RMC facilities.

All biological waste from the facility should undergo either autoclaving or chemical disinfection. These wastes would be discharged from laboratory sinks, floor drains, or the tissue digesters and would be held and disinfected in retention tanks before being discharged into the sanitary sewer system. Tap water entering the facility through spigots in the sinks or shower heads would have backflow preventers to protect the potable water distribution system from contamination. Biological cultures could be disposed of in the sinks after undergoing treatment with chemical disinfectants for an appropriate amount of time. The autoclaving process involves placing waste to be autoclaved in a special container. When autoclaving occurs, an indicator strip on the container changes its colour. This allows facility workers and waste management workers to be able to tell at a glance whether waste has undergone autoclaving. To manage the waste generated from the proposed RMC facility laboratory the following mitigation strategies will be implemented.

Waste Minimization

The best practice is to ensure that all facilities minimize their waste generation to the barest possible minimum. Appropriate plans, strategies and actions would be established to ensure adequate HW minimization at source. Accordingly, RMC will implement the following waste minimization strategies.

- Make Purchasing restrictions to ensure the selection of less wasteful materials; sustainability is embedded in the procurement manual,

- Recycle materials and products if applicable,
- Ensure good management and control practices especially in the purchase and use of pharmaceuticals (long shelf life), and
- Enforcing a rigorous and careful segregation of the HW at source.

Waste Segregation

Proper segregation of waste at source generation (at each department) is essential, efficient and effective in managing HW. It helps in reducing the quantity of waste requiring treatment prior to final disposal and ultimately reduces the cost of waste treatment/management. Segregation involves putting different classes of wastes into separate and appropriate temporary storage color-coded containers/bags as recommended by the Healthcare Waste Management National Guidelines. Waste segregation and waste colour coding work hand in hand. The waste generated from the proposed facility will be segregated and color-coded as outlined below in Table 6 as recommended by WHO (Table 7).

Table 7: Waste segregation and waste colour coding as recommended by WHO

Waste Categories	Colour container and marking	Type of container	Collection frequency
Infection waste	Yellow with biohazard symbol (highly infectious waste would be additionally marked HIGHLY INFECTIOUS).	Leak-proof strong plastic bag placed in a container (bags for highly infectious waste would be capable of being autoclaved).	When three-quarters filled or at least once a day.
Sharps waste	Yellow, marked **SHARPS** with biohazard symbol	Puncture-proof container.	When filled to the line or three-quarters filled.
Pathological waste	Yellow with biohazard symbol.	Leak-proof strong plastic bag placed in a container	When three-quarters filled or at least once a day.
Chemical waste	Brown, labelled with appropriate hazard symbol	Plastic bag or rigid container	On demand.
Non-hazardous waste	Black	Plastic bag inside a container or container which is disinfected after use	When three-quarters filled or at least once a day

Labeling

An important aspect of colour coding is labeling. All waste bags or containers would be labeled with basic information in Amharic language and or in English. Basic label information would include the type of waste in the container, name of the laboratory section, date of collection, and warning of hazardous nature.

- Identify the source of HW or date of generation in case of an accident or improper segregation of the waste, ensure that the workers responsible for HW management handle the different types of wastes safely, ensure that each staff member feels more responsible for what they put into the bag/receptacle.
- Ensure that Medical Departments gather data on the amount of waste produced in each department.

Collection of Waste from RMC Complex

Collection of waste is extremely important particularly to avoid over spilling of waste out of collection containers. Collection would be done promptly and routinely or as often as required. This will reduce the probability of contaminated waste coming into contact with the public. Collection of waste would be done by approved and trained personnel fully equipped with appropriate PPEs and transporting equipment such as laboratory trolley and carts. RMC laboratory staff and pharmacy staff will be actively involved in the collection of waste as would the waste handlers. They would ensure that their containers/bags (Bins/boxes and collection receptacles) are never more than three-quarters full before sealing them at their points of generation. They would also ensure that such collection containers are appropriately labeled as per Guidelines for Management of each Class of HW.

The following would also be adhered to when collecting waste:

- All HW would be sorted on site before collection and transportation. This will bring about easy identification of content of containers thus preventing careless handling and the risk of secondary infection.
- There would be a fixed schedule for the collection of waste bags and containers from each medical department. This is to ensure the regular removal of waste from each location and to ensure coordination between medical staff and cleaning or housekeeping staff. The minimum frequency of waste removal would be once per working shift.
- No bags would be removed without labelling indicating the point of generation (department, office and laboratory section) and content.
- Laboratory, pharmacy and nurse workers would immediately replace the bags or containers with new ones of the same type.
- There would be separate schedules and separate collection times for different colour coded containers.
- Separate trolleys would be used for different types of waste.
- Vehicles will be disinfected and cleaned daily or at the end of haulage with an appropriate disinfectant at an appropriate site where wastewater will be properly disposed of.

- Waste ducts that convey sacks of waste by gravity will not be used, as they tend to scatter waste at the exits of the chutes, and are subject to fouling by the waste, leading to nuisances such as smell and insects.
- Carts and vehicles used to transport the waste will be carefully designed so that they are stable, quiet in operation, and so that transportation can be achieved with the minimum of effort and inconvenience.
- The trolleys or carts would be large enough so that waste is not piled up on them in an unsafe way and the trolleys and carts would be designed to prevent and accommodate any form of spillage.
- Waste bags would not be hand carried around the HCF, since it increases the risk of injury to the legs, arms, and torso from incorrectly disposed of sharps or other items.
- Sealed sharps containers would be placed in a labelled, yellow infectious health-care waste bag before removal from the healthcare or laboratories.
- Water and hand-wash materials would be readily available for healthcare waste handlers to wash their hands after handling HW.

Handling Waste at RMC Complex

When handling waste, handlers will wear protective clothing at all times including face masks, aprons, boots, and heavy-duty gloves, as required.

- Sharps
- When handling sharps, needles will not be recapped or bent.
- Syringe will be placed in a safety box immediately.

When there is a need to use needle removers, it will take place immediately after the injection.

- Safety boxes will be fully and properly assembled before use.
- Safety boxes will also be sealed and collected when they are ¾ full and will never be emptied or opened,
- Sharps containers (i.e., safety boxes) will be placed as close to the point of use as possible and practical, ideally within arm's reach,
- Safety boxes will be labeled so that people will not unknowingly use them as a garbage container for discarding other items,
- Safety box will not be shaken to settle their contents,
- Safety boxes will not be placed in high traffic areas (corridors outside laboratory rooms or sample preparation rooms) where people could bump into them or be stuck by someone carrying sharps to be disposed of,

- Containers will not be placed on the floor or anywhere they could be knocked over.

Infectious waste bins:

Infectious waste bins would be covered before collection. It would be cleaned and disinfected with 0.5% chlorine solution after emptying and before reuse.

Waste Handling Safety Measures at RMC Complex

- All personnel handling infectious medical waste will wear gloves and additional protective medical clothing and personal protective equipment (PPE) appropriate to the level of risk they encounter and will remove any protective medical clothing used prior to leaving the work area and to place it in a designated area or container. List of PPE is described in this chapter. When performing procedures where splashing is not expected, gloves are the minimum PPE that would be worn;
- Protective medical clothing and PPE would not be submitted for laundering unless sterilized;
- When performing procedures where splashing may occur or when infectious medical waste bags or containers may contact more than the worker's hands and wrists, the following medical protective clothing and PPE is provided in addition to gloves;
    - Appropriate protective medical clothing would be of material that does not permit infectious medical waste from penetrating and reaching workers clothes or skin;
    - Eye protection, surgical face masks, and face shields when personnel may need to clean the area.

Additionally, immunization will be undertaken for staff members, as necessary (e.g. vaccination for hepatitis B virus, tetanus immunization).

Waste Storage at RMC Complex

Storage is classified into internal and external. Consideration for storage will be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. The following rules would be observed for proper storage of HW in Ethiopia

- Initial packaging and storage would take place where HW is generated,
- Storage of waste will then be moved to a temporary on-site storage location,
- Non-risk HW would always be stored in a separate location from the infectious/ hazardous HW to avoid cross-contamination.

Internal storage is the temporary placement of waste at the point of generation before transfer to external storage points. A storage location for the HW would be designated inside the RMC facilities in each department. The waste in the bin-liners or containers would be stored in a separate area, room or building appropriate to the quantity of waste produced bearing in mind the frequency of collection.

Segregation of hazardous waste from general waste would be maintained in storage. There would be planned periodic cleaning and disinfection of temporary storage areas and the containers. The storage time for HW before it is transferred to external storage facilities would be on a daily basis. External storage refers to the transit point where waste is stored after removal from primary storage to the time it is collected and transported for treatment and final disposal. External storage location would be isolated at RMC compound where larger containers found near incinerators would be used to store waste until it is incinerated.

To ensure that waste is kept separated, the central storage receptacles for each colour coded bag will be placed in similarly colour coded receptacles.

- There will be one or more external storage points for hazardous and non-hazardous waste depending on the layout of RMC laboratories and other facilities,
- The external storage point(s) for the hazardous and non-hazardous waste will be geographically separate at RMC compound,
- The walls and floors would be smooth, without cracks, impervious, easy to clean and disinfect.
- The site will be spacious, well-ventilated and lit;
- All loading and unloading of waste would take place within the designated collection area around the storage point;
- Larger volume waste bins would be available at the external storage facility to receive waste containers from the internal storage points,

RMC will designate an area within its premises where waste may be temporarily stored until final collection for disposal and onward treatment. It is expected that RMC will manage the HW it generates. Such a general storage location would be located at the back of the facility and away from the view of the public and it would be included in the design of the proposed RMC building. In addition, the waste storage area will be large enough to contain all the hazardous waste produced by the campus with space capacity to cope with any maintenance or breakdown of the treatment unit. The storage area would be totally enclosed and secured from unauthorized access, inaccessible to animals, insects, and birds, and easy to clean and disinfect with an impermeable hard-standing base, good water supply, drainage, and ventilation.

Waste Transportation

Consideration of transportation must be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. Transportation is classified into on-site transport and off-site transport, since the waste generated from BSL 3 NRL complex is treated at RMC facility, off-site transport will be done for fly and bottom ash, sludge and wastewater (if it required)**.**

On site transportation

The on-site transport involves conveying wastes from the various points of generation within a laboratory to a temporary storage location also within the same area. The following would be adhered to when carrying out On Site transportation and every effort would be made to avoid unnecessary handling of HW:

- All waste bags would in-place and intact at the end of transportation,
- Carts, trolley, or containers used for the transportation of health-care waste would not be used for the transportation of any other material; and would be used for transporting safety boxes and bins,
- Waste that has the potential to leak will be double bagged,
- Waste bags would be placed in containers (e.g. cardboard boxes or wheeled, rigid, lidded plastic or galvanized bins), before being placed directly into the transportation vehicle,
- A trolley, bin, or wheelbarrow will be used for transporting safety boxes and bins,
- The collected waste will not be left even temporarily anywhere other than at the designated storage room,
- Containers would be covered with lids during storage and transport.

Off-site Transportation

During the transportation of waste outside the EPHI compound the following safety precautions would be included:

- Single-bagged waste and containers of sharps and liquids would be placed within a rigid or semi-rigid container such as a bucket, box, or carton lined with a plastic bag,
- Containers would be covered with lids during transportation,
- When transporting plastic bags of infectious waste, care would be taken to prevent tearing of the bags,
- Infectious waste would not be compacted before treatment,
- Outside RMC, infectious waste would be transported in closed, leak-proof, rigid containers using trucks,

- The transportation would be properly documented, and all vehicles will carry a consignment note from the point-of collection to the treatment facility,
- Vehicles used for the carriage of waste would be disinfected prior to use for any other purpose,
- The vehicles would be free of sharp edges, easy to load and unload by hand, easy to clean and disinfect, and fully enclosed to prevent any spillage in the facility premises or on the road during transportation,
- The vehicles would carry adequate supplies of plastic bags, protective clothing, cleaning tools, and disinfectants to clean and disinfect in case of any spillage for reasonably anticipated facial exposure to infectious medical waste.

Waste Treatment and Disposal Methods for RMC Complex

The World Health Organization (WHO) recommends that waste treatment techniques which minimize the formation and release of chemicals or hazardous emissions should be given priority. In general, proper treatment and disposal of healthcare waste (HW) is necessary to ensure that its impact on the environment and human health is minimized or eliminated. Among all the current existing technologies for the treatment and disposal of HW, the most appropriate technology will be applied, and this would be the most reliable, affordable, and sustainable technology in accordance with the technical, human and financial resources of RMC. Moreover, the technology would also minimize the immediate public health risks associated with HWM with the lowest impact on the environment. So that several methods are appropriate for infectious waste treatment, depending on the type of waste material. These treatment methods will include one of the following options or combination of options: steam sterilization, incineration, thermal inactivation, gas/vapor sterilization, chemical disinfection, and sterilization by radiation, or electromagnetic radiation.

Waste Incineration Technology

RMC should construct and install incinerators that fulfill the national emission requirements (Annex VIII). Hence, the following options were considered.

First, transportation of the decontaminated waste from the RMC to an existing national centralized waste facility located 90 Km away from Addis Ababa. Nevertheless, this option is risky and expensive in the context of Ethiopia.

The second option is on-site treatment of waste using an incinerator. There are different types of incineration options available. Medical waste incineration involves the burning of waste produced by hospitals, veterinary facilities, and medical research facilities. These wastes include both infectious ("red bag") medical wastes as well as non-infectious, general housekeeping wastes. The emission factors presented here

represent emissions when both types of these wastes are combusted rather than just infectious wastes.

Controlled Air Incineration: is the most widely used medical waste incinerator (MWI) technology, and now dominates the market for new systems at hospitals and similar medical facilities. This technology is also known as starved-air incineration, two-stage incineration, or modular combustion.

Combustion of waste in controlled air incinerators occurs in two stages. In the first stage, waste is fed into the primary, or lower, combustion chamber, which is operated with less than the stoichiometric amount of air required for combustion. Combustion air enters the primary chamber from beneath the incinerator hearth (below the burning bed of waste). This air is called primary or under fire air. In the primary (starved-air) chamber, the low air-to-fuel ratio dries and facilitates volatilization of the waste, and most of the residual carbon in the ash burns. The second stage, excess air is added to the volatile gases formed in the primary chamber to complete combustion. Secondary chamber temperatures are higher than primary chamber temperatures waste feed capacities for controlled air incinerators range from about 0.6 to 50 kg/min to 6,500 lb./hr.) (at an assumed fuel heating value of 19,700 kJ/kg [8,500 Btu/lb]). Waste feed and ash removal can be manual or automatic, depending on the unit size and options purchased. This type of incinerator is the most preferred incinerator for RMC. The incinerator has a capacity to burn 50 kg per hour with emission reduction device control (Fabric filter coated with catalyst) made from Poly tetra fluoro ethylene (PTFE), with parallel de dusting, lower contamination of filter dusts because of polychlorinated dibenzo-p-dioxins or polychlorinated dibenzofurans (PCDD/PCDF) destruction at the catalytic surface that have high efficiency reduction of dioxin up to <0.1 ng TEQ/m^3 where TEQ is Toxicity Equivalency Quantity. After completion of installation, the incinerator shall be calibrated by an appropriate body and certified before starting the operation.

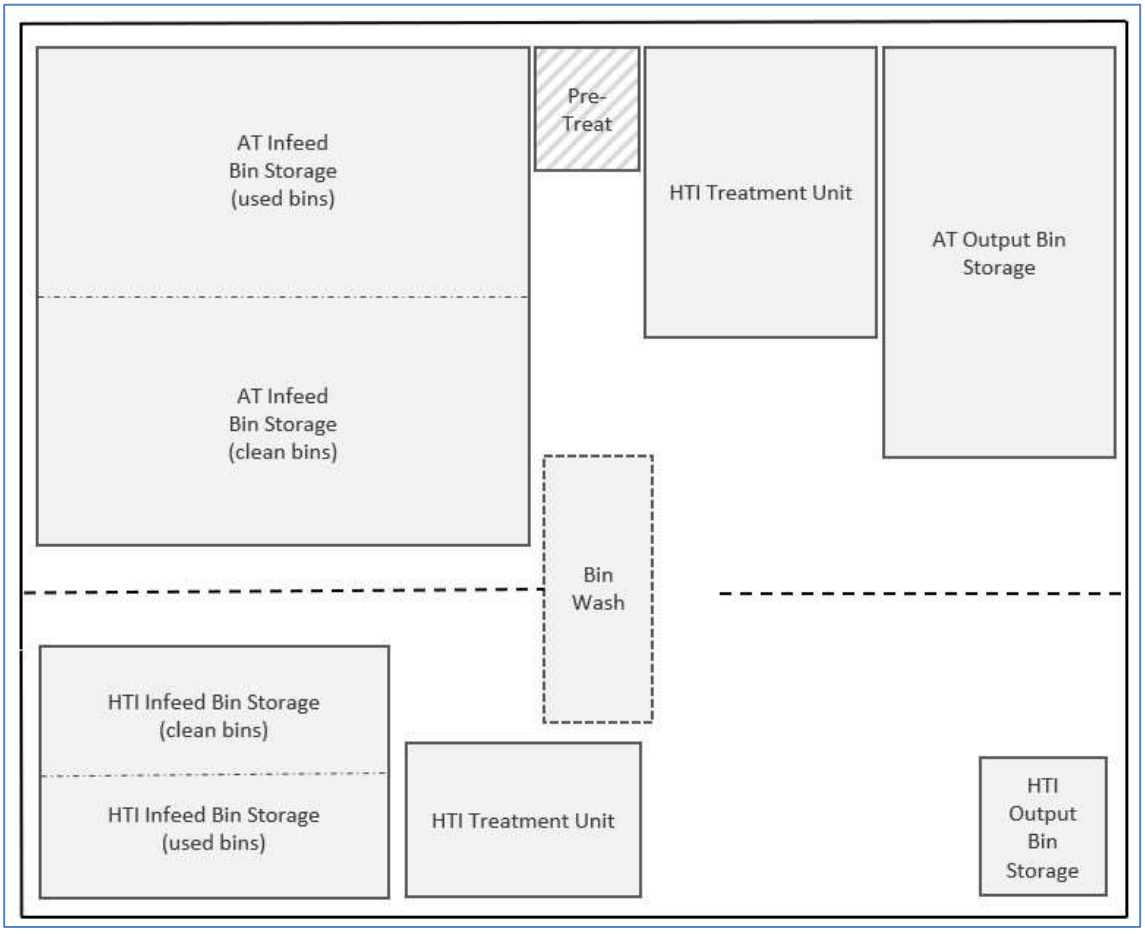
Rotary Kiln Incinerators: Rotary kiln incinerators, like the other types, are designed with a primary chamber, where waste is heated and volatilized, and a secondary chamber, where combustion of the volatile fraction is completed. The primary chamber consists of a slightly inclined, rotating kiln in which waste materials migrate from the feed end to the ash discharge end. The waste throughput rate is controlled by adjusting the rate of kiln rotation and the angle of inclination. Combustion air enters the primary chamber through a port. An auxiliary burner is generally used to start combustion and maintain desired combustion temperature. It has a high temperature range of 1200^{o}C to 1600^{o}C. However, it is relatively cost and used for wastes with long residence time.

Of the different options available a High Temperature Incinerator (HTI) is recommended because it can treat all waste types except radioactive waste. For a facility of this size – 1000 beds at the final phase - an HTI of 150-200kg/hr. capacity with filtration system is preferred due to the type/scope of waste that can be treated and air pollution control system.

Note: The space allocated for pre-treatment is not required for all treatment technologies. It may also not be required if the treatment unit procured includes integrated pre-treatment.

The development of a combination of HTI and AT technology is considered good practice to provide for the safe and compliant treatment of healthcare waste types expected to be generated at the hospital. With this in mind, the footprint of the waste treatment building would need to be large enough to accommodate space for two separate processing units and associated outputs.

Figure 11: Indicative layout of waste treatment building containing HTI and AT



It is suggested that the AT operations are undertaken in a separate room from HTI operations. This is to minimize the risk of cross contamination and operator error when bins and wastes are loaded and unloaded. However, providing two adjoining rooms it would be feasible to utilize a single bin wash.

Waste Disposal Methods

Disposal of hazardous ash: Fly ash and bottom ash from incineration is generally considered to be hazardous, because the waste would have heavy metal content and dioxins and furans. The waste will be collected and then solidified with cement/ encapsulated in double containers made from polyethylene material to transport in safe manner to disposal site utilized by Kotebe waste treatment plants for landfilling. Alternatively, the homogeneous mixture would be transported in liquid state to Kality wastewater treatment plant and then the treated sludge will be disposed in secured manner at landfilling disposal site utilized by Addis Ababa water and sewerage Authority. As plan B, Sendafa Sanitary landfill will be considered for final disposal of handling incineration residues if this would be socially and environmentally feasible.

Liquid Waste Generated from RMC Treatment and Disposal

Liquid contaminated waste (e.g. pathological sample, blood, faces, urine, other body fluids and contaminated fluids, liquid wastes from compounding room, contaminated liquid wastes from ICU unit, OPD, OR and others) requires special handling, as it may pose an infectious risk to healthcare workers and the public with contact or handle the waste.

Segregation, minimization, and safe storage of hazardous materials are just as important for liquid wastes as they are for solid wastes. Typically, a system of sewer pipes linked to form a sewerage system will collect wastewater from around a facility of RMC and carry it below ground to a central location for treatment at RMC compound. The treatment plant is located at a facility, and wastewater collected from different facilities by pipe system and passed into different units of liquid waste treatment units. Liquid wastes generated from RMC complex, which contains pathogens blood and hazardous chemical, except hazardous chemical they are treated with disinfectants, and finally it is disposed of into liquid waste treatment plant which will be constructed during the construction of RMC as per WHO recommendation. Liquid wastes with highly infectious would be treated using 5% sodium hypochlorite (NaOCl – bleach) before disposal. Sodium hypochlorite would never be mixed with detergents or used for disinfecting ammonia-containing liquids, because it might form toxic gases. Lime milk (calcium oxide) can be used to destroy microorganisms in liquid wastes with high organic content requiring disinfection (e.g. stool during a cholera outbreak). Onsite treatment of healthcare sewage will produce a sludge that contains

high concentrations of pathogens and should be treated before disposal. All hazardous chemicals used in the RMC (such as: formaldehyde, chloroform, phenol, ethyl alcohol, isopropyl alcohol, amyl alcohol and sodium hypochlorite) would not become waste for this facility. Waste fluid generated from the RMC may need pH adjustment. Effluent from the RMC also needs to meet the country standard to be discharged into publicly operated sewage collection and treatment systems at Addis Ababa.

Regarding sanitary liquid waste, the sanitary waste can be generated from different facilities of RMC. Sanitary waste could be generated from administrative activities and from toilets, showers and sinks in the building bathroom facilities; the sanitary liquid waste management described below.

Onsite Waste Treatment for RMC

The packaged onsite wastewater treatment system which will be constructed in RMC compound is a combined sludge and clarification plant. This is a self-contained treatment plant with activated sludge Primary sedimentation, or septic tanks are installed ahead of the plant to reduce solids and COD loading. A secondary sedimentation tank after the reactor removes the biomass from the treated sewage before it is released to surface water or transported to a centralized treatment/disposal facility.

1. Septic tanks

The septic tank is the most commonly used wastewater pre-treatment unit for onsite wastewater systems. Tanks may be used alone or in combination with other processes to treat raw wastewater before it is discharged to a subsurface infiltration system. In RMC's context the tanks will be subordinate with other pathogen removal processes. The tank provides primary treatment by creating quiescent conditions inside a covered, watertight rectangular, oval, or cylindrical vessel, which is typically buried. In addition to primary treatment, the septic tank stores and partially digests settled and floating organic solids in sludge and scum layers. This can reduce the sludge and scum volumes by as much as 40 percent, and it conditions the wastewater by hydrolyzing organic molecules for subsequent treatment in the soil or by other unit processes.

A septic tank removes many of the settle able solids, oils, greases, and floating debris in the raw wastewater, achieving 60 to 80 percent removal. The solids removed are stored in sludge and scum layers, where they undergo liquefaction. During liquefaction, the first step in the digestion process, acid-forming bacteria partially digest the solids by hydrolyzing the proteins and converting them to volatile fatty acids, most of which are dissolved in the water phase. The nature of liquid waste in a septic tank varies.

2. Sand/media filters

Sand filters are essentially aerobic, fixed-film bioreactors used to treat septic tank effluent. Other very important treatment mechanisms that occur in sand filters include physical processes such as straining and sedimentation, which remove suspended solids within the pores of the media, and chemical adsorption of dissolved pollutants (e.g., phosphorus) to media surfaces. The latter phenomenon tends to be finite because adsorption sites become saturated with the adsorbed compound, and it is specific to the medium chosen. Bio slimes from the growth of microorganisms develop as attached films on the sand particle surfaces. The microorganisms in the slimes absorb soluble and colloidal waste materials in the wastewater as it percolates around the sand surfaces. The absorbed materials are incorporated into new cell mass or degraded under aerobic conditions to carbon dioxide and water. Treatment Processes and Systems Most of the biochemical treatment occurs within approximately 6 inches (15 centimeters) of the filter surface. As the wastewater percolates through this active layer, carbonaceous BOD and ammonium-nitrogen are removed. Most of the suspended solids are strained out at the filter surface. The BOD is nearly completely removed if the wastewater retention time in the sand media is sufficiently long for the microorganisms to absorb and react with waste constituents. With depleting carbonaceous BOD in the percolating wastewater, nitrifying microorganisms can thrive deeper in this active surface layer, where nitrification will readily occur.

3.Continuous-flow, suspended growth aerobic system

The aerobic suspended-growth process that maintains a relatively high population of microorganisms (biomass) by recycling settled biomass back to the treatment process. The biomass converts soluble and colloidal biodegradable organic matter and some inorganic compounds into cell mass and metabolic end products. The biomass is separated from the wastewater through settling in a clarifier for recycling or wasting to sludge handling processes. Preliminary treatment to remove settle able solids and floatable materials is usually provided by a septic tank or other primary treatment device. Most onsite designs can provide significant ammonia oxidation and effective removal of organic matter. The basic system consists of several interrelated components include:

- An aeration tank or basin.
- An oxygen source and equipment to disperse atmospheric or pressurized air or oxygen into the aeration tank at a rate enough to always maintain positive dissolved oxygen.
- A means to appropriately mix the aeration basin and ensure suspension of the biomass (usually accomplished by the aeration system).

- A clarifier to separate the biomass from the treated effluent and collect settled biomass for recycling to the aeration basin.

Incinerator Fly Ash Control Method

Flue (exhaust) gases from incinerators by burning medical waste can contain fly ash (particulates), heavy metals, dioxins, furans, and thermally resistant organic compounds. Currently several convention methods are used to treat incinerator fly ash generated by medical waste incineration. To reduce the impacts raised from the fly ash and flue gases the RMC will propose to utilize the primary strategies (operation by trained, qualified personnel, use of personal protection equipment, periodic maintenances, Auditing and reporting systems and routine inspection of furnace and air pollution control systems) and secondary strategies like fabric filter coated with catalyst made from PTFE, with parallel "de-dusting" to remove most of the fly ash, lower contamination of filter dusts because of PCDD/ PCDF destruction at the catalytic surface with high efficiency (< 0.1 ng TEQ/m3 with Cement Solidification Technology (CST) and then encapsulated in double containers made from polyethylene material to transport in safe manner to disposal site utilized by Kotebe waste treatment plants for landfilling. Alternatively, the homogeneous mixture can be transported in liquid state to a Kality wastewater treatment plant and then the treated sludge will be disposed in secured manner at landfilling disposal site utilized by Addis Ababa water and sewerage Authority. As plan B, Sendafa Sanitary landfill will be considered for final disposal of handling incineration residues if this would be socially and environmentally feasible.

Final Disposal for Treated Wastewater and Sludge

The treated wastewater from RMC will be released to land or surface water if and only if it fulfills the country standard for general standard for all other industrial effluent discharge to inland water and controlled application of effluents to land. If the treated waste fulfills the requirement, it can be also used as greenery and toilet flushing. If it does not fulfill the above criteria, the wastewater would be transported to those treatment plants by using sewage trucks that empty septic tanks. Regarding sludge, sludge generated in RMC would be transported to AAWSSA Kotebe treatment plants that are designed to treat and dispose sludge, using vacuum trucks.

Once a sewer line is constructed to the site, treated wastewater from RMC will be released into a sewer line of Addis Ababa Water Supply and Sewerage Authority (AAWSA) Kality treatment plant.

Radioactive Waste Management Options

- If possible, the first option of managing radioactive waste is to return it to supplier while observing the Basel Convention. The other options are to: "Decay

in storage", which is the safe storage of waste until its radiation levels are indistinguishable from background radiation; a general rule is to store the waste for at least 10 times the half-life of the longest-lived radionuclide in the waste.

- Long-term storage at an authorized radioactive waste disposal site.
- It is not appropriate to disinfect radioactive solid waste by wet thermal or microwave procedures.
- Disposable syringes containing radioactive residues should be emptied in a location designated for the disposal of radioactive liquid waste. Syringes should then be stored in a sharps container to allow decay of any residual activity before normal procedures for disposal of syringes and needles are followed.
- Higher-level radioactive waste of relatively short half-life (e.g., from iodine-131 therapy) and liquids that are immiscible with water, such as scintillation-counting residues and contaminated oil, should be stored for decay in marked containers, under lead shielding, until activities have reached authorized clearance levels.
- Radioactive waste resulting from cleaning-up operations after a spillage or other accident should be retained in suitable containers unless the activity is low enough to permit immediate discharge.

5.15 Project Activities

5.15.1 Construction Phase

The construction activities include site preparation, infrastructure utilities installation, removal of existing buildings in library and administrative building sites**.** The major activities during construction phase are civil construction work, vehicular movement, loading and unloading civil items and plant machineries, on site storage of civil items and plant machineries, erection of plant and civil structures, power supply, maintenance of construction machinery and disposal of solid wastes.

The construction activity is expected to start in January 2022 and be finalized in 2025.

5.15.2 Operation and Maintenance Phase

RMC is expected to start its operation in 2026 particularly for the Advanced Multi-Specialty Hospital that will provide services such as the emergency department, outpatient, Inpatient, Critical care unit, Mother & Child (MCH), Dialysis, Operation rooms, Cath Lab, Endoscopy, radiology, advanced comprehensive laboratory, pathology, radiation therapy, nuclear medicine, pharmacy, and administrative units. It will also include solid and liquid waste management facilities such as incinerators, wastewater treatment plants, and drainage systems. The other four hospitals will be

constructed in the second and third phases of the project. The Advanced Multi-Specialty Hospital is currently under construction, with 35% of the work completed.

5.15.3 Decommissioning Phase

Decommissioning activities include the removal of inventory to obtain a state of passive safety, dismantling and removal of the components, systems and equipment including decontamination as appropriate with the aim of re-utilization of facilities for production after construction or to make the facility suitable for any activity after construction.

Here, it is important to give clues on the need for identifying and screening the likely impacts with their significances encountered per the project`s phases, mentioned above.

5.16 Environmental and Social Performance of RMC Project against ESIA

Based on the site observation and review of the ESMP, the company is operating as per the environmental and social impacts management plan. The construction activities were evaluated as compliance against air pollution, preparation of emergency response plan, RAP, preparation of spill response plan, noise pollution, traffic Impacts and OHS Risks. It was evaluated Partial compliance against soil impacts, and water resource impacts. Correction actions should be taken as per the mitigation measures proposed in the ESIA report.

Releasing wastewater from a concrete batching plant directly into surface water can have several negative environmental impacts. Concrete wastewater can contain high levels of suspended solids, pH, and chemicals that may harm aquatic life and degrade water quality. High levels of suspended solids can lead to sedimentation, which can smother aquatic habitats and disrupt the natural balance of the ecosystem. It's important to manage concrete batching plant wastewater properly by using treatment systems or recycling practices to minimize its environmental impact.

Storing used oils in an open area can indeed pose significant environmental risks. It can lead to soil and water contamination, and the potential for spills or leaks can further exacerbate pollution. The contractor should use a designated, covered storage area for used oils to prevent exposure to the elements and ensure that the storage containers are leak-proof and have secondary containment measures to capture any spills or leaks. Clearly label the containers to indicate that they contain used oil and should be handled with care

It's crucial to have a well-stocked first aid kit to handle emergencies effectively. There is a need to purchase additional supplies to ensure the kit is fully equipped. Essential items typically include bandages, antiseptics, adhesive tape, scissors, tweezers, burn ointment, and a first aid manual.

6. BASELINE INFORMATION OF THE PROJECT PROPOSAL

6.1. Biophysical and Environmental Baseline Information of the City

Addis Ababa is the capital and largest city of Ethiopia. It was founded in 1886 and has a population of 3,384,569 according to the 2007 population census, with annual growth rates of 3.8%. This number has been increased from the originally published 2,738,248 figures and appears to be still largely underestimated.

It is where the African Union and its predecessor the OAU is based. It also hosts the headquarters of the United Nations Economic Commission for Africa (ECA) and numerous other continental and international organizations. Addis Ababa is therefore often referred to as "the political capital of Africa" due to its historical, diplomatic, and political significance for the continent. The city is populated by people from different regions of Ethiopia. It is home to Addis Ababa University. The Federation of African Societies of Chemistry (FASC), and Horn of Africa Press Institute (HAPI) are also headquartered in Addis Ababa.

6.1.1 Geographical Location and Area

Addis Ababa lies 9°1’48” N latitude and 38°44’24” E longitude. The city is located at the heart of the country, at an altitude ranging from 2,100 meters at Akaki in the south to 3,000(9,800 ft.) meters at Entoto Hill in the North. This makes Addis Ababa the third highest city in the world, after La Paz and Quito in Latin America. Its time zone is categorized as East Africa Time (UTC+3). The city occupies a total area of 540 Sq. Km2.

The project site is found in Bole sub-city, Woreda 13, Addis Ababa, Ethiopia on a six (6) hectare land formerly reserved for a park but was being used as a dumping ground for construction waste. It is found on the ring road that leads from Bole international airport to diaspora square, and near other prominent Institutions such as the Bole international airport, Skylight Hotel, churches, national stadium (under construction), and the Windows of Africa Project led by the Office of the Prime Minister. The site is categorized under the flat topography and located within the following GPS coordinates.

- 38.7990624554134, 8.99596804879402:
- 38.7968940841604, 8.99665577491354:
- 38.7965150900542, 8.99591102525657:
- 38.7961102107737, 8.99476572934434:
- 38.7961142284343, 8.99475750148445:
- 38.7980780582021, 8.99419399722231:

- 38.7988368967273, 8.99452565776149:
- 38.7990624554134, 8.99596804879402:

Figure 12: Project Location and nearby landmarks



6.1.2 Soil and Geology

The geotechnical investigation of the RMC site was conducted by JEROCCIA Geotechnical Services and Engineering PLC. This was conducted by drilling eleven boreholes to a maximum of 30-meter depth. From the investigation, the following major layers were identified:

- Fill materials (Variegated color, clayey SILT, SILTY SAND soil mixed with fractured rock pieces and boulders)
- Highly to moderately weathered, Medium strong, closely to widely spaced, Ignimbrite rock,
- Completely weathered rock (Decomposed into light grey to brown, medium dense to dense, clayey salty SAND/Sandy SILT
- Highly weathered to fresh, closely to widely spaced, medium strong sandstone.

6.1.3 Climate of the City

Addis Ababa has a Sub-tropical highland climate. The city has a complex mix of highland climate zones, with average temperature differences of up to 12.2°C,

depending on elevation and prevailing wind patterns. The high elevation regulates temperatures year-round, and the city's position near the equator means that temperatures are constant from month to month (www.climatezone.com).

As shown in table 1 above, the months from June to mid-September mark the main rainy season during which days and nights are cool by local standards. Average annual rainfall is 1,184mm, of which about 80% falls between June and September, the months of July and August being the wettest. The hottest and driest months are usually April and May. The short rains fall during March to mid-April, characterized by relatively cool nights and warm days.

Mid-November to January is a season for occasional rain. The highland climate regions are characterized by dry winters, and this is the dry season in Addis Ababa. During this season the daily maximum temperatures are usually not more than 23 °C (73 °F), and the night-time minimum temperatures can drop to freezing. The short rainy season is from February to May. During this period, the difference between the daytime maximum temperatures and the night-time minimum temperatures is not as great as during other times of the year, with minimum temperatures in the range of 10–15 °C (50–59 °F). At this time of the year the city experiences warm temperatures and pleasant rainfall. The long-wet season is from June to mid-September; it is the major winter season of the country. This period coincides with summer, but the temperatures are much lower than at other times of year due to the frequent rain and hail and the abundance of cloud cover and fewer hours of sunshine. This time of the year is characterized by dark, chilly, and wet days and nights. Next is autumn which is a transitional period between the wet and dry seasons.

The highest record temperature was 32 °C (90 °F) on August 27, 1996, while the lowest record temperature was 0 °C (32 °F) on November 23, 1999.

6.1.4 Noise

The major sources of noise in Addis Ababa city are transportation and human activities. The most common form of noise pollution is from transportation, and noise from aircraft landing and departure. As RMC project is found near Bole international airport and adjacent to the main road that leads from Bole to Megenagna and vice versa, this Street is a major thoroughfare with multiple lanes of traffic going in both directions and around about on the northern corner of the RMC Project, resulting the most common form of noise pollution from traffic activities. The noise impact of aircraft landing and departure during nighttime is significant and there is no cumulative impact during the daytime as the main road and airport are found in opposite directions.

6.1.5 Flora and Fauna

Addis Ababa city fundamentally possesses an urban environment. The built-up area in Addis Ababa city comprises, of terrestrial vegetation that are grown as fencing shrubs, ornamental trees on open spaces, street side and median trees, recreational parks, and patches of indigenous trees in religious institutions such as churches. Moreover, the upper catchment of Addis Ababa City, mainly along the Entoto mountain chain, has plantation forest of mostly eucalyptus trees. Studies indicate that the amount of plantation forest cover in five upper catchment Sub-Cities of Addis Ababa comprising of Gulele, Yeka, Kolfe keranyo, and Bole Sub-Cities consist of 10, 14.9, 5, 0.42 and 4.84 square kilometer areas of plantation forest respectively. On the other hand, the remaining sub-cities of Addis Ababa such as Nefas selk lafeto, Kirkos, Ledeta, Addis Ketema and Arada did not have any plantation forest cover (Fikirte, & Mare, 2015).

Biodiversity conservation and the sustainable utilization of its resources is a paramount endeavor that should be considered in all development project implementation.

6.1.5.1 Plant Biodiversity

Information about the state of biodiversity of the project site was obtained through a reconnaissance survey, by using checklists, and through interviews and discussions with the public. A reconnaissance survey was made on April 23, 2021, to observe the overall vegetation found in the project area. According to IFC's standard, the project area could be classified as modified habitat where human activities have substantially modified the area's primary ecological functions and species composition. The area has no significant vegetation cover. The project area contains scattered Acacia and Eucalyptus trees with no undergrowth (Figure 4). Following sampling technique (Kent, 2012), sample plots of 20 x 40 (800 m^2) sizes were purposively laid to count the Acacia and Eucalyptus trees. There are 35 Acacia and 17 Eucalyptus individual trees in the project site. Other tree species like apple, Enset, Eucalyptus and Acacia are also found outside the project site.

Figure 13: Scattered Eucalyptus within the project site.

Figure 14: Acacia trees within the project site.





6.1.5.2 Animal Biodiversity

In order to assess the animal biodiversity in the project site a reconnaissance survey was made on April 23, 2021. During this observation, different bird species were found outside the project site on the East ward side of the project site, on the wetland area. Wastewater coming from different areas of the town, one on the northern and the other on the western side of the project area, overflows on the open ground. This dirty water forms a swampy ground and most of the birds are feeding on this area of the project site. Then data were collected using point count techniques by selecting an appropriate locations/observation point to make sure maximum chances of observations following the method of Sidra *et al.* (2013). During this survey a total of two-point stations, one at the beginning of the swampy ground, the second in the middle, were selected depending on the size of the swampy ground and maximum distance were observation of birds possible. Field observations were carried out at two different times of the day, at 6:00 - 10:00 a.m. in the early morning and at 4:00 - 6:00 p.m. in the afternoon when birds are active. The available birds were observed by the naked eye, then bird species were taxonomically classified by using bird guidebook of Redman *et al*. (2011) and other standard references. We have identified four different species of birds, namely, *Leptoptilos crumenifer*, *Threskiornis aethiopicus*, *Alopochen aegyptiaca*, and *Necrosyrtes monachus* each had a total number of 17, 14, 12, and 4, respectively (Figure: 5) and the common swift (*Apus apus*) was observed. Frogs and toads were also observed on the project site.

Figure 15: Different bird species of the area nearby but not directly adjacent the project.





6.1.6 Surface and Ground Water Resources

The main surface water resources present in and around Addis Ababa are the rivers in the Akaki sub-basin which traverses the city from northeastern and northwestern parts of the city down to the southern plains culminating at Lake Aba-Samuel. There are several perennial rivers, within the Akaki River Sub-basin. The most important ones are Big Akaki, Little Akaki and Kebena. The RMC project area is located within the upper catchment of the Akaki river basin.

It is observed that the project is surrounded by one main river called Kersa-Agoza River to the northeast side project site. There are also two other streams outside the boundary of the project site and flow into the Kersa-Agoza River (Figure 17). Stakeholder consultation revealed that, one stream is manmade diversion from the construction of the national stadium found to the North ward direction of the project site. The streams are heavily polluted by household and commercial waste. Solid waste in the form of trash, litter, and garbage often ends up in these surface water resources. The water is then used to irrigate grass for animal feed and vegetables for commercial purposes. Therefore, the environmental protection office should monitor rivers and streams to prevent pollution from household, sewage, and commercial wastes.

Based on the observation and measurement, shallow ground water was not encountered in all test boreholes up to a maximum of 30-meter depth.

Generally, the wastewater discharged from domestic premises like residences, institutions and commercial establishments is termed as "Sewage/Community wastewater". It comprises 99.9% water and 0.1% solids and is organic because it

consists of carbon compounds like human waste, paper, vegetable matter etc. Besides community wastewater/sewage, there is industrial wastewater in the region. Many industrial wastes are also organic in composition and can be treated physio-chemically and/or by micro-organisms in the same way as sewage (Zhou & Smith, 2002).

Uncontrolled storm water and surface runoff can cause significant environmental damage with the accompanying loss of property. Land use and land cover of the project site is grazing and vegetable crop production to Southeast of the project site. These activities can absorb water through irrigation and consumption for some daily activities. The land use changes due to project construction will result in impervious surface (solid surfaces that prevent aeration, infiltration, and water penetration, resulting in several harmful side effects). When the project area is made impervious land, the peak discharge in the main river will rise, increasing the likelihood of flooding. The main river found towards the eastern boundary of the project site requires a retaining wall to mitigate overflow of the river during the heavy rainy season.

For the management of the river and streams near the project site, the team of consultants recommends establishing a stakeholder platform comprising of the river riparian institutions, communities, and government counterparts to implement an integrated water resources management (IWRM) approach to protect the watershed where the project site is located.

Figure 16: Unplanned sewage line flowing into the wetland area beyond the perimeter of the Hospital.



Figure 17: The lower part of the Kersa-Agoza River in south – eastern direction from the project site.



6.2. Socio-Economic Baselines

6.2.1 Population and Demographic Characteristics

Addis Ababa is the capital city of Ethiopia. It is also the largest city in the country by population, with a total population of 3,384,569 according to the 2007 census. However, it is believed that this number was inaccurate when recorded and underestimated the city's population. The city has through recent years seen a robust annual growth rate, and population counts as of 2017 are growing closer to 4 million.

According to Addis Ababa office of the Mayer report; Bole sub-city is organized into 14 woredas with a population density of 328,900 in which 154,542 are male and 174,358 are females. The population density of the sub-city per sq. Kms. is 2,694.1.

6.2.2 Health Service

The WHO standard for developing countries for physician to population ratio is one physician per 10,000 population. According to the 2023 report from the Ministry of Health, there are 0.7 physicians per 10,000 inhabitants, which is below the global average of 1.3 per 10,000. The health workforce density for essential categories, including physicians, health officers, nurses, and midwives, was only 1.22 per 1,000 people in 2021/22. Additionally, Health centers distribution in different regions of Ethiopia at the end of 2023 shows: Harari (9) and Dire Dewa (16). Tigray (237), Afar (102), Amhara (910), Oromia (1422), Somali (229), Benishangul Gumuz (65), Central Ethiopia (233), Gambella (30), and Addis Ababa (105)., Sidama (136), Southern Nations (287).

Data shows that the private hospital sector expanded its activities in urban areas, especially in the capital city. The numbers of private health facilities are increasing steadily, but numbers of beds in private hospitals are still inadequate compared to healthcare demand growth.

According to Addis Ababa Mayor's office, Bole sub-city has three public health centers, 20 higher private clinics, nine private junior clinics (Table 8).

Table 8: Distribution of Health Institutions in Bole Sub-City

Ownership	Health Centers	Primary Clinic	Medium Clinic	Specialty clinic	Specialty Centers	Hospitals
Private	-	15	89	56	14	8
Governmental	6	3	9	-	-	-
NGO	-	1	1	-	-	-
Total	6	19	99	56	14	8

6.2.3 Education

According to the third population and housing census of Ethiopia of 2007, about 85.3 percent of the population of Addis Ababa was literate. Based on the Urban Employment Unemployment survey study, there is an improvement in literacy rate in Addis Ababa. The literacy rate by sex in 2012 indicated us a similar trend with that of the previous years. Hence, 94.3 percent of male was literate while the proportion of literate among female populations was accounted for 80.0 percent. Thus, the average literacy rate of the city in 2004 E.C was 86.4% which was above the average literacy rate of the country.

According to AACBoE in 2004 E.C there were a total of 797,226 students in different levels in Addis Ababa. Of them 125,794 KG students, 484,517 primary school students, 152,514 secondary school students, and 34,401 college students. According to AABoE of 2004 E.C annual report, there were 2,221 schools in the city, of which 1,050 are kindergarten, 760 primary schools, 188 secondary schools (9-12), 265 alternate basic education centers and one College of Teacher Education. According to AABoE, 30,953 teachers were teaching at various levels in Addis Ababa. The number of teachers at various levels progressively increased in the past five years. In 2004 E.C there had been 6,241 KG teachers, 16,862 primary school teachers, 6,583 secondary school and 1,203 ABE teachers. In Primary school the share of Female teachers accounts for 45 % (7323).

According to Addis Ababa Mayer office Bole sub-city has different government, private, NGO and public schools and educational institutions distributed to different woredas (Table 9).

Table 9: Educational Institutions in Bole sub-city

	KG	Primary School	Secondary School	Preparatory	TVET	College	University
Governmental	8	13	4	1	1	---	---
Private	107	65	17	9	45	2	2
NGO	2	2	2	1	---	---	---
Public	3	3	2	---	---	---	---

6.2.4 Water Supply and Sanitation

Addis Ababa has not yet reached full coverage of water supply or sewerage and faces significant and growing water scarcity. It is estimated that only 44% of the population has access to clean water, 23 and 30% have access to piped sewage or vacuum truck service, respectively. Addis Ababa has two sources of water – surface and

groundwater. Surface water comes from 3 dams that feed into 2 treatment plants these are Geffersa, Legedadi, and Dire Dams. They are in the east and northwest of the city and flow to the city using gravity. There are 3 primary well fields for groundwater extraction, with 50-60 wells. They are in the southeast section of the city. Water is collected into tankers via gravity and treated, and then pumped to the city. The per capita distribution is estimated to be around 40 liters /day, well below the city's goal of 110 liters /day. Ababa Water and Sewerage Authority (AAWSA) is currently supplying water to certain parts of the city on a rotation basis, with some areas receiving water only two days a week through distribution lines or water trucks.

6.2.5 Waste Management Facilities

Addis Ababa has a land fill site and the Reppie waste to Energy plant. The waste to energy plant converts non-hazardous solid waste generated in the city to power energy. It is close to the existing land fill and has introduced better management practices of municipal solid waste in Addis Ababa. This includes modern technology, sorting facilities for recycling and collection of municipal solid waste and the opening of a new landfill site under best practice management standards.

Regarding hazardous medical solid waste, there are no central waste treatment plants in Addis Ababa. But there is a new centralized incinerator built by the Ministry of Health in Adama town 90 km away from Addis Ababa designed for incineration of pharmaceutical and medical waste. This approach would reduce health and environmental pollution risks that would arise from several inefficiently managed and run incinerators or burning/burials pits. However, the major drawback of this approach is the transportation infrastructure requirement and the risk during waste transportation from RMC facility to centralized Incineration place as well as cost.

6.2.6 Water Treatment and Drainage

Sewage disposal is the responsibility of the Addis Ababa Water Supply and Sewerage Authority (AAWSSA). It operates with seventeen wastewater treatment plants. The main ones are Kality and Kotebe and the others are in twelve condominium areas. The sewer line is connected to Kality treatment plant and sludge is transported to Kotebe treatment plant using vacuum trucks that empty septic tanks. The treatment involves circulation of sewer in various ponds for about 30 days to make the level of BOD fall below 5mg/L. The Kality had capacity of 7,600 m3/day wastewater treatment however, according to Addis Ababa Water and Sewerage Authority (AAWSA), currently the project expansion has been upgraded to capacity of 100,000 m^3/day to treat wastewater with the support of the World Bank.

The other main treatment plant is called Kotebe treatment plant, it receives only sludge from vacuum trucks that empty septic tanks. The Kotebe treatment plan was established 22 years ago by Addis Ababa Water Supply and Sewerage Authority with the objective to treat and dispose of sludge collected from the city with the capacity to treat volume of 85,000 m^3/day. In addition, Addis Ababa Water Supply and Sewerage Authority introduced an expansion project to increase the capacity and efficiency of the treatment plant by an additional 80,000 m3/day in the coming few years. In addition to this, there are also several decentralized treatment plants that primarily serve condominiums. Industries are not connected to the sewage system, they manage their own waste overseen by the Addis Ababa Environment, Forest, and Climate Change Commission (now Environment Protection Authority).

6.2.7 Electricity

According to the 1999 census of Ethiopia 98.12 percent of housing units was using electricity for lighting. The data show a slight difference between sub cities in terms of the type of lighting. More than 95 percent of the housing units in all the sub cities of Addis Ababa have electricity.

Moreover, the census indicates that the proportions of housing units in Addis Ababa city administration with electricity have increased from 95.5 percent in 1994 to 98.12 percent in 1999. According to the Office of the Mayor, Performance Management Directorate, this figure rose to 99.01% in the year 2004 E.C.

It is therefore expected that the project's access to electricity is ensured.

6.2.8 Solid Waste Management

Addis Ababa, as the political and economic center of the country, there is a high rate of population agglomeration accompanied by rural–urban migration, resulting in a substantial amount of solid waste generation. According to the city government BSC study team assumption, (February 30, 2002, E.C) of the total solid waste generated 76% from residential, 9% from commercial areas, 6% from street sweeping, 5%from industries, 3% from hotels and 1% was from hospitals. The Per Capita solid waste generation rate is 0.34 Kg/cap/day. Currently it is 0.45kg/capita/day and as a total 1,020,000 kg or 3,063.06 m^3 with density of waste per year and 330 kg/m^3 per day. There is a 5% rise in urban waste generation per year (Addis Ababa City Administration, 1998 E.C). The proportions of housing units disposing solid waste through vehicle or containers were significantly higher in urban area (38.0%), in Addis Ababa this system covers 92.0 percent of households (Welfare Monitoring Survey 2011). The average amount of solid waste generation per m^3 /day in the city was 2,585 in 2002, and grow to 5, 6137 in 2004 E.C. The number of vehicles in charge of

disposing of the generated waste was 79 in 2002 and increased to 99 in the year 2003 E.C.

6.2.9 Environmental Protection

Regarding protection of the environment, the city administration is committed to the protection and preservation of the physical and biotic resources of the city. According to AACEPA 9,900 hectares of land are reserved for forest. Forty-five unions are organized and working with the city Environment Protection Authority. In 2004 E.C a total of 1,000,039 indigenous seedlings have been planted. Of these 77% of them grow well and are in good condition. In 2004 E.C 55,950 kg solid wastes have been collected and reused to generate energy.

6.2.10 Culture

According to Bole sub-city administration culture and tourism office tourism development and archeology management unit, there are 16 historical manmade and natural archeological sites. These include religious places (St. Michael tunnel, St. Urael Church, EgziabherAb church, Tsire-Ariam St. Sillasie church) and other historical sites (W/ro Zefeshewal School, Princess Atsede Asfaw palace, Chari-Chancho Tunnel, Bitwoded Mekonen Endalkachew residence, Gurd-shola Tree,). Out of these, Chari-Chancho Tunnel, Bitwoded Mekonen Endalkachew residence, Tsire Ariam St. Sillasie church and Egziabher-Ab church are found in Woreda 10. However, all of these archeological and historical sites are found far away from the proposed project site and situated in such a way that they will not be impacted by the project. The project site was reserved for the construction of Adwa Park however no park related development has taken place, instead illicit practices such as illegal dumping of solid waste, and sexual harassment proliferate, in addition informal settlements and chewing of Kat (mild narcotic) has been taking place within the project site. Therefore, the negative impact of the project in cultural and tourism area is not applicable. Consultation with the Woreda culture and tourism office also confirmed the same.

7. ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, technology scale and waste management options.

7.1 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. The No Project Option is the least preferred from the socio-economic and health perspective. The proposed project will have a significant positive impact in the health service utilization of the country by providing quality healthcare service. The project will make important contributions toward the growth of the country by generating revenue and saving hard foreign currency. With the range of specialties and high global standards, we expect this will quickly be a global medical tourism hub. Therefore, the campus will contribute significantly to generation of foreign currency through medical tourism. The campus will also create 5,000-7,000 jobs and will have a heavy emphasis on training. Therefore, it becomes apparent that the No Project alternative is not the preferred alternative to the country considering the positive socio-economic impacts of the project.

7.2 Alternative Site

The site is one of the areas where informal settlements and land grabs have been expanding. Though the site had been reserved for a park (Adwa Park), it has been serving as an illegal dumping ground for solid wastes and causes adverse environmental and health problems. In addition, Land, water, and soil pollution in the neighborhood are primarily caused by illegal dumping that affect the physical environment and the waterways by contaminating surface water found to the east of the project site. The site is located near the Bole International Airport in Addis Ababa which is the transport and commercial hub of the country; the majority of the import – export transactions take place in the capital. The city hosts a number of international and regional organizations; it is the seat of AU and UN-ECA headquarters, as well as many other multinational organizations, and diplomatic missions. Despite of such National, regional, and international importance, Addis hardly meets the required urban quality and standard of an international city in its physical fabric as well as in the level of infrastructure and service provisions. As per Addis Ababa City Administration, there is no other alternative site readily available to construct a healthcare facility of such scale in park-like setting. Therefore, retaining the proposed project site is the only alternative that the city administration has.

7.3 Alternative Schedule

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

7.4 Alternative Designs

This option curtails undertaking the project but with different infrastructural designs that encompass buildings, roads, power, water, and sewerage. The presented project design was however achieved by considering the options available that would ensure cost-effectiveness and avoid or reduce environmental and social impacts as much as possible. The project design will ensure the compliance with the national construction quality standards for Hospital building (building material quality, mixing design, soundproof, ventilation, illumination, sanitation, radiation protection, plumbing, parking space and green area). Several design options were explored but they would result in higher building densities and less internal transport/path optimization. This would mean the project would use more energy and resources as compared to the preferred project option. Additionally, the alternative possible designs would also reduce the project's accessibility to patients as well as its targeted balance with nature that will create ambience.

7.5 Utilities

7.5.1 Electricity

The traditional paradigm of energy supply for health facilities worldwide involves access to grid power from national sources and backed up by on-site fuel-based generator power. Diesel generators, which have long been the default on-site power option, have become increasingly expensive to fuel and maintain. As a proportion of total health service costs, fuel costs can be particularly high, especially in the most resource-constrained settings. Therefore, Diesel generators are preferred if and only if the power supply is interrupted. The RMC should also consider using on-site renewable energy sources such as solar energy either as a primary or backup source for minor operations.

7.5.2 Water

Roha Medical Campus will consume 21,600 M^3 of water per year. The two main options that exist for water use are to use a variety of sources that curtail overreliance on municipal supply: boreholes, and rainwater harvesting, whilst the second option curtails using the Addis Ababa Water supply system only.

The former option, which is the best case, has the advantages of ensuring consistent supply while placing minimal pressure on the regional water infrastructure. It also promotes wise use, water recycling and capture strategies that ensure effective usage and conservation of water. The disadvantages of this option are that it will involve the construction of extra facilities and management for the treatment plan and therefore entails an extra cost. The latter option has the main disadvantage of placing the maximum possible pressure on the regional water demand even if water recycling and conservation strategies are employed. RMC should consider borehole construction after five years to minimize the pressure of regional water demand.

7.5.3 Transport

The availability of basic infrastructures in the hospital ensures affordable delivery of basic health services. Transportation infrastructure is vital in accessing healthcare services as well as reducing mortality. The project has two alternatives of using existing asphalt road accesses which are found to north south boundaries of the project site. Since public schools are found to the south boundaries of the project site, use of this road for Ambulance is not recommended due to sound pollution. The main road from Megenegna to Bole will serve as the main access road for RMC.

7.5.4 Materials

Alternatives for materials to be used in the project are using locally procured materials and the second option involves primarily importing materials. The former alternative is preferred option since it will ensure the project contributes to the national economy by creating business opportunities for the suppliers of these materials while conserving the environment by ensuring the most environmentally friendly suppliers are contracted. For a service that demands high quality and unavailable materials, it is preferable to use imported materials.

7.5.5 Sewage Management Alternatives

The proposed project site will be constructed using modern, locally, and internationally accepted materials to achieve public health, safety, security, and environmental aesthetic requirements.

Three locally available wastewater treatment technologies are discussed below:

Alternative one: **Use of stabilization ponds/lagoons**

This refers to the use of a series of ponds/lagoons that allow several biological processes to take place before the water is released to the environment. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used, heavy metals sink, and decomposition processes take place. They are usually a nuisance to the public because of the smell from the lagoons/ponds. This option is highly effective for biological waste generated from healthcare services; it however requires ample space.

Alternative Two: Use of Constructed wetland alternatives

This is one of the powerful tools/methods used in raising the quality of life and health standards of local communities in developing countries. Constructed wetland plants act as filters for toxins. The advantages of the system are the simple technology, low capital and maintenance costs required. They are best for the treatment of secondary effluent. However, they require space and a longer period to function. It is thus not the best alternative for this kind of project because the waste is biological in nature. If properly built, maintained, and operated, constructed wetlands can effectively remove many pollutants associated with municipal, and industrial wastewater, and stormwater. Such systems are especially efficient at removing contaminants such as BOD, suspended solids, nitrogen, phosphorus, hydrocarbons, and even metals. *Constructed wetlands* are finding uses increasingly in communities because they cost less than conventional wastewater treatment plants.

Alternative Three: **Construction of a septic tank connected to Sewer line.**

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. Construction of septic tanks is economically feasible and socially acceptable. As the waste generated from hospital is infectious and the treatment efficiency of septic tank low, this alternative is not valid with respect to Environment. In conclusion, the recommended course of action for the wastewater management from the proposed project is the construction of waste stabilization ponds with previously mentioned advantages. In addition, there is no available sewer line around the project site and this option is the least preferred option of waste management.

7.5.6 Solid Waste Management Alternatives

A lot of solid waste will be generated from the proposed development. An integrated solid waste management system is recommendable.

- **Waste reduction and Minimization**: the proponent will give priority to Reduction at Source of the waste materials. This approach is economical, socially acceptable, and environmentally feasible. This option will demand a solid waste management awareness program in the management and the workers. Notices for proper waste management/handling may be posted at strategic places for the sake of visitors.
- **Recycling and Reuse of the waste**: This will call for a source separation program to be put in place especially in the kitchen section. The recyclables waste such as damaged medical equipment, damaged furniture, old patient beds, wood packaging, and metals can be sold to waste buyers within the city. Non-recyclable contaminated wastes such have fluid bags, vials, used ampules and expiry drugs should be incinerated.
- **Secured sanitary land filling**: This is the most feasible option although it should be the last resort option for the proponent to consider in terms of social, economic, and environmental perspective. Municipal waste from sanitary areas is collected by safety tank and disposed in Addis Ababa city administration sanitary land fill. This option is only used for municipal waste and does not include infectious waste. Infectious waste will be collected and incinerated.

8. GAPS AND/OR ASSUMPTIONS IN ESIA PROCESS

Impact identification and analysis is based on professional judgments and negative impacts ranked as very high, high, and low based on biophysical conditions and subjective judgments by the professional. However, we try to quantify impacts using Matrix Values of likelihood and consequence.

Impact mitigation measures are devised for impacts with medium and above impact significance. Regarding the probability of impact occurrence, some impacts are definite, probable, and improbable. It means that the occurrence probability varies. The assumptions may not always be correct, and the analysis may not be correct.

The mitigation measures for liquid waste management are devised by the assumptions that the effluent from the plant must meet the national effluent discharge quality standards, including the "Quality Standards Classified for general," before discharge to the environment.

9. PROJECT IMPACT IDENTIFICATION AND ANALYSIS

9.1 Impact Analysis

Once all the important impacts have been identified, their potential size and characteristics were predicted systematically by the environmental specialists based on physical, biological, socio-economic, and cultural data to estimate the likely characteristics and parameters of impacts (e.g. magnitude, spatial occurrence etc.). For this analysis a weighted matrix was used, and rating techniques were used to assist in the total impact estimation (as well as assign values). The total impact analysis result is displayed in the table below.

Table 10: Impact Classification Matrix

Character (C)	Negative (-)	Neutral (0)	Positive (+)
Disturbance (D)	Important (3)	Regular (2)	Limited (1)
Significance (S)	High (3)	Medium (2)	Low (1)
Occurrence (O)	Very probable (3)	Probable (2)	Unlikely (1)
Extension (E)	Regional (3)	Local (2)	Specific (1)
Duration (D)	Permanent (3)	medium- term (2)	Short term (1)
Reversibility (R)	Irreversible (3)	Partial (2)	Reversible (1)
Total	**18**	**12**	**6**

The total impact for the identified anticipated impacts was assessed by using below formula:

Total Impact (TI) = C x (D + S + O+ E + D + R) and it is interpreted as follow:

Negative ()	Positive (+)
Severe ≥ - 15	High ≥ 15
Moderate -15 > -9	Medium 15 > 9
Compatible ≤ -9	Low ≤ -9

(Source: Inter-American Development Bank, 2002)

Table 11: Total Impact Analysis of the Proposed Project

Identified Impacts	Character (C)	Significance (S)	Disturbance (D)	Occurrence (O)	Extension (E)	Duration (D)	Reversibility (R)	Total Impact	Remark
Pre-Construction and Construction Phase									
Resettlement Impacts	-	3	2	3	1	1	2	(-12)	Moderate
Impact on air quality	-	2	2	3	2	1	1	(-11)	Moderate
Impact on noise environment	-	2	1	3	2	1	1	(-10)	Moderate
Impact on water resource	-	3	2	3	3	1	1	(-13)	Moderate
Impact on soil quality	-	3	2	3	1	1	1	(-9)	Compatible
Impact on fauna and flora	-	3	2	3	2	3	3	(-16)	Moderate
Increased pressure on utilities	-	1	2	2	2	1	1	(-10)	Moderate
Increased heavy traffic	-	2	2	3	2	1	1	(-11)	Moderate
OHS risks	-	3	1	3	1	2	2	(-13)	Moderate
Income generation	+	3	1	3	3	3	2	(+16)	High
Improving growth of the economy	+	2	1	3	2	1	2	(+11)	Medium
Increase land & utilities value	+	3	3	3	2	3	2	(+16)	High
Market for goods and services	+	3	2	3	3	2	2	(+15)	High
Creation of employment and business opportunities	+	2	2	3	2	1	1	(+11)	Medium
Increase economic activities and revenue	+	3	2	3	2	3	2	(+15)	High
Operational Phase									
Impact on air quality	-	2	2	2	2	2	2	(-12)	Moderate
Impact on noise environment	-	3	2	3	2	3	3	(-16)	Moderate

Impact on water resource	-	3	2	3	3	3	3	(-17)	Moderate
Impact on soil quality	-	3	1	3	2	3	3	(-15)	Moderate
Increased pressure on utilities	-	2	2	3	2	3	3	(-15)	Moderate
Increased heavy traffic	-	2	2	3	2	2	2	(-13)	Moderate
OHS risks	-	3	2	3	1	3	2	(-14)	Moderate
Income generation	+	3	2	3	2	3	2	(+15)	High
Creation of employment and business opportunities	+	3	2	3	2	3	2	(+15)	High
Increase economic activities and revenue	+	2	2	3	3	3	3	(+16)	High
Population increase	+	2	1	3	2	2	1	(+11)	Medium
Increase land and utility value	+	2	2	3	2	3	3	(+13)	High
Access to Healthcare services	+	3	2	3	2	3	3	(+16)	High
Improving growth of economy	+	3	2	3	2	3	3	(+16)	High
Environmental conservation & restoration	+	2	1	3	3	2	3	(+14)	Medium
Decommissioning Phase									
Impact on soil quality	-	1	1	1	1	1	1	(-6)	Compatible
Impact on water resource	-	1	1	1	1	1	1	(-6)	Compatible
Impact on air quality	-	2	1	3	1	1	1	(-9)	Compatible
Impact on noise Environment	-	2	1	3	1	1	1	(-9)	Compatible
Visual impact	-	2	1	2	1	1	1	(-8)	Compatible
Increasing waste generation	-	2	2	2	2	1	1	(-10)	Moderate
OHS risks	-	2	2	2	2	1	1	(-10)	Moderate

Income generation	+	2	1	2	1	1	1	(+8)	Low
Creation of employment	+	2	1	2	1	1	1	(+8)	Low
Increase economic activities	+	2	1	2	2	1	1	(+9)	Low

Where, C=Characteristics, S=Significance, D=Disturbance, O=Occurrence, E =Extension, D*=Duration, R=Reversibility

9.2 Positive Impacts

Implementation of the proposed RMC project without hesitation will result in a wide range of benefits. The major positive impacts associated with the proposed project are:

9.2.1 Income Generation

Even though the number is very difficult to determine, the proposed project is expected to provide direct and indirect employment to a number of workers during the pre-construction and construction phases. These range from unskilled casual workers, semi-skilled and skilled employees. During the operational phase of the proposed project a number of people (health professionals, security guards, cleaners, food handlers and other supportive staff) will be employed. A number of people are expected to benefit directly from the proposed project during its different phases. Some of the anticipated people to benefit from the project activities are Designers, health professionals, supervisors, contractors, local material suppliers, masons, daily labourers, dwellers, merchants, security guards, cleaners, gardeners, drivers, woodworkers, metal workers, plumbers, consultants, etc. Approximately the project will create jobs for over 1000 -7000 people during the different phases.

9.2.2 Improving Growth of the Economy

Various industry studies estimate that Africans currently spend at least USD 3-5 billion every year on global "medical tourism" to places like Thailand, India, and Dubai. Local private hospitals are often overcrowded because of the lack of alternatives. Patients across Africa have shown their willingness to pay for high-quality healthcare. As the emerging middle class and formal employment expand, the need for reliable, affordable healthcare is growing rapidly. This project will create foreign hard currency through medical tourism. In addition, the use of locally available materials during the construction phase of the project, including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc., the project will contribute towards the growth of the economy by contributing to the gross domestic product. The consumption of office and medical equipment's, medicine, machines, chemical and reagents, materials, fuel oil and others will attract taxes, including VAT which will be payable to the government, hence increasing government revenue while the cost of these raw materials will be payable directly to the producers. It is reported that, Ethiopians are estimated to spend up to USD 500M annually on medical tourism for procedures ranging from specialized neurosurgery to common services including IVF and knee replacements. One of the

important contributions of this complex towards the growth economy of the country is saving foreign hard currency from the people going abroad for seeking medical treatment. It will also make an indirect contribution by creating healthy and productive societies.

9.2.3 Creation of Employment and Business Opportunities

Throughout the lifecycle development of the project, different employment and business opportunities will be created for various people in the area.

During the design phase different professionals and consultants (project managers, engineers, architects, building economists, land surveyors, environmentalists, economists, urban planners etc.) will be involved in the planning stages of the project. The activities involved in the erection, installation, maintenance, and management of the proposed hospital project will create employment i.e. employees involved in the production, sale and transportation of the building's materials, construction of the building, maintenance of the building and management (caretaker, domestic staff etc.). Security services, cleaning and waste collection are also some of the services that will benefit indirectly. Other employment opportunities that will be created will include for workers involved in the civil and interior works of construction such as engineers, masons, foremen, bricklayers, machine operators, interior designers, electricians, masons etc. It is expected that 1200 temporary jobs will be created during the construction phase.

It is expected that RMC will create 5000-7000 jobs, 25% of doctors will initially be foreigners and with the aim to have a fully Ethiopian medical staff within five years. 4500 medical staff, registered nurses, administrative and support, and ancillary services will be involved during the operation of the project. The project strives for gender parity particularly for its permanent employees and encourages youth to apply.

Moreover, the people who are involved in these businesses supply and value chains will benefit from the employment creation. Additionally, the project will create business opportunity for the people who are involved in quarrying and brick production, furniture and carpentry, glass production, plant and gardening, tarmac, building contractors, equipment supply and maintenance, electric fittings, plumbing fittings and water infrastructure and food and drinking establishment service.

9.2.4 Increase Economic Activities and Revenue

Income generated from the consultancies, services undertaken, and employees will provide income which will be taxed and generate revenue for the state. In addition, fees levied for the submission of plans to the local authorities and state agencies for

approval and application for services will generate revenue that is used to meet the various governmental goals and objectives.

The construction phase of the project will also increase the economic activities in the region, and revenue for the central government through taxes, through businesses that will be formed to service the increased population. These services include health, food and nutrition, transport, and recreation that the workers taking part in the construction will require from time to time. The project will also increase the economic activities that will be carried in the area through those that will be primarily as a result of the project's internal and ancillary activities; its supply chain; its value chain, and those that will be formed as a result of the service of the project. Foreign people from neighboring countries are also expected to be treated in this hospital which is one of the means of generating revenue for the country.

9.2.5 Access to Health Service

As the main objective of the project is to provide quality healthcare service, it will increase access to quality of health service of the community. Specially, the local community will be more benefited as they will be accessible to it. Pricing will be affordable, and it is planned for more than 10% of patients to be referred by the public sector and treated at public insurance rates.

9.2.6 Environmental Conservation and Restoration

The recycling of the waste to be used as raw materials in the construction process reduces the demand for raw materials and reduces the potential impact on the environment. The proposed project will create a conducive environment for patients, visitors, and workers by making the compound clean green. This will include the establishment and maintenance of flower beds and greenery belts. The project will develop a park with public access; it will rehabilitate the environmental pollution of land and water surrounding the site of the campus.

9.2.7 Increases Land and Utilities Value

The establishment of the project in the area, the goods, and services it will offer will increase the commercial viability of the area and will consequently increase the land other utilities values in the surrounding area due to the potential high returns after development. This will attract more high-income investors into the region as well as more middle-income groups as settlers.

9.2.8 Market for Goods and Services

As a result of different activities that will be undertaken during different phases of the project, there will be many market opportunities for the local communities. The

activities and services will offer a market for these small-scale entrepreneurs involving in catering, pharmacy retailers; vegetables, glass production; plant and gardening; tarmac, asphalt, and bitumen; chemicals; building contractors; electric fittings; plumbing fittings and water infrastructure etc.

9.3 Negative Impacts

9.3.1 Resettlement Impact

Site observations and the Resettlement Action Plan indicated that there were houses with family members located within the project territory. As per Bole Sub-city land use administration, only 8 households are eligible for compensation due to displacement related to the project. However, 136 households are affected by the project including the informal settlers, the below table from the RAP shows the entitlement status and monetary amount paid to PAPs apart from the 98 informal settles, the remaining 38 households either received replacement land or condominium apartments from the Bole Sub-city administration. Public consultation revealed that livelihood decline among affected communities. In addition, project-induced displacement has resulted in socioeconomic decline for the displaced population, as relocated communities face the task of restoring livelihoods amid new—and often less favorable—geographic, environmental, social, and economic conditions.

Table 12: Project Affected Persons Entitlement and compensation

Entitlement Status of households	Amount (ETB) Paid to PAPs by the Project
Informal Settlers (98)	7,493,400.00
2003 EC (20)	4,820,700.00
1997 EC (10)	2,759,980.00
Kebele Household (2)	244,000.00
Court Case HH 1988 (6)	7,715,184.80
Enterprises (8)	560,000.00
Total	23,593,264.80

9.3.2 Impact on Air Quality

Pre-construction Phase: Pre-construction phase will involve site clearance activity for development of access road and the project. Clearance of the site will involve removal of vegetation and land leveling activities. These activities will lead to dust generation. During site preparation and construction, the use of heavy equipment would generate combustive-engine exhausts that would contribute to air

pollution. But these emissions will be limited to the site only and have impact for short duration only during clearance activity.

Construction Phase: Land filling, site establishment, earth works, construction materials processing, construction activities, vehicle movement, etc. may generate fugitive dust particles. Operation of construction vehicles such as dump trucks, cranes, and those involved in waste disposal actions would also produce temporary and localized emissions of other air pollutants. Mobile sources, such as construction and waste transport vehicles, would produce other air pollutants (such as Sulphur oxide), but the quantities would be minimal relative to the number of mobile sources required. Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc. during the construction period. The impact on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period).

Operation Phase: The movement of vehicles in and out, burning/combustion of solid waste will result in emission of outdoor air pollutants such as CO_2, CO, SO_2, Dioxin, Furans and PM. Additionally, office equipment (printer, photocopiers, fax, cleaning equipment and products), medical and diagnostic service, waste handling, ventilation system and personal activities can result emission of chemical and microbial indoor air pollutants. The RMC project site is located close to the main highway which is a relatively high traffic road that gives rise to gaseous emissions and dust. However, the emission from vehicles will not contribute to the deterioration of air quality as compared to high traffic movement in the area.

Air pollution due to incineration of waste: Incineration of laboratory waste if carried out in an inappropriate facility could result in localized pollution of air. The key emissions to the air from operation of the incinerators are odor, 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. 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 design and siting is appropriate and filtered particulate air via efficient particulate air filters.

The major concern of all air pollutants is production of Dioxins and Furans during incineration of selected waste types. Items common to medical waste that may

contain dioxins and furans are blood bags and fluid (IV) bags. Smaller amounts of dioxins are present in bleached paper products including facial tissue, toilet tissue, paper towels, and disposable diapers.

Dioxins have been called the most dangerous chemical known to man. Contrary to popular usage, "dioxin" is not one compound of a single, defined toxicity, but a family of compounds consisting of 17 dioxins and furans, and 13 polychlorinated biphenyls (PCBs). Each has a wide range of toxicities. Dioxins form from the burning of plastics and paper containing polyvinyl chloride. Furans are similar to dioxins, and cause cancer in animals, and are suspected to cause cancer in people. These chemicals form when temperatures are not consistent, when waste is not completely incinerated, and during by-pass events when air pollution control equipment fails.

Dioxins formed during incineration could be released into the air and travel long distances via air currents, contaminating fields and crops. Cattle and other livestock could eat soil contaminated with dioxin, the dioxin enters their tissues, and then people eat the contaminated meat and dairy products. Once dioxins enter the human body it can be absorbed by fat tissue where they stay for years. In the environment, dioxins tend to accumulate in the food chain. Birds are highly susceptible to poisoning because of their eating habits close to the ground. Dioxin is absorbed by algae in surface waters and eaten by fish which then become poisoned by dioxins. If there is inappropriate waste management and incineration, there is a high probability in which the above-mentioned issues could happen since there are water bodies, grazing lands, dwellings, and schools close to the project site.

9.3.3 Impact on Noise Environment

Pre-construction Phase: Pre-construction phase will involve site clearance activity for development of access road and the project. Clearance of site will involve removal of vegetation and land leveling activities by using machinery which lead to generation of noise. The noise generated during this phase will be site specific and for short duration.

Construction Phase: Operation of different machinery and equipment for construction activities, running heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have an impact on existing acoustic environment. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

Operation Phase: The major sources of noise are highway traffic from the main road and landing and departure of aircraft. The source of continuous and disturbing

noise and vibration during the operational phase is from the main road that leads from Megenagna to Bole. Generators and boilers will be installed within the facility and can be additional sources of sound. Also, there will be occasional noise due to ambulances and vehicles movement, patients/their visitors, maintenance machinery. Appropriate measures to mitigate resulting noise to the surrounding and indoors need to be implemented. Measures shall be incorporated in the design and material specification of the hospital and utilities buildings.

9.3.4. Impact on Water Resources

There is one main river called Kersa-Agoza River near the project and two streams outside the project site from north to the east and meet at Kersa-Agoza River. The water streams are heavily polluted by household and commercial waste and solid waste in the form of trash, litter, and garbage often ends up in these surface waters. The water is used to irrigate the grass for animal feed and vegetable crops for commercial purposes even if the water is highly polluted. If RMC does not take appropriate mitigation action, the cumulative water pollution will be significant.

Pre-Construction & Construction Phases: Significant quantity of water will be required for various construction activities of the hospital project particularly from concrete batching plant. Run-off from the construction site may carry a higher quantity of sediments and oil which may pollute the surface water and impact aquatic life. Thus, measures such as sedimentation tanks should be used to minimize the surface water pollution related to construction activity from the batching plant. Improper disposal or accidental spills of used oils from garage can lead to contamination, affecting the water quality and posing serious environmental and health risks.

Operation Phase: Significant quantity of water will be required for various operation activities of the hospital. The main sources of liquid waste from hospital are administration and wards, kitchen, laundry, operating rooms and ICU, laboratories, radiology, hemodialysis, dental departments, toilets, maintenance department, runoff from paved areas etc. Waste water and sewage volumes are expected to escalate.

Generally, the waste generated from hospitals is infectious in nature and it can contaminate surface and ground water if it is not properly managed. Therefore, it must be treated and meet the national general standard prior to disposal.

9.3.5 Impact on Soil Quality

Pre-construction & Construction Phases: Storage of raw material, fuel and construction debris generated from the construction site may contaminate the soil, thus measures should be taken to prevent the soil pollution.

Operation Phase: The liquid and solid waste generated from different activities/service the Hospital during operation may affect the characteristics of the local soil if there is no proper waste management.

9.3.6 Impact on Biodiversity

Natural habitat destruction by development projects (e.g. linear infrastructures, urbanization, commercial centers, etc.) has continued to cause the loss of genetic and species diversity, the fragmentation of natural habitats and the degradation of ecosystem function. The causes of biodiversity loss are entirely related to our ways of survival and halting and stopping or reducing this loss requires a shift in the path of human development. This in turn depends on fundamentally integrating biodiversity concerns into decisions made in every facet of our lives. Therefore, protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.

9.3.6.1 Plant Biodiversity

Pre-construction & Construction Phase: The proposed project will not have significant direct and indirect project-related impacts on the biodiversity of the area in terms of habitat loss and fragmentation, and degradation. The biodiversity in the proposed project area is not a national or local priority site for conservation and sustainable utilization. As it is described above the project site has no significant vegetation cover except scattered trees of Acacia and Eucalyptus species and the project establishment on this site will not have any serious impact on the vegetation, particularly woody species, of the area. However, there will be destruction of the scattered Acacia and Eucalyptus tree species during project construction and appropriate mitigation measures should be designed to reduce this impact.

9.3.6.2 Impact on Bird Species of the Area

Pre-construction & Construction Phase: The bird species found in the project area are closely linked with the wastewater that overflows on the ground due to inappropriate management of wastewater discharge of the city. Therefore, even if the project will not be established on the proposed site and if the wastewater is properly managed, allowed to pass through a canal, then the area will be dry, and the birds will no longer visit that area and migrate to other areas in search of food. Thus, the project establishment will not have a direct significant impact on the birds currently found in the project site. The existence or disappearance of the different bird species found in the project area will not be directly related to the project but

with the wastewater that flows over on the ground, and it is sourced from manmade diversion from the construction of the national stadium. Therefore, the project will not be required to propose mitigation measures for these migratory bird species.

9.3.7 Increased Pressure on Utilities

- **Construction and Operational phases**: Apart from the plant workers, truck drivers that supply raw materials to the plant and those that take away finished products occasionally spend the night in the town. The upward increases in house rent will be exacerbated by the housing needs generated by the location of the plant in the town. Additionally, it leads to an increasing demand for power and potable water supply.
- **Operation Phase:** use of electricity from the national grid will create additional pressure to the city administration. The use of groundwater during its operation will cause water exhaustion and overconsumption of groundwater, causing ecological problems such as decreased water levels, water pollution, seawater intrusion, and deterioration of water quality.

9.3.8 Traffic Impacts

Preconstruction and Construction Phases: In this phase, together with other developments the project will contribute to increasing the amount of heavy traffic plying the roads around it. Heavy trucks do not have the risk of causing accidents due to their limited maneuverability but also place added pressure on the roads and can lead to failure (cracks and potholes). This is failure is however a combination of factors including:

- The total of trips of heavy trucks
- The strength of the roads in context of carrying the heavy loads, and
- The resilience of the roads towards weathering.

Operation phase: There will be increased traffic flow resulting from the transport for staff and patients. This may lead to increased traffic jams and hazards in the area, especially if the roads in the region are not upgraded to cater for this demand. As a result of the project and other projects targeting the area, the area will experience an increase in traffic albeit intermittent, and this will increase the risk of traffic hazards since the probability of occurrence of the hazards will be increased by having more cars on the roads.

9.3.9 Waste Impacts

Operation Phase: There is no statistical data on the amount of solid waste generated at hospitals. There is also no information on the current solid waste generation at the hospitals to be closed. On the other hand, calculation of the amount of solid waste to be generated may not be necessary. In the health campus, there will be around 5,000 daily visitors and outpatients in addition to 300 inpatients at full occupancy situation. Based on previous studies, average solid waste generation from the hospital is assumed to be 0.2 kg/cap-day, which results in total solid waste generation of around 1,060 kg/day. The same situation as the wastewater discharge applies here as well. If properly managed only 25% (250 Kg/day) of the waste will be hazardous infectious waste.

Hazardous Wastes

Hazardous wastes that will be generated during the operational phase will comprise of empty containers of chemicals, used cartridges, fluorescent lamps and oily rags or equipment resulting from maintenance works.

Medical Wastes

Medical waste will include the followings:

- Microbiological laboratory wastes,
- Waste blood samples and objects contaminated with blood,
- Used surgery clothes,
- Dialysis wastes (wastewater and equipment),
- Air filters containing bacteria and viruses,
- Carcasses of subject animals,
- Injector needles, and
- Broken glasses and similar objects.

Medical waste has hazardous and infectious content and causes extremely adverse impacts on workers and public health (e.g. many diseases) as well as soil when it is not handled properly.

Decommission phase: Solid and liquid wastes are accumulated in the camp. Used oils, grease and contaminated packaging materials, liquid wastes from concrete batching plants and other plastic wastes may cause surface and ground water pollution if they are not properly disposed.

Water Quality: Water quality could be affected by activities that cause soil erosion, weathering of newly exposed soils leading to leaching and oxidation that could release chemicals into the water, discharges of waste or sanitary water, presence of dissolved salts from untreated groundwater used to control fugitive dust.

9.3.10 Occupational Health and Safety Risks

Pre-construction and construction phases: Several OSH risks will occur from the activities, processes, materials, and equipment involved in the construction phase of the project. Some of the important risks will be:

Injuries or Injurious substances, materials, and equipment from:

- Moving parts of equipment e.g. saws, tractors, grinders etc.,
- Moving heavy materials,
- Open foundation pits,
- Open flames, heat generating or using processes,
- Working at heights,
- Emission of radiation i.e. EMFs from electrical equipment and bright lights from welding operations, and
- Corrosive chemicals.

Fire from:

- Flammable liquids & gases, chemicals, electricity, welding, open flames, heated materials and heat producing processes such as grinding, burning fuels etc.

Intoxication from:

- Toxic substances, corrosive chemicals, adhesives, waste gases, smoke, dusts and emitted particulate matter.

Operational Phase: A diverse number of health and safety concerns will be associated with the hospital environment. These are related with day-to-day operations including maintenance works like management of waste, preparation of drugs, and operation of machinery / equipment and handling patients.

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:

- Inadequate lighting and ventilation in workplaces,
- Lack of safe access particularly for disabled employees,

- Lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and handling of samples,
- Misuse of equipment and materials for functions they are not designed,
- Lack of safety signage in specific areas,
- Electrical hazard,
- Eye hazards such as splashes,
- Chemical hazards (acids, alkalis, expired drugs, oxidizing and reactive chemicals), and
- Biological hazards (samples of blood or other body fluids with potential to cause diseases).

The most obvious potential concern of operating of RMC involves handling of infectious organisms. The proposed facility would have attributes of most laboratories in that it would have identified physical, electrical, and chemical hazards.

RMC laboratories and pharmacy stores will have highly infectious agents, diagnosis process or culture. So, there would be a possibility of infectious agents escaping from Containment. Potential means for infectious agents to leave the laboratory containment and possibly cause human health impacts would include five pathways. These are direct transmission, vector-borne transmission, vehicle-borne transmission, airborne transmission, and water-borne transmission.

Bio bank infectious agents would be escaped from facilities, it may have fewer potential risks resulting life-threatening for personnel working in bio bank and community. The agents that may cause less severe human disease, present ales serious hazard to workers, and may present a risk of spreading to the community.

The common routes of exposure to infectious agents are inhalation, inoculation, ingestion and contamination of skin and mucous membranes. Inhalation hazards may arise during work practices that can generate aerosols. These include the following: centrifugation, mixing (e.g., blending, vortexing, and sonication), pouring/decanting and spilling/splashing of culture fluids. Inoculation hazards include needle sticks and lacerations from sharp objects. Ingestion hazards include the following: splashes to the mouth, placing contaminated articles/fingers in mouth, consumption of food in the laboratory, and mouth pipetting. Contamination of skin and mucous membranes can occur via splashes or contact with contaminated fomites.

Decommission Phase: Removal of civil structure of the camp and other structures will result in occupational health safety impacts.

10. IMPACT MITIGATION MEASURES

This section discusses the possible mitigation measures of the major identified negative impacts associated with implementation of the project in the specific area to make sure that the residual impacts are compliant with regional and national standards to safeguard the health and surrounding environment.

10.1 Pre-construction and Construction Phases

10.1.1 Mitigation Measures for Resettlement Impacts

- The dwellers should be consulted about the resettlement process.
- RAP and livelihood restoration should be prepared for eight households.
- The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 129 households. The project will make livelihood assistance payment to informal settlers, provide skill trainings and hire people from the locality during construction and operation of the medical campus.
- Alternative resettlement sites should be immediately provided for displaced people, particularly for eight households.
- Displaced people should be advised as to how to sustain livelihood activities: Specially the family to be resettled has shown interest towards livestock breeding

10.1.2 Mitigation Measures for Air Pollution

- Avoid unnecessary excessive vehicle movement and have proper schedule plan.
- Limit vehicle speeds on non-surfaced roads.
- Maintain equipment and vehicles in good working order to avoid excessive emissions.
- Excavated surface should be sprayed with water from time to time to reduce dust emission during operations.
- Safety officers at the facility should have authority to inspect and restrain contractors from generating excessive dust within healthcare buildings.
- Using rubber curtains/other material to limit dust during screening should be considered.
- Spray roads, material stockpiles and screening areas with water if dust becomes problematic,
- Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility,
- Workers will be provided with PPE and the use of PPE shall be enforced,

- Dumping of material from the heavy vehicles will be done from an appropriate height for less dust generation.
- The heavy vehicles are the main sources for release of carbon monoxide and nitric oxide, so to avoid the increase of pollutant in the site; the vehicles will be maintained properly and regularly.
- Provision of face mask to workers to minimize inhalation of dust particles.
- Low sulphur diesel should be used for running construction equipment and vehicles.
- Vehicles carrying construction material and debris should be covered with tarpaulin cover,
- Raw materials excavated soil and other debris should be stored and transported under covered nets.
- Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising dust.
- Enclosing the structures under construction with dust proof nets.
- Regular maintenance and services of machines and engines as per the Manual.
- Educate and raise awareness of construction workers on emission reduction techniques and give occupational health and safety training for all workers.

10.1.3 Mitigation Measures for Noise Pollution

- Routine timely maintenance of equipment as per the Manual;
- Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents;
- Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided;
- Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above;
- There should not be construction activities to be undertaken during night hours to prevent any disturbance to nearby residents;
- Acoustic enclosures should be provided with DG (Diesel generator) sets and machinery to control the noise levels at construction site;
- Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc.;
- Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment;

- Placing signs around the site to notify people about the noisy conditions;
- Regular maintenance of equipment to ensure they remain efficient and effective,
- Construction works should be carried out only during the specified period/schedule;
- There should not be unnecessary horning of the involved machinery;
- Provision of billboards at the construction site gates notifying of the construction activity and timings;
- Educate and raise awareness of construction workers on noise reduction techniques.

10.1.4 Mitigation Measures for Water Source Pollution

- Temporary storm water drains and rainwater harvesting ponds should be constructed so as to store rainwater for construction activities;
- Pollutant retention during runoff like Filter strips *are* vegetated with grasses and groundcovers that filter and reduce the velocity of water and improve treatment;
- Water for curing can be saved by carrying out curing in early morning or late evening and covering structures with gunny bag so the moisture can be restored for longer time;
- Regular inspections at site to monitor leakages in water storage tanks;
- Creating awareness among construction workers about the importance of water conservation;
- Prevent piling up of excavated soil, raw material, and construction debris at site by proper management and disposal;
- Minimize run-off by using sprays for curing,
- Construction of storm water drains along with sedimentation tanks with sandbags as partition to retain the soil particles from storm water drain,
- Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies;
- Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies, and;
- Construction vehicles and machinery should be regularly serviced and checked for any leakage of oil;

10.1.5 Mitigation Measures for Soil Contamination

- The topsoil must be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process;
- Topsoil shall be stored separately from subsoil and other overburden material;
- Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation,
- Avoid spilling leaking of chemical;
- Soil conservation measures must be applied to the stockpiles to prevent erosion. Prepare trenches around the borrow area to prevent runoff entering into a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages;
- Where possible ensure low work surface gradients so that run-off flows at a controlled rate so as to minimize channeling and soil erosion during high rainfall,
- Fuel storage area should be paved;
- Construction debris should be stored under covered sheds and paved surface and should be disposed of regularly to designated sites;
- Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the camp site;
- Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, and;
- There must be Proper solid waste management practice (Sorting, collection, transportation, reuse, recycle, recovery and disposal).

10.1.6 Mitigation Measures for Biodiversity

The following mitigation measures shall be implemented to reduce the expected fauna and flora lost.

- The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project;
- Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development;

- Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible;
- Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan;
- Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens;
- Clearing vegetation only in construction areas and demarcating areas where no clearing will happen;
- Restrict human movement and fence the wetland area where animals such as birds are found as much as possible to protect the bird species.

10.1.7 Mitigation Measures for Increased Pressure on Utilities

The following mitigation measures shall be taken so as to reduce pressure on utilities in the area as due to the project activities.

- Employing water conservation techniques and only using the required amounts of water to prevent wastage;
- RMC will have its own water supply borehole in addition to the municipal supply;
- Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible;
- Using machines with power saving technologies i.e. high efficiency equipment,
- Providing proper sanitary facilities for construction workers;
- Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.

10.1.8 Mitigation Measures for High Traffic Impact

- Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site;
- Ensuring all drivers for the project comply to speed regulations;
- Making sure the construction does not occupy the road reserves and complying with traffic and land demarcation obligations;
- Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.

10.1.9 Mitigation Measures for HSE Risks

- Employing an OSH plan that will outline all OSH risks and provide a strategy for their management.

- Regular provision of health and safety training for all workers.
- Optimization of working schedule and work to minimize several material vehicle mobilizations trips.
- Regular inspection and scheduled maintenance of all equipment
- Ensuring all potential hazards such as movable machine parts are labeled.
- Raising awareness and educating workers on the risks from equipment and ensuring they receive adequate training in the use of the equipment.
- Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out.
- Placing visible and readable signs around where there are risks.
- Ensuring there is security in and around the site to control the movement of people.
- Providing safe and secure storage for equipment and materials on the site.
- Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.
- Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.
- Labeling chemicals and material according to the risks they possess.
- Creating safe and adequate fire and emergency assembly points and making sure they are well labeled.
- Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbors.
- Provision of first aid kit and having Move with nearby health center.

10.2 Operational Phase Impact Mitigation Measures

10.2.1 Mitigation Measures for Air pollution

- Air pollution both indoor and outdoor, monitoring should be carried out quarterly to check the air pollution level,
- Incinerator filters would be tested annually and replaced as necessary,
- Waste segregation for wastes with polychlorinated dibenzo-dioxins and polychlorinated dibenzo-furans PCDD/Fs would be done and these wastes would never be incinerated,
- Wastes would be introduced into the incinerator only after the optimum temperature is reached in the final combustion chamber,

- The waste charging system would be interlocked with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits.
- A flue gas treatment system would be used for control of acid gases, particulate matter, and other air pollutants.

Regarding air pollution from incinerators**,** priority mitigation measures should focus on sitting and selecting the waste types to be incinerated and employ incinerator design as a last resort. The following mitigation measures could help avoid and/or minimize the impacts:

Proper waste reduction and segregation

- Waste reduction reduces the volume and toxicity of materials for incineration (or other treatment option), thus decreasing incinerator use, emissions and the resulting health and environmental risks. For example, incineration might be reserved for only the most dangerous types of waste, e.g., contaminated sharps.
- Onsite Waste segregation to separate plastic and paper wastes containing PVC. These wastes include blood bags and fluid (IV) bags, mercury containing dental wastes and bleached paper products including facial tissue, toilet tissue, paper towels, and disposable diapers.
- These toxic pollutant producing wastes should be rolled out from the incineration system recycled back to manufacturing of the same or different product.

Proper Siting

- The location of an incinerator can significantly affect dispersion of the plume from the chimney, which in turn affects ambient concentrations, deposition and exposures to workers and the community. In addition to addressing the physical factors affecting dispersion, sitting must also address issues of permissions/ownership, access, convenience, etc.

In order to minimize the health and environmental impacts of air pollutants the following should be considered for siting the incinerator:

- Minimizing ambient air concentrations and deposition of pollutants to soils, foods, and other surfaces, e.g.,
  - Open fields or hilltops without trees or tall vegetation are preferable. Siting within forested (near to the river) areas is not advisable as dispersion will be significantly impaired.

- Valleys, areas near ridges, wooded areas should be avoided as these tend to channel winds and/or plumes tend to impinge on elevated surfaces or downwash under some conditions.

- Minimizing the number of people potentially exposed, e.g.,
  - Areas near the incinerator should not be populated, e.g., containing housing, public schools, main road or other areas where people congregate.
  - Areas near the incinerators should not be used for agriculture purposes, e.g., leafy crops, grasses or grains for animals.

Appropriate sizes for buffer surrounding incinerators are based on dispersion modeling. If nighttime operation may occur, a 500 to 750 m buffer surrounding the facility is advisable to achieve dilution ratios above 1000. During the day, a 250 m buffer should obtain the same dilution ratio. These distances are based on ideal conditions, e.g., relatively flat and unobstructed terrain.

Proper Incinerator Design

- Proper design and operation of incinerators should achieve desired temperatures, residence times, and other conditions necessary to destroy pathogens, minimize emissions, avoid clinker formation and slagging of the ash (in the primary chamber), avoid refractory damage destruction, and minimize fuel consumption. Good combustion practice (GCP) elements also should be followed to control dioxin and furan emissions.

Note: Based on the amount and type of waste to be produced by the hospital, it is advisable to use Double-chamber incinerator design.

10.2.2 Mitigation Measures for Noise Pollution

- The use of continuous insulation (CI) in building enclosures from the sources,
- exterior walls and roofing system designs to decrease the impact of noise pollution from aircraft traffic.
- Wall and roof-ceiling assemblies must have an Outdoor-Indoor Transmission Class (OITC) rating of 40 or greater or an Sound Transmission Class (STC) rating of 50 or greater, and fenestration that is part of the building must have an OITC or STC rating of 30 or greater for buildings within 1000 ft. (300 m) of expressways and buildings within 5 mi (8 km) or less of airports serving more than 10,000 commercial jets per year.
- Isolation of noise sources such as boilers, generators, and the provision of ear protectors to employees working in areas where noise levels exceed noise limits.
- Conducting all noisy activities during the day when permissible levels are higher.

- Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment.
- Using equipment with low noise ratings or noise reduction technologies.
- Regular maintenance of machines and equipment and generators as per the manual.

10.2.3 Mitigation Measures for Water Source Pollution

- Treatment of effluents (all medical liquid wastes) and sewage prior disposal into the environment,
- Ensure that water exiting through the sink drains is diverted to a retention tank where it would be disinfected before being sent to the sewer system.
- Sludge is transported to Kotebe treatment plant using vacuum trucks, after permit for disposal is obtained.
- Construction of gabion wall and subsequent plantation to the main Kersa-Agoza river to control the erosion and scouring of land in flood,
- Water quality testing at distribution point to monitor and detect contamination through any leakage,
- Proper management of solid waste should be done to prevent any contact between the waste and storm water,
- Incinerated ash should be properly disposed in secured areas,
- Storm water drains should be separate from effluent drains,
- Regular monitoring of the treatment plant as per the technical requirement,
- Storm water system should be inspected & cleaned before heavy rain every year,
- Adoption of best management practices to prevent water wastage and minimize water loss.
- Installation of leakage detection system to minimize the water loss from the treatment plant, and
- Regular monitoring of treated wastewater every six months to check the treatment efficiency and quality of treated water.

10.2.4 Mitigation Measures for Soil Contamination

To reduce the impact of soil contamination, the following measures should be implemented.

- Treatment of the effluents and sewage and ensuring proper disposal,
- Ensure that water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system,

- Proper management of solid and liquid wastes as recommended in the document,
- Chemical and biomedical waste generated should be managed as per guidelines of Ethiopia government.

10.2.5 Mitigation Measures for Increased Pressure on Utilities

- Employing water conservation techniques and only using the required amounts of water to prevent waste,
- Use of deep borehole as alternative source of water,
- Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible,
- Using of solar power for minor operations,
- Using only the required amounts of water during normal operations,
- Placing signs of conservation of water and electricity.
- Using machines and equipment with a high level of power efficiency and servicing them as often as required to maintain their efficiency and
- Awareness creation about water and power saving techniques for the workers.

10.2.6 Mitigation Measures for Increased Traffic Impact

- Placing visible and clear signs to control the movement of vehicles in and out of the site.
- Having alternative entrances and exits for emergency operations and staffs rather than using the main gate,
- Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site,
- Ensuring all drivers for the project comply to traffic regulations,
- Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.

10.2.7 Mitigation Measures for OHS and Public Health Risks

To reduce the burden of occupational health and safety, the following measures should be implemented.

- Employing and EHS/OSH plan,
- Laboratory workers would be trained in equipment operating and handling techniques during operation,
- HEPA filters at the RMC facility would be tested annually and replaced as necessary,

- Training would be provided in sample and waste handling, transportation, and storage.
- All material would be sterilized by autoclave or chemical disinfection.
- Provide continuous occupational health and safety training to all workers.
- Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear,
- Placing readable signs and symbols as required,
- Providing firefighting equipment and maintaining them to ensure they are fully functional,
- Effective vaccines or therapeutic measures would be available for all risk groups,
- Personnel working in biobank Centre would receive specific training in handling pathogenic and potentially lethal agents and would be supervised by competent staff in handling infectious agents and associated procedures,
- Ampoules containing infectious materials would never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal,
- Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use of maps on elevators, staircases etc.
- Providing adequate storage for hazardous and flammable substances and controlling access to them.
- Monitoring the movement, handling, and management of healthcare wastes to ensure they are safely managed and do not present any EHS risks.
- Establishment of Infection prevention committee.
- Implementation infection prevention and patient safety standard,
- Establishment of Proper barriers or isolation for the protection of radiation from X-ray MRI, Ultrasound machines etc.
- Regular checkup of X-ray, MRI, Ultrasound machines etc.

10.3 Decommission phase Impact Mitigation Measures

10.3.1 Waste Generation Impact Mitigation Measures

Much of the solid material could be recycled and sold as scrap or used in road building or bank Re-stabilization projects; the remaining nonhazardous waste would be sent to permit disposal facilities. Industrial wastes (lubricating oils, hydraulic fluids, battery electrolytes, fluids, coolants, solvents, purging solutions, and cleaning agents) would be treated similarly to maintenance wastes during operation (put in containers, characterized, and labeled, possibly stored briefly, and

transported by a licensed hauler to an appropriate permitted off-site disposal facility). Impacts could result if these wastes were not properly handled and were released into the environment.

10.3.2 Occupational Health and Safety Risks Mitigation Measures

- Training of workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two person lifts are necessary,
- Planning work site layout to minimize the need for manual transfer of heavy loads.
- Selecting tools and designing workstations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations,
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks,
- Conducting sawing, cutting, grinding, sanding, chipping, or chiseling with proper guards and anchoring as applicable, and
- Maintaining clear traffic ways to avoid driving heavy equipment over loose scrap. Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as handrails and toe boards to prevent materials from being dislodged. Evacuating work areas during blasting operations and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures.

11. PROJECT RELATED RISKS

11.1 Risks Associated with Handling and Storage of Infectious Materials

Bio bank centers are expected to hand and store infectious agents, during specimens' collection, handling, transportation and storage, there will be a risk of exposure for the specimen. If the specimen has an infectious agent, it may cause human disease, present a hazard to workers, and may present a risk of spreading to the community.

Mitigation strategies: Specimen containers should be robust and would not leak when the cap or stopper is correctly applied. No material would remain on the outside of the container. Containers would be correctly labeled to facilitate identification. Specimen request or specification forms would not be wrapped around the containers but placed in separate, preferably waterproof envelopes.

To avoid accidental leakage or spillage, secondary containers, such as boxes, will be used, fitted with racks so that the specimen containers remain upright. The secondary containers may be of metal or plastic, should be auto clavable or resistant to the action of chemical disinfectants, and the seal would preferably have a gasket. They should be regularly decontaminated. Laboratories that receive large numbers of specimens should designate a room or area for this purpose.

Storage of ampoules containing infectious materials: Ampoules containing infectious materials would never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal. If very low temperatures are required, ampoules would be stored only in the gaseous phase above the liquid nitrogen. Otherwise, infectious materials would be stored in mechanical deep-freeze cabinets or on dry ice. Laboratory workers would wear eye and hand protection when removing ampoules from cold storage. The outer surfaces of ampoules stored in these ways would be disinfected when the ampoules are removed from storage.

11.2 Risks Related to Improper Use of Equipment

Laboratory workers are at risk for repetitive use of laboratory equipment such as X-ray machine, MRI machines, electrotherapy equipment, ultrasound, and laser treatment machines, pipetting, centrifuge, BSC homogenizers, shakers, blenders, sonicators, freezers, autoclave and other equipment. Certain items of equipment may create hazards including life treating diseases such as cancer.

Mitigation strategies:

- Operation of equipment according to the manufacturer's instructions,
- Operation of equipment according to the manufacturer's instructions,
- Operation of equipment according to the manufacturer's instructions.

11.3 Risk of Fire Outbreak

Different combustible materials such as flammable liquids, solid materials, and loose electrical connections etc. could cause serious fire incidents in RMC complex facility laboratories, pharmacy store, bio bank Centre, central warehouse. Flammable liquids are volatile in nature and liberate vapors at ambient or elevated temperatures that can ignite in the presence of sparks, hot plates, naked flames or other hot surfaces.

Mitigation measures: All staff will have training in fire control through regular firefighting drills.

- Fire extinguishers would be available in accessible area near to fire risk area and ensure that all fire-fighting equipment is regularly maintained and serviced.,
- Fire emergency telephone numbers would be displayed in communal areas.,
- Automatic fire alarm system for the entire laboratory will be installed,
- Water flow alarms would be connected to the facilities fire alarm monitoring station,
- Fire hazard signs such as 'No Smoking' signs will be provided. Directions to exit in case of any fire incidence and emergency contact numbers will be provided. The contact/emergency numbers will be displayed within the laboratory.

11.4 Chemical Hazard

Handling of chemicals is a typical routine activity for many lab workers, but the risks and hazards remain the same. Many organic and inorganic chemicals are corrosive to the skin and to the eyes and can be toxic.

Mitigation strategies: Full safety wear should be provided to any members of the team handling chemicals, and provisions to treat any exposure or clean spillages should be present in the laboratory.

11.5 Risks associated with Waste Transportation

Medical waste may contain potential pathological organisms which if improperly managed may be a risk to healthcare staff and the public during transportation. Therefore, waste generated from healthcare facilities has become a focal point due

to its several consequences as a threat to the health of patients, healthcare staff and outside the medical establishment. Studies have shown personnel dealing with medical waste are by the biological, physical and chemical hazards such as needle sticks, cuts, falls, strains, sprains, burns, eye and back injuries during collection, handling and transportation. Several injuries such as hand cuts due to handling broken glass occurred due to exposure to medical wastes inside and outside hospital premises. During the transportation of waste, there might be releasing of waste to environment.

Mitigation Strategies: On-site transportation would take place whenever possible during less busy times (i.e. in the evenings or very early morning).

- All waste bags would be in-place and intact at the end of transportation.
- Carts, trolleys, or containers used for the transportation of infectious waste would not be used for the transportation of any other material; and would be used for transporting safety boxes and bins.
- A trolley, bin, or wheelbarrow will be used for transporting safety boxes and bins,
- Waste that has the potential to leak will be double bagged.
- Waste bags would be placed in containers (e.g. cardboard boxes or wheeled, rigid, lidded plastic or galvanized bins), before being placed directly into the transportation vehicle,
- The collected waste will not be left even temporarily anywhere other than at the designated storage room.

11.6 Risks associated with Covid-19

COVID-19 is a serious global health problem costing the lives of many people, including healthcare workers (HCWs). Working in the ICU department, long working hours, inadequate supply of PPE, lack of access to alcohol-based hand rub at the point of care, providing care within one meter of a COVID-19 patient and direct contact with an environment in which a COVID-19 patient received care were risk factors for COVID-19 infection.

Mitigation strategies: Proper use and adequate supply of PPE and the implementation of basic infection prevention and control measures with frequent protocol revision and strict supervision are essential to minimize exposure risk of HCWs to COVID-19 infection.

12. ENVIRONMENTAL AND SOCIAL IMPACTS MANAGEMENT PLAN

This ESMP is developed with an aim to outlines actions necessary to prevent, mitigate and control possible negative environmental and social impacts during the different phases of the project and to analyze steps/measures that could be taken in respect to this. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The purpose of this management plan is not only to ensure that the project complies with the relevant legislation and guidelines but also that it avoids (where possible), reduces, or minimizes its risks. Together with the actions proposed in ESMP of this report this management plan will synergistically enable the project to set environmental performance objectives, goals and targets and achieve them. The ESMP is proactive in nature and will be upgraded if new facilities or modification of existing facilities, with environmental concerns, come up at a later stage. A comprehensive and effective ESMP must be prepared and implemented to safe-guard environmental concerns. Therefore, ESMP is a vital output of an environmental and social impact assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined below will address the identified potential negative impacts and mitigation measures of the proposed project based.

Impact Description	Mitigation Measures	Indicators	Responsible Body	Time	Update	Cost (in Birr)/year
Displacement	• The dwellers should be consulted about the resettlement process. • The RAP and LRP developed by RMC for 136 project affected households should be implemented while observing the Ethiopian law, and international norms. • The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 136 households. The project will make livelihood assistance payments to informal settlers, provide skill training, and hire people from the locality during construction and operation of the medical campus. • Alternative resettlement sites should be immediately provided for displaced people, particularly for eight households. • Displaced people should be advised as to how to sustain livelihood activities.	• Public consultation • Preparation of RAP	• Owner of project (Roha Medical Campus) • AA Environmental Protection Office • Bole sub-city land administration office	Before construction of the project	First Consultation made on Jan 2021. RAP and LRP developed in April 2021. All Compensation payments to 38 Households and Livelihood improvement payments to 98 Households made. Alternative resettlement location provided to 38 Households as per the RAP.	28,000,000 (one-off)
Air Pollution	• Avoid unnecessary excessive vehicle movement and have proper schedule plan, • Limit vehicle speeds on non-surfaced roads, • Maintain equipment and vehicles in good working order to avoid excessive emissions. • Excavated surface should be sprayed with water from time to time to reduce dust emission during operations. • Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility, • Workers will be provided with PPE and the use of PPE shall be enforced, • Dumping of material from the heavy vehicles will be done from an appropriate height for less dust generation. • The heavy vehicles are the main sources for release of carbon monoxide and nitric oxide, so to avoid the increase of pollutant in the site; the vehicles will be	• Buffer zone marked and respected. • Complaint community • Formation of dust	• Roha Medical Campus • Contractor	During construction	Experienced Grade one Contractor (Elmi Olindo Contractors Plc) appointed. Contractor provided with the ESIA to implement air pollution measures in the ESMP. No complaint forwarded	400,000

	maintained properly and regularly. • Provision of face mask to workers to minimize inhalation of dust particles. • Vehicles carrying construction material and debris should be covered with tarpaulin cover, • Raw materials excavated soil and other debris should be stored and transported under covered nets. • Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising dust. • Enclosing the structures under construction with dust proof nets. • Regular maintenance and services of machines and engines as per the Manual.					
Noise Pollution	• Routine timely maintenance of equipment as per the Manual. • Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents. • Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided, • Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above, • Acoustic enclosures should be provided with DG (Diesel generator) sets and machinery to control the noise levels at construction site, • Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc. • Provision of PPEs such as ear plugs for employees working in	• Complaint • Physical observation	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement noise pollution measures in the ESMP. Regular inspection performed by contractor and project owner. No complaint forwarded	100,000

	noisy conditions or with noisy equipment, • Construction works should be carried out only during the specified period/schedule,					
Water resource Pollution	• Regular inspections at site to monitor leakages in water storage tanks, • Prevent piling up of excavated soil, raw material and construction debris at site by proper management and disposal. • Minimize run-off by using sprays for curing. • Construction of storm water drains along with sedimentation tanks with sandbags as partition to retain the soil particles from storm water drain, • Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies. • Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies, and • Construction vehicles and machinery should be regularly serviced and checked for any leakage of oil.	• Laboratory test, if necessary, site observation	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement noise pollution measures in the ESMP. Inspections in the form of river water tests performed and regular inspection performed by contractor and project owner.	385,000.00
Soil Impacts	• Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation, • Avoid spilling leaking of chemical. • Soil conservation measures must be applied to the stockpiles to prevent erosion. Prepare trenches around the borrow area to prevent runoff entering into a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic	• Site observation, Presence of topsoil stockpile	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement soil pollution measures in the ESMP. Regular inspection performed by contractor and project owner.	200,000

	spillages, • Fuel storage area should be paved • Construction debris should be stored under covered sheds and paved surfaces and should be disposed of regularly to designated sites. • Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the site • Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, and • There must be Proper solid waste management practice (Sorting, collection, transportation, reuse, recycle, recovery and disposal).					
Biodiversity Impacts	• The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project, • Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. • Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible. • Rehabilitation strategies	• Presence of Rehabilitation strategies,	• Contractor, RMC	During construction	12,000 indigenous trees native to the area planted on project site by project owner. 8 trees transplanted to make way for construction.	10,260,000

	following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan. • Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. • Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.					
Utilities Impacts	• Employing water conservation techniques and only using the required amounts of water to prevent waste, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Providing proper sanitary facilities for construction workers, • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency,	• Presence of borehole, presence of maintenance plan	• Contractor, RMC	During construction	Contractor provided with the ESIA to implement utilities impact measures in the ESMP. Regular inspection performed by contractor and project owner.	600,000.00
Traffic Impact	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations, • Making sure the construction does not occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	• Number of accidents	• Contractor, RMC	Construction	Contractor provided with the ESIA to implement traffic impact measures in the ESMP. Regular inspection performed by contractor and project owner. Traffic circulation plan devised, and Signs placed over the construction site. No accident occurred	500,000
EHS Risks	• Employing an ESH plan that will outline all ESH risks and provide a strategy for their management.	• Number of accidents	• Contractor, RMC	Construction	Contractor provided with the ESIA to avoid	3,500,000

	• Regular provision of health and safety training for all workers. • Optimization of working schedule and work to minimize several material vehicle mobilizations trips. • Regular inspection and scheduled maintenance of all equipment • Ensuring all potential hazards such as movable machine parts are labeled. • Raising awareness and educating workers on the risks from equipment and ensuring they receive adequate training in the use of the equipment. • Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials on the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. • Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. • Labeling chemicals and material according to the risks they possess. • Creating safe and adequate fire and emergency assembly points and making sure they are well labeled. • Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of	, presence of PPE, provision of training			EHS risks, and implement measures in the ESMP. Regular inspection performed by contractor and project owner. ESH plan in place by the contractor and project owner. PPE present. Trainings provided regularly.	

	emergency, by conducting regular drills and involving the neighbors. • Provision of first aid kit					
Air pollution	• Air pollution both indoor and outdoor, monitoring should be carried out quarterly to check the air pollution level, • Incinerator filters would be tested annually and replaced as necessary. • Waste segregation for wastes with polychlorinated dibenzo-dioxins and polychlorinated dibenzo-furans PCDD/Fs would be done and these wastes would never be incinerated • Wastes would be introduced into the incinerator only after the optimum temperature is reached in the final combustion chamber • The waste charging system would be interlocked with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits. • A flue gas treatment system would be used for control of acid gases, particulate matter, and other air pollutants. • Proper waste reduction and segregation should be employed • Proper Siting of incinerator as per the recommendation • Proper Incinerator Design as per the recommendations	• Report, physical observation	• RMC	During incinerator operation,		11,970,000 includes CAPEX for incinerator filtration system
Noise Pollution	• The use of continuous insulation (CI) in building enclosures from the sources, • exterior walls and roofing system designs to decrease the impact of noise pollution from aircraft traffic. • Wall and roof-ceiling assemblies must have an Outdoor-Indoor Transmission Class (OITC) rating of 40 or greater or an Sound Transmission Class (STC) rating of 50 or greater, and fenestration that is part of the building must have an OITC or STC rating of 30	• Report, physical observation, number of compliant	• RMC	Operation		600,000

	or greater for buildings within 1000 ft. (300 m) of expressways and buildings within 5 mi (8 km) or less of airports serving more than 10,000 commercial jets per year. • Isolation of noise sources such as boilers, generator and the provision of ear protectors to employees working in areas where noise levels exceed noise limits, • Conducting all noisy activities during the day when permissible levels are higher. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Using equipment with low noise ratings or noise reduction technologies. • Regular maintenance of machines and equipment and generators as per the manual.					
Water Resource Impact	• Treatment of effluents (all medical liquid wastes) and sewage prior disposal into the environment, • Ensure that water exiting through the sink drains will be diverted to a retention tank where it would be disinfected before being sent to the sewer system. • Sludge is transported to Kotebe treatment plant using vacuum trucks, • Water quality testing at distribution point to monitor and detect contamination through any leakage, • Proper management of solid waste should be done to prevent any contact between the waste and storm water, • Incinerated ash should be properly disposed in secured areas, • Storm water drains should be separate from effluent drains, • Regular monitoring of the treatment plant as per the	• Laboratory test if required, report and physical observation	• RMC	Operation		35,000,000

	technical requirement, • Storm water system should be inspected & cleaned before heavy rain every year, • Adoption of best management practices to prevent water wastage and minimize water loss. • Installation of leakage detection system to minimize the water loss from the treatment plant, and • Regular monitoring of treated wastewater every six month to check the treatment efficiency and quality of treated water					
Soil Impacts	• Treatment of the effluents and sewage and ensuring proper disposal, • Ensure that water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system, • Proper management of solid and liquid wastes as recommended in the document, • Chemical and biomedical waste generated should be managed as per guidelines of Ethiopia government.	• Report, physical observation	• RMC	Operation		17,000,000
Utilities Impact	• Employing water conservation techniques and only using the required amounts of water to prevent waste, • Use of deep borehole as alternative source of water, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Using of solar power for minor operations, • Using only the required amounts of water during normal operations, • Placing signs of conservation of water and electricity. • Using machines and equipment with a high level of power efficiency and servicing them as often as required to maintain their efficiency and	• Report	• RMC	Operation phase		8,550,000.00

	• Awareness creation about water and power saving techniques for the workers.					
Traffic Impact	• Placing visible and clear signs to control the movement of vehicles in and out of the site. • Having alternative entrances and exits for emergency operations and staffs rather than using the main gate, • Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site • Ensuring all drivers for the project comply to traffic regulations • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use	• Report, physical observation	• RMC	operation		600,000
OHS and Public Health Impacts	• Employing and EHS/OSH plan • Laboratory workers would be trained in equipment operating and handling techniques during operation, • HEPA filters at the RMC facility would be tested annually and replaced as necessary, • Training would be provided in sample and waste handling, transportation, and storage. • All material would be sterilized by autoclave or chemical disinfection. • Provide continuous occupational health and safety training to all workers • Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear • Placing readable signs and symbols as required • Providing firefighting equipment and maintaining them to ensure they are fully functional • Effective vaccines or therapeutic measures would be available for	• Report, physical observation	• RMC	Operation		No Major costs to reflect, it is included in the operations cost of the business model.

	all risk groups • Personnel working in biobank Centre would receive specific training in handling pathogenic and potentially lethal agents and would be supervised by competent staff in handling infectious agents and associated procedures • Ampoules containing infectious materials would never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal • Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use of maps on elevators, staircases etc. • Providing adequate storage for hazardous and flammable substances and controlling access to them. • Monitoring the movement, handling and management of healthcare wastes to ensure they are safely managed and do not present any EHS risks. • Establishment of Infection prevention committee. • Implementation infection prevention and patient safety standard • Establishment of Proper barriers or isolation for the protection of radiation from X-ray MRI, Ultrasound machines etc. • Regular checkup of X-ray, MRI, Ultrasound machines etc.					
Water resource impacts	• Nonhazardous waste would be sent to permitted disposal facilities. • Spill response plan. • Green belts with properly selected plant species • Develop decommissioning plan for impact mitigation	• Physical observation	• RMC, contractor	Decommission		300,000 Cost for developing a standalone decommissioning plan
Waste Generation impacts	• nonhazardous waste would be sent to permitted disposal facilities.	• Physical observation	• RMC, contractor	Decommission		

	• leveling of the project site • restoration of the project site • Develop decommissioning plan for impact mitigation					
Occupational Health and Safety Risks	• The work environment should be healthy. • Employers should take steps to prevent the transmission of HIV and other blood-borne pathogens, • Appropriate health education should be given to workers. • Develop decommissioning plan for impact mitigation	• Physical observation	• RMC, contractor	Decommission		
	Total					**52,810,000**

Table 13 Environmental and Social Management Plan

13. ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The Environmental and Social Monitoring Plan is a very essential part of the project implementation. It helps to follow up the implementation of the proposed measures, as they are required, and to anticipate possible environmental hazards and/or detect unpredicted impacts over time. This kind of monitoring must be carried out by the company's top management unit on a regular basis. The company top management together with affiliated units of the City Environmental Protection Authority/or Sub-city and district offices and representatives of the local community's should have to carry out an occasional monitoring on the performance of the environmental and social management plan.

The different areas to be monitored shall be monitored in accordance with the state of the environment. In-house environmental monitoring program needs to be instituted for the project, while external environmental monitoring shall address the foregoing key issues to ensure compliance with good production practices to avoid unnecessary adverse impacts. Therefore, it is recommended that the monitoring results should be recorded by the Environmental Safety Officer.

Table 14: Environmental and Social Monitoring Plan

Impact Description	Proposed mitigation measures	Monitoring Indicators	Responsible parties	Reporting Frequency	Budget required/yr., monitoring cost
I. Preconstruction and Construction					
Displacement	• The PAPs should be consulted about the resettlement process. • The RAP and LRP developed by RMC for 136 project affected households should be implemented while observing the Ethiopian law, and international norms. • The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 129 households. The project will make livelihood assistance payment to informal settlers, provide skill training, and hire people from the locality during construction and operation of the medical campus. • Alternative resettlement sites should be immediately provided for displaced people, particularly for 38 households. • Displaced people should be advised as to how to sustain livelihood activities: Specially one family to be resettled has shown interest towards livestock breeding,	• Public consultation	• Public consultation	Every six months	5,000
Air Pollution	• Avoid unnecessary excessive vehicle movement and have proper schedule plan, • Limit vehicle speeds on non-surfaced roads, • Maintain equipment and vehicles in good working order to avoid excessive emissions. • Excavated surface should be sprayed with water from time to time to reduce dust emission during operations. • Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility, • Workers will be provided with PPE and the use of PPE shall be enforced, • Dumping of material from the heavy vehicles will be done from an appropriate height for less dust	• Buffer zone marked and respected. • Complaint community • Formation of dust	• Roha Medical Campus • Contractor	Every six months	5.000

	generation. • The heavy vehicles are the main sources for release of carbon monoxide and nitric oxide, so to avoid the increase of pollutant in the site; the vehicles will be maintained properly and regularly. • Provision of face mask to workers to minimize inhalation of dust particles. • Low sulfur diesel should be used for running construction equipment and vehicles. • Vehicles carrying construction material and debris should be covered with tarpaulin cover, • Raw materials excavated soil and other debris should be stored and transported under covered nets. • Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising dust. • Enclosing the structures under construction with dust proof nets. • Regular maintenance and services of machines and engines as per the Manual.				
Noise Pollution	• Routine timely maintenance of equipment as per the Manual. • Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents. • Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided, • Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above, • Acoustic enclosures should be provided with DG (Diesel generator) sets and machinery to control the noise levels at construction site, • Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc. • Provision of PPEs such as ear plugs for	• Complaint • Physical observation	• Contractor, RMC	Every six month	5000

	employees working in noisy conditions or with noisy equipment, • Construction works should be carried out only during the specified period/schedule,				
Water resource Pollution	• Regular inspections at site to monitor leakages in water storage tanks, • Prevent piling up of excavated soil, raw material, and construction debris at site by proper management and disposal, • Minimize run-off by using sprays for curing, • Construction of storm water drains along with sedimentation tanks with sandbags as partition to retain the soil particles from storm water drain, • Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies. • Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies, and • Construction vehicles and machinery should be regularly serviced and checked for any leakage of oil.	• Laboratory test, if necessary, site observation	• Contractor, RMC	Every three months	10,000
Soil Impacts	• Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage, or any other material, which may inhibit the later growth of vegetation, • Avoid spilling leaking of chemical. • Soil conservation measures must be applied to the stockpiles to prevent erosion. Prepare trenches around the borrow area to prevent runoff entering a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages, • Fuel storage area should be paved, • Construction debris should be stored under covered sheds and paved surfaces and should be disposed of regularly to designated sites. • Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits	• Site observation, Presence of topsoil stockpile •	• Contractor, RMC	Every six months	4,000

	within the camp site, • Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, and • There must be Proper solid waste management practice (Sorting, collection, transportation, reuse, recycle, recovery and disposal).				
Biodiversity Impacts	• The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project, • Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. • Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible. • Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan. • Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. • Clearing vegetation only in construction areas and demarcating areas where no clearing will happen. • Restrict human movement and fence the wetland area where animals such as birds are found as much as possible to protect the bird species.	• Presence of Rehabilitation strategies,	• Contractor, RMC	Every six months	3,000
Utilities Impacts	• Employing water conservation techniques and only using the required	• Presence of	• Contractor, RMC	Every six month	2,000

	amounts of water to prevent waste, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Providing proper sanitary facilities for construction workers. • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency,	borehole, presence of maintenance plan			
Traffic Impact	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations, • Making sure the construction does not occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	• Number of accidents	• Constrictor, RMC	Every three month	6,000
HSE Risks	• Employing an HSE plan that will outline all HSE risks and provide a strategy for their management. • Regular provision of health and safety training for all workers. • Optimization of working schedule and work to minimize several material vehicle mobilizations trips. • Regular inspection and scheduled maintenance of all equipment • Ensuring all potential hazards such as movable machine parts are labeled. • Raising awareness and educating workers on the risks from equipment and ensuring they receive adequate training in the use of the equipment. • Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials on the site. • Placing visible and readable signs to control the movement of vehicles and	• Number of accidents, presence of PPE, provision of training	• Contractor, RMC	Every three month	10,000

	notify motorists and pedestrians around the, and workers in the site. • Providing firefighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. • Labeling chemicals and material according to the risks they possess. • Creating safe and adequate fire and emergency assembly points and making sure they are well labeled. • Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbors. • Provision of first aid kit				
II. Operation Phase Impacts					
Air pollution	• Air pollution both indoor and outdoor, monitoring should be carried out quarterly to check the air pollution level, • Incinerator filters would be tested annually and replaced as necessary, • Waste segregation for wastes with polychlorinated dibenzo-dioxins and polychlorinated dibenzo-furans PCDD/Fs would be done and these wastes would never be incinerated, • Wastes would be introduced into the incinerator only after the optimum temperature is reached in the final combustion chamber, • The waste charging system would be interlocked with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits. • A flue gas treatment system would be used for control of acid gases, particulate matter, and other air pollutants. • Proper waste reduction and segregation should be employed, • Proper Siting of incinerator as per the recommendation • Proper Incinerator Design as per the recommendations	• Report, physical observation	• RMC	Every six month	8,000
Noise	• The use of continuous insulation (CI)	• Report,	• RMC	Every six	5000

Pollution	in building enclosures from the sources, • exterior walls and roofing system designs to decrease the impact of noise pollution from aircraft traffic. • Wall and roof-ceiling assemblies must have an Outdoor-Indoor Transmission Class (OITC) rating of 40 or greater or an Sound Transmission Class (STC) rating of 50 or greater, and fenestration that is part of the building must have an OITC or STC rating of 30 or greater for buildings within 1000 ft. (300 m) of expressways and buildings within 5 mi (8 km) or less of airports serving more than 10,000 commercial jets per year. • Isolation of noise sources such as boilers, generator and the provision of ear protectors to employees working in areas where noise levels exceed noise limits, • Conducting all noisy activities during the day when permissible levels are higher. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Using equipment with low noise ratings or noise reduction technologies. • Regular maintenance of machines and equipment and generators as per the manual.	physical observation, number of compliant		month	
Water Resource Impact	• Treatment of effluents (all medical liquid wastes) and sewage prior disposal into the environment, • Ensure that water exiting through the sink drains is diverted to a retention tank where it would be disinfected before being sent to the sewer system. • Sludge is transported to Kotebe treatment plant using vacuum trucks, • Water quality testing at distribution point to monitor and detect contamination through any leakage, • Proper management of solid waste should be done to prevent any contact between the waste and storm water, • Incinerated ash should be properly disposed in secured areas, • Storm water drains should be	• Laboratory test if required, report and physical observation	• RMC	Every three month	80,000

	separate from effluent drains, • Regular monitoring of the treatment plant as per the technical requirement, • Storm water system should be inspected & cleaned before heavy rain every year, • Adoption of best management practices to prevent water wastage and minimize water loss. • Installation of leakage detection system to minimize the water loss from the treatment plant, and • Regular monitoring of treated wastewater every six month to check the treatment efficiency and quality of treated water				
Soil Impacts	• Treatment of the effluents and sewage and ensuring proper disposal, • Ensure that water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system, • Proper management of solid and liquid wastes as recommended in the document, • Chemical and biomedical waste generated should be managed as per guidelines of Ethiopia government.	• Report, physical observation	• RMC	Every six months	6,000
Utilities Impact	• Employing water conservation techniques and only using the required amounts of water to prevent wastage, • Use of deep borehole as alternative source of water, • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible, • Using of solar power for minor operations, • Using only the required amounts of water during normal operations, • Placing signs of conservation of water and electricity. • Using machines and equipment with a high level of power efficiency and servicing them as often as required to maintain their efficiency and • Awareness creation about water and power saving techniques for the workers.	• Report	• RMC	Every six months	15,000

Traffic Impact	• Placing visible and clear signs to control the movement of vehicles in and out of the site. • Having alternative entrances and exits for emergency operations and staff rather than using the main gate, • Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site, • Ensuring all drivers for the project comply to traffic regulations, • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	• Report, physical observation	• RMC	Every three month	6,000
OHS and Public Health Impacts	• Employing and EHS/OSH plan, • Laboratory workers would be trained in equipment operating and handling techniques during operation, • HEPA filters at the RMC facility would be tested annually and replaced as necessary, • Training would be provided in sample and waste handling, transportation, and storage. • All material would be sterilized by autoclave or chemical disinfection. • Provide continuous occupational health and safety training to all workers. • Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear, • Placing readable signs and symbols as required, • Providing firefighting equipment and maintaining them to ensure they are fully functional, • Effective vaccines or therapeutic measures would be available for all risk groups, • Personnel working in biobank Centre would receive specific training in handling pathogenic and potentially lethal agents and would be supervised by competent staff in handling infectious agents and associated procedures, • Ampoules containing infectious materials would never be immersed in	• Report, physical observation	• RMC	Every three month	10,000

	liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal, • Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use of maps on elevators, staircases etc. • Providing adequate storage for hazardous and flammable substances and controlling access to them. • Monitoring the movement, handling and management of healthcare wastes to ensure they are safely managed and do not present any EHS risks. • Establishment of Infection prevention committee. • Implementation infection prevention and patient safety standard, • Establishment of Proper barriers or isolation for the protection of radiation from X-ray MRI, Ultrasound machines etc. • Regular checkup of X-ray, MRI, Ultrasound machines etc....				
III. Decommissioning Phase Impacts					
Water resource impacts	• nonhazardous waste would be sent to permitted disposal facilities. • Spill response plan. • Green belts with properly selected plant species	• Physical observation	• RMC, contractor	Every three month	3000
Waste Generation impacts	• Non-hazardous waste would be sent to permitted disposal facilities. • Leveling of the project site • Restoration of the project site	• Physical observation	• RMC, contractor	Every three month	5,000
Occupational Health and Safety Risks	• The work environment should be healthy. • Employers should take steps to prevent the transmission of HIV and other blood-borne pathogens, • Appropriate health education should be given for workers	• Physical observation	• RMC, contractor	Every three month	6,000
	Total Monitoring Cost				**194,000**

It is to be noted that the budget quoted in the monitoring plan is for reporting purposes and in some cases for additional external personnel or services required such as a water testing lab. The other personnel and services costs for the ESMP are incorporated into the business model of the Hospital operations.

14. PUBLIC AND STAKEHOLDER CONSULTATION

14.1 Stakeholder Consultation

Stakeholder consultation was conducted with Woreda 13 social affairs office on 13/05/2021, Bole sub-City land administration and use office, Bole sub-city health office on 14/05/2021, Bole community school administrator on 13/05/2021, and Bole sub-city Environmental protection office and youth academic center on 14/05/2021.

All stakeholders welcomed the project considering its positive socio-economic impacts.

Figure 18: Stakeholder consultation with bole sub-city environmental protection officer

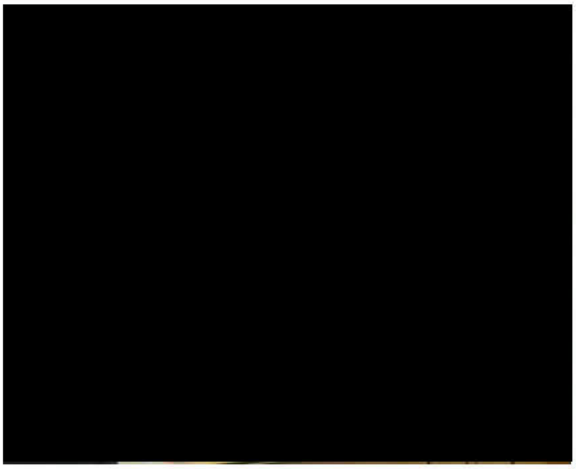


Figure 19: Stakeholder consultation with school administrator



Figure 20: Stakeholder consultation with woreda labour and social affairs office



The Woreda and sub-city officers had appreciated the importance of the project in terms of responding to the ever-increasing healthcare demand in Addis Ababa City as well as the country. However, it also has significant adverse impacts on displaced people unless appropriate mitigation actions are taken. RMC should give priority to the affected community in creating job opportunities. It should also prepare RAP and an appropriate compensation scheme for the affected community.

14.2 Public Consultation

Consultations were conducted with local community specifically those which are directly affected by the project and not yet resettled from the project site and who are currently using the land for different purposes such as grazing, farming, and dwelling on 15/05/2021. Our grievance management system was based on dialogue with stakeholders first and foremost and is designed so as to prevent any retaliation risks by clarifying the objectives of the project and the actions taken by RMC.

The consultation was conducted in the presence of stakeholders from Woreda13 labour and social affairs office, Addis Ababa city administration Environmental protection and green development commission, and sub-city environmental protection officer. The consultation was about the potential impacts of the project on their livelihoods. The composition of the participants is annexed to this report. Almost all the participants agreed that there are many inevitable benefits of the medical campus for local and national community.

The opening remark and introduction were conducted by the consultant, by explaining the objectives of the consultation and RMC representative describing the nature of the project and its benefit to the community and the country at large. The RMC representative also explained the social responsibility of RMC and its action before the implementation of the project such as preparation of RAP and livelihood restoration.

All community members who participated in the consultation supported the project but expressed concerns regarding the Resettlement Action Plan (RAP) processes. They felt that the government did not provide sufficient time for them to prepare psychologically and economically. As a result, the displacement seemed forced and lacked a sustainable, timely solution. This situation has negatively impacted the livelihoods of many residents, particularly those from informal settlements and people living in rented accommodations.

A significant number of participants emphasized that the Resettlement Management Committee (RMC) should prioritize job creation for those directly affected by the project, taking into account their educational background and experience.

Furthermore, it was suggested that the RAP process should be transparent, providing accurate and detailed information about the resettlement at an early stage. This is to prevent the risk of impoverishing affected households. There needs to be clear and transparent guidelines regarding entitlements and compensation for each type of displacement, which should be disclosed and discussed with the affected communities.

In conclusion, understanding the impacts on livelihoods before and after relocation is crucial. This comprehensive approach is necessary to reduce the risk of impoverishment and to safeguard and enhance the livelihoods of affected households throughout the relocation process.

Figure 21: RMC representative at the public consultation

Figure 22: Woreda social affairs officer

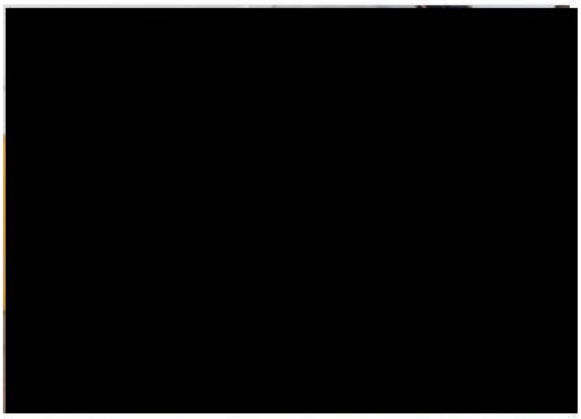




Figure 23: Community members who participated in the public consultation



The Constitution of the Federal Democratic Republic of Ethiopia (FDRE) guarantees comprehensive compensation for land expropriated for public purposes, emphasizing the public's exclusive right to participate in development initiatives, especially those affecting their communities. Article 44 specifies that individuals displaced or whose livelihoods are adversely affected by government projects are entitled to fair monetary compensation or alternative forms of compensation, such as relocation with adequate government support. This ensures that community members forced to relinquish their land holdings for projects like the Roha Medical Campus are compensated for their loss and any development on their land. Observations and interviews with affected families suggest that the compensation provided by the government has been inadequate, highlighting the need for the government to focus on rehabilitating the impacted community and their families.

The Rural Land Administration Proclamation No. 456/2005 states that rural landholders evicted for public use must receive compensation proportional to the development made on the land and any acquired property or be provided with substitute land. The compensation rate is determined by federal or regional land administration laws, depending on the authority conducting the eviction. This ensures that rural landholders are compensated in a manner that reflects the development value of their land at the time of expropriation. This compensation includes not just the land, but also vegetation, and crops on it, in line with the civil law's definition of property. Proper compensation is critical for allowing displaced individuals and their families to sustain their livelihoods. Inadequate compensation can lead to unemployment and other social and economic challenges, potentially resulting in community resistance to development projects.

Moreover, a key objective of investment in Ethiopia, including projects like the Roha Medical Campus, is to create employment opportunities in the service sector. Therefore, it is imperative for the Roha Medical Campus to prioritize employment for the local community, particularly for those displaced due to land expropriation. The government should also undertake rehabilitation programs for those severely affected by such projects, with the Roha Medical Campus supporting these efforts to ensure the well-being and economic stability of the local community.

15. CONCLUSION AND RECOMMENDATION

15.1 Conclusion

There is unanimous agreement on the significance of expanding health coverage in the city by establishing the proposed Medical Campus. This project is expected to bring several socio-economic benefits, such as creating job opportunities for thousands, fostering human resource development, ensuring the health and productivity of citizens, and reducing the need for local patients to travel long distances abroad in search of high-quality healthcare.

However, despite its local and national benefits, the project could also lead to various negative impacts during the pre-construction, construction, and operational phases. A major concern during the pre-construction stage is the resettlement of people living within the project area. Engaging in thorough consultations with the affected community and taking proactive steps to locate alternative housing sites are expected to mitigate these impacts. The construction phase will likely entail typical industry-related issues, including noise, occupational hazards, dust and air pollution, and waste management challenges. Implementing proper construction techniques, waste management, and occupational health and safety measures should minimize these effects.

During the operational phase, the primary concerns are solid and liquid waste, which could potentially contaminate surface water sources and the surrounding environment. These issues are anticipated to be addressed through effective waste segregation, recycling, and management practices. Additionally, air pollution resulting from the improper incineration of selected medical waste is planned to be mitigated through strategies such as waste reduction and segregation, the use of proper incineration procedures, and the strategic placement and design of incinerators, informed by wind pattern studies.

15.2 Recommendation

To ensure that this Environmental and Social Impact Assessment (ESIA) study effectively contributes to the project's sensitivity, acceptability, and sustainability, the following steps should be taken: Key stakeholders, including the project owner,

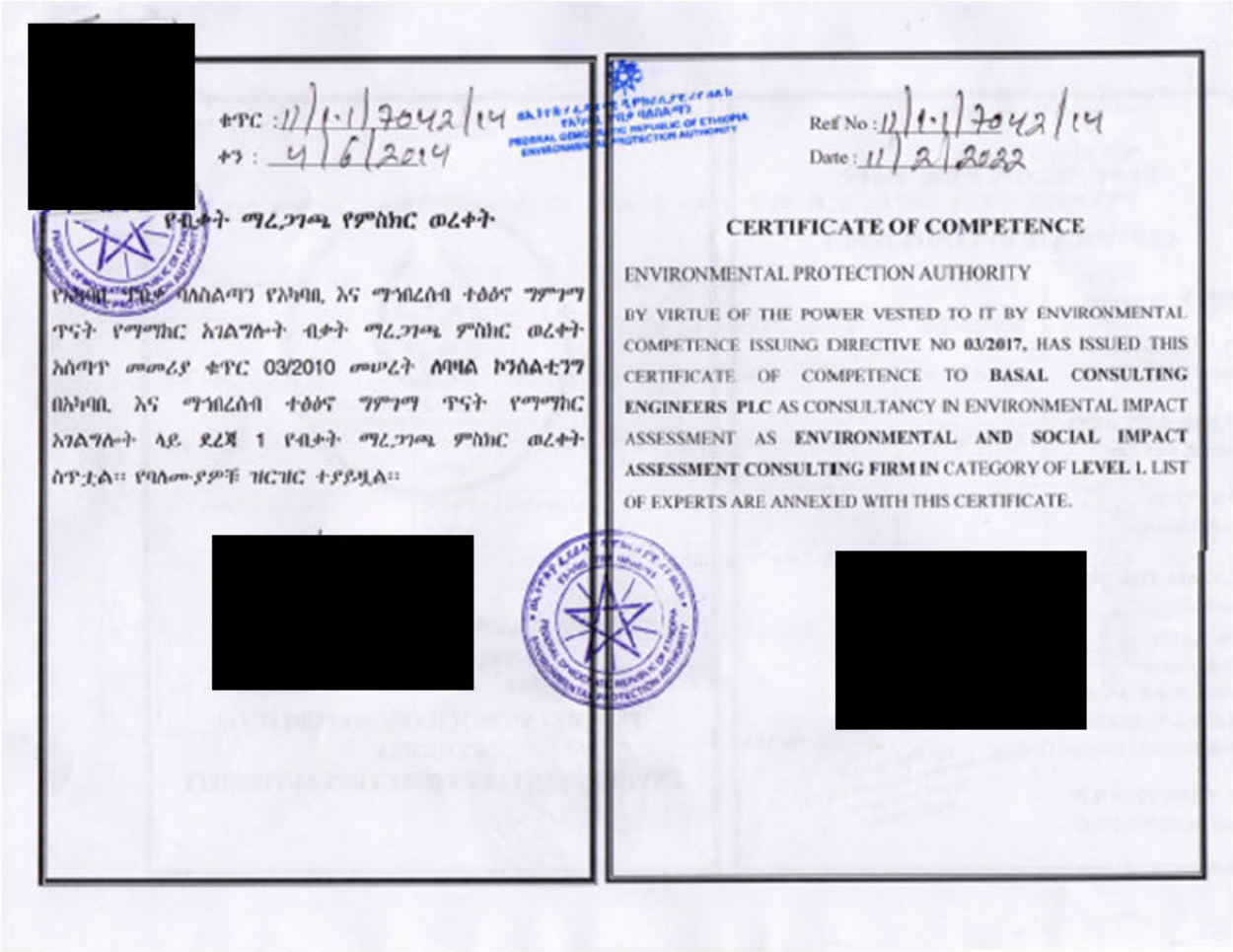
members of the settled community, and the Addis Ababa land use and environmental protection offices, need to be fully informed about the potential environmental and social impacts, mitigation measures, and their respective roles in managing and mitigating these impacts. The project owner must provide the necessary financial and material resources to meet the environmental and social requirements of the project. Additionally, RMC should develop the required implementation plans, as well as monitoring and evaluation frameworks, to put this ESIA into action.

REFERENCES

1. (Inter-American Development Bank, 2002): IDB Center for Development Studies – CDS Santiago – Chile. Prepared as part of Technical Cooperation ATN/JF-6618-RG "Support Program for Improvement of Environmental Management in Countries of Latin America and the Caribbean".
2. (SBPDA), Sanitation, Beautification and parks development Agency of Addis Ababa, Solid Waste Management Status Report of Addis Ababa ,2003
3. AACIB 2006. Strategic Plan of Addis Ababa City (1998-2003E.C.). Addis Ababa City Administration, Culture and Information Bureau: Addis Ababa
4. Environment Policy of Ethiopia, 1997.
5. Environmental Assessment Sourcebook, Vol. 3: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper 154, 1991.
6. EPA (Environmental Protection Authority) (2000). Environmental Impact Assessment Guideline document, Addis Ababa, Ethiopia.
7. FDRE Constitution 1995. The Constitution of the Federal Democratic Republic of Ethiopia. -http://en.wikipedia.org/wiki/Addis_Ababa
8. Fikirte, D., Mare, A. (2015). Mapping of Plantation Forest in the Upper Catchment of Addis Ababa. *Int J Environ Sci*. 4:158-165.
9. Kent, M. (2012). Vegetation description and data analysis: a practical approach. 2nd ed. John Wiley & Sons, New York. 414pp.
10. Manyel, S.V., Kagonji, I.S., (2012). Analysis of Medical Waste Incinerator Performance Based on Fuel Consumption and Cycle Times. Engineering, 4, 625-635 http://dx.doi.org/10.4236/eng.2012.410080 Published Online October 2012 (http://www.SciRP.org/journal/eng)
11. MMIS (2010). The Incinerator Guidebook: A practical Guide for selecting, Purchasing, installing, operating and maintaining small scale incinerators in low resource settings.
12. Muluken Azage and Abera Kumie, (2007). Healthcare waste generation and its management system: the case of health centers in West Gojjam Zone, Amhara Region, Ethiopia
13. Redman, N., Stevenson, T., Fanshawe, J. (2011). Birds of the Horn of Africa: Ethiopia, Eritrea, Djibouti, Somalia, and Socotra. 2nd edition, Christopher Helm, London, UK. Pp. 460.
14. Salar El-Haggar (2007). *Sustainable Industrial Design and Waste Management*. Elsevier Science and Technology Books. ISBN 0123736234.
15. Sidra S., Ali, Z., Chaudhry, N. M. (2013). Avian diversity at new campus of Punjab University in relation to land use change. Pakis J Zool 45: 1069-1082.

16. WHO: 2016, Best practices for incineration
17. Zhou, H. and Smith, D. (2002). Advanced Technologies in Water and Wastewater Treatment, *J. Environ. Engg. Sci*., **1**: 247-264.

ANNEX I: LEGAL DOCUMENTS OF THE CONSULTANT



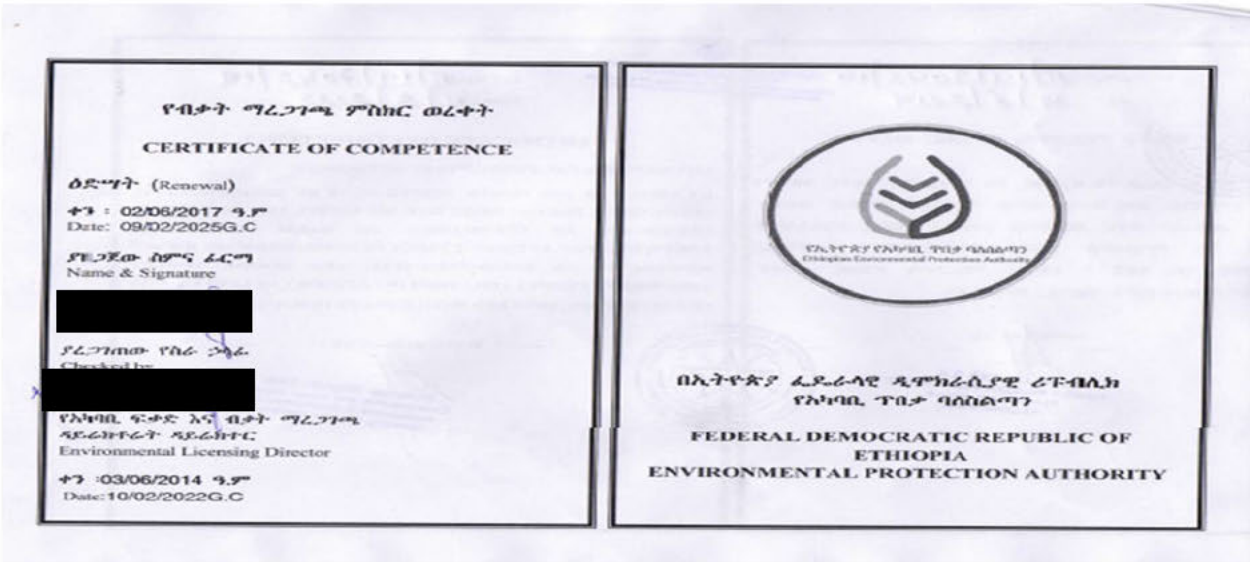
የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ ጥበቃ ባለስልጣን የአካባቢ እና ማኅበረሰብ ተፅዕኖ ግምገማ ጥናት የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት ለባሳል ኮንሰልቲንግ በአካባቢ እና ማኅበረሰብ ተፅዕኖ ግምገማ ጥናት የማማከር አገልግሎት ላይ ደረጃ 1 የብቃት ማረጋገጫ ምስክር ወረቀት ሰጥቷል። የባለሙያዎቹ ዝርዝር ተያይዟል።

CERTIFICATE OF COMPETENCE

ENVIRONMENTAL PROTECTION AUTHORITY

BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO **BASAL CONSULTING ENGINEERS PLC** AS CONSULTANCY IN ENVIRONMENTAL IMPACT ASSESSMENT AS **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTING FIRM IN** CATEGORY OF **LEVEL 1.** LIST OF EXPERTS ARE ANNEXED WITH THIS CERTIFICATE.



የብቃት ማረጋገጫ ምስክር ወረቀት

CERTIFICATE OF COMPETENCE

ዕድሣት (Renewal)

ቀን : 02/06/2017 ዓ.ም
Date: 09/02/2025G.C

ያዘጋጀው ስምና ፊርማ
Name & Signature

ያረጋገጠው የስራ ኃላፊ
Checked by:

የአካባቢ ፍቃድ እና ብቃት ማረጋገጫ ዳይሬክተር ዳይሬክተር
Environmental Licensing Director

ቀን :03/06/2014 ዓ.ም
Date:10/02/2022G.C

በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአካባቢ ጥበቃ ባለስልጣን

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
ENVIRONMENTAL PROTECTION AUTHORITY

የኢትዮጵያ ፌደራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአካባቢ ጥበቃ ባለስልጣን
FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
ENVIRONMENTAL PROTECTION AUTHORITY

ቁጥር: 11/1/1/7042/14
ቀን: 3/6/14 ዓ.ም

ለባዛል ኮንሰልቲንግ የማማከር አገልግሎት በአካባቢ እና ማህበራዊ ተፅዕኖ ጥናት ዘርፍ የአማካሪ ድርጅት የባለሙያዎች ዝርዝር

ተ/ቁ	የባለሙያዎች ስም	ደረጃ	የሚያማክሩበት ሙያ	ስልክ	ቋሚነት
1	[redacted]	ከፍተኛ አማካሪ	የመጠት አማቂ ጋዝ ልቀት ተንታኝ ባለሙያ	[redacted]	ሥራ አስኪያጅ
2	[redacted]	ከፍተኛ አማካሪ	የኢኮኖሚ ጉዳዮች ተንታኝ ባለሙያ	[redacted]	
3	[redacted]	ከፍተኛ አማካሪ	የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ	[redacted]	✓
4	[redacted]	ከፍተኛ አማካሪ	የአካባቢ ጤና ተንታኝ ባለሙያ	[redacted]	
5	[redacted]	ከፍተኛ አማካሪ	የብዝሐ ሕይወት እና የስርዓተ-ምህዳር ተንታኝ ባለሙያ	[redacted]	
6	[redacted]	መካከለኛ አማካሪ	የውሃ ሀብት አጠቃቀም አጥኚ ባለሙያ	[redacted]	
7	[redacted]	ከፍተኛ አማካሪ	የአካባቢ ብክለት ተንታኝ ባለሙያ	[redacted]	

ከሰላምታ ጋር

[redacted]

[redacted]

የንግድ ስም ምሥክር ወረቀት ቁጥር 0042263168

የንግድ ምዝገባ ቁጥር 10-314128007

የንግድ ሥራ ፈቃድ ቁጥር 10-16128008

በአማራ ብሔራዊ ክልላዊ መንግስት

የንግድና ትራንስፖርት ቢሮ

የንግድ ስም ምዝገባ ምስክር ወረቀት

በንግድ ሥራ ምዝገባና ፈቃድ አዋጅ ቁጥር 686/2002 መሠረት የተሰጠ

1 ሥም [redacted]

2. የንግድ ዋና ዘርፍ መደብ ልዩ ዝርዝር ንግድ ሥራዎች

3 የፈቃድ መስጫ መደብ 32222

4 የንግድ ሥራው አድራሻ [redacted]

5 የንግድ ስም "ባዝልኮንሰልቲንግ" / BASAL CONSULTING

6 ከላይ የተሰጠው የንግድ ስም በአዋጅ ቁጥር 686/2002 አንቀጽ 24 መሠረት የኢመልከቻቹህ የንግድ ስም ተደርጎ የተመዘገበ መሆኑን እናረጋግጣለን።

ይህ የምዝገባና የምስክር ወረቀት ዛሬ 05/05 ቀን 200 ዓ.ም በ ጋንጋሎ ከተማ ተሰጠ

የንግድ ምዝገባና ፅድላት አፈጸጸር ስም [redacted] ፈርማ [redacted]

ማሳሰቢያ፣ በንግድ ስሙ ላይ ማናቸውም መሻሻል በሚደረግበት ጊዜ በሁለት ወር ጊዜ ውስጥ ማሳወቅ አለበት።

በአማራ ብሔራዊ ክልላዊ መንግስት ንግድና ገበያ ልማት ቢሮ

Amhara National Regional State Trade and Market Development Bureau

የግብር ከፋይ ምዝገባ ቁ./TIN 0042863148
የንግድ ምዝገባ ቁ. AM/DES/BW/1/0020049/2008
Principal Registration No.
የቀድሞው ንግድ ፈቃድ ቁጥር 016/07
Previous License No.
የንግድ ሥራ ፈቃድ ቁጥር AM/DES/BW/03/137/5945047/2008
Business License No.
ቀድሞ ተሰጠበት ቀን 27/9/2007
Previous Date of Issuance
የተሰጠበት ቀን 3/2/2008
Date of Issuance
የታደሰበት ቀን: 23/2/2016

[redacted]

የንግድ ሥራ ፈቃድ
በ[redacted] አዋጅ ቁጥር 980/2008
መሰረት ተሰጠ

Business License

Issued Under Commercial Registration and Business license proc.No 980/2016

1. የማለሰቡ/ድርጅቱ ስም [redacted]
2. ዜግነት ኢትዮጵያዊ
3. የንግድ ስም
4. ሥራ አስኪያጅ ስም [redacted]
5. የንግድ ድርጅቱ አድራሻ [redacted]

ፋክስ ኢ-ሜይል

1. Owner/Company Name [redacted]
2. Nationality Ethiopian
3. Trade Name
4. General Manager Name [redacted]
5. Business Address [redacted]

Fax E-mail

6. የንግድ ሥራ መስክ
(86312)በአካባቢ አዲትና አማክር አገልግሎት የማማከር አገልግሎት, (86311)የሕክምና የማማከር አገልግሎት

6. Field of Business
(86312)Environmental auditing and environmental protection consultancy service , (86311)Health consultancy service

7. ካፒታል በኢት ብር 558,586.00

ይህ የንግድ ፈቃድ ዛሬ 24/2/2016 በ[redacted] አማራ ክልል የንግድ ሥራ ፈቃድ ተሰጥቷል

7. Capital in ETB 558,586.00

This Business License is issued in Amhara

This license is valid up to 11/4/2023

የሃላፊ ስም/Name of Official [redacted]
ፊርማ/Signature

ለ 2016 ታድሷል

ማሳሰቢያ- 1. ይህ የንግድ ፈቃድ በማዘጋጃ ፈቃድ ቁጥር 980/2008 መሠረት እንደ ዘመኑ ጥምቀት በሚሆን በተቀመጠው መሠረት መታደስ አለበት።
N.B. This License Shall be renewed in accordance with Proclamation No. 980/2008 as per the fiscal year.

2. ይህ የንግድ ፈቃድ የማስገር ዋስትና በማስጫ ወይም በእዳ ሊያዝ አይችልም።
The holder of this License is forbidden for surety ship or debt

የኢትዮጵያ ፌደራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአማራ ብሔራዊ ክልላዊ መንግስት ገቢዎች ባለስልጣን
Federal Democratic Republic of Ethiopia
AMHARA NATIONAL REGIONAL STATE REVENUE AUTHORITY

የግብር ከፋይ ምዝገባ ሰርተፊኬት
TAXPAYER REGISTRATION CERTIFICATE

የግብ ከፋይ መለያ ቁጥር:
Taxpayer Identification Number: [redacted]

የድርጅት/የግለሰብ ሥም:
Name of Business/Individual: [redacted]

የተመዘገበ አድራሻ/Registered Address:

ክልል:
Region: [redacted]

ዞን/ክ.ከተማ:
Zone/Sub City:

ወረዳ:
Woreda:

ቀበሌ /በአሶርዬ/:
Kebele/Farmer's Assoc.:

የቤት ቁጥር:
House No.:

የንግዱ ዓይነት:
Nature of Business: LEGAL SERVICES

የሰጠው ተቋም:
Issuing Authority: የአማራ ብሔራዊ ክልላዊ መንግስት ገቢዎች ባለስልጣን
AMHARA NATIONAL REGIONAL STATE REVENUE AUTHORITY

የተሰጠበት ቀን:
Date of Issuance: 26 GINBOT 2007
03-JUN-15

ይህ የምስክር ወረቀት የግብር ከፋይነት ብቸኛ የግብር ከፋይነት ምዝገባ ሲሆን ከዚህ ተደም ቦሰሩ የግብር ከፋይነት ምዝገባ ሰነዶች ካሉ በዚህ ሰነድ የተተኩ መሆናቸውን ንቡ።
ከላይ በተጠቀሰው መረጃ ላይ ማንኛውም አይነት ለውጥ በጀረገ ግብር ከፋዩ ለሚመለከተው የግብር ሰብሳቢ ጽ/ቤት የማሳወቅ ግዴታ አለበት።

This certificate represents the sole and only registration as a taxpayer and supersedes all prior registration documentation.
The taxpayer is responsible for notifying the appropriate Tax Office of any changes to the above information.

[redacted]

የሰርተፊኬት ቁ.:
Certificate No.: 1138657810013

1138657810013

የሚሰጠው ባለሥልጣን መ/ቤት ማህተም
Seal of Issuing Authority

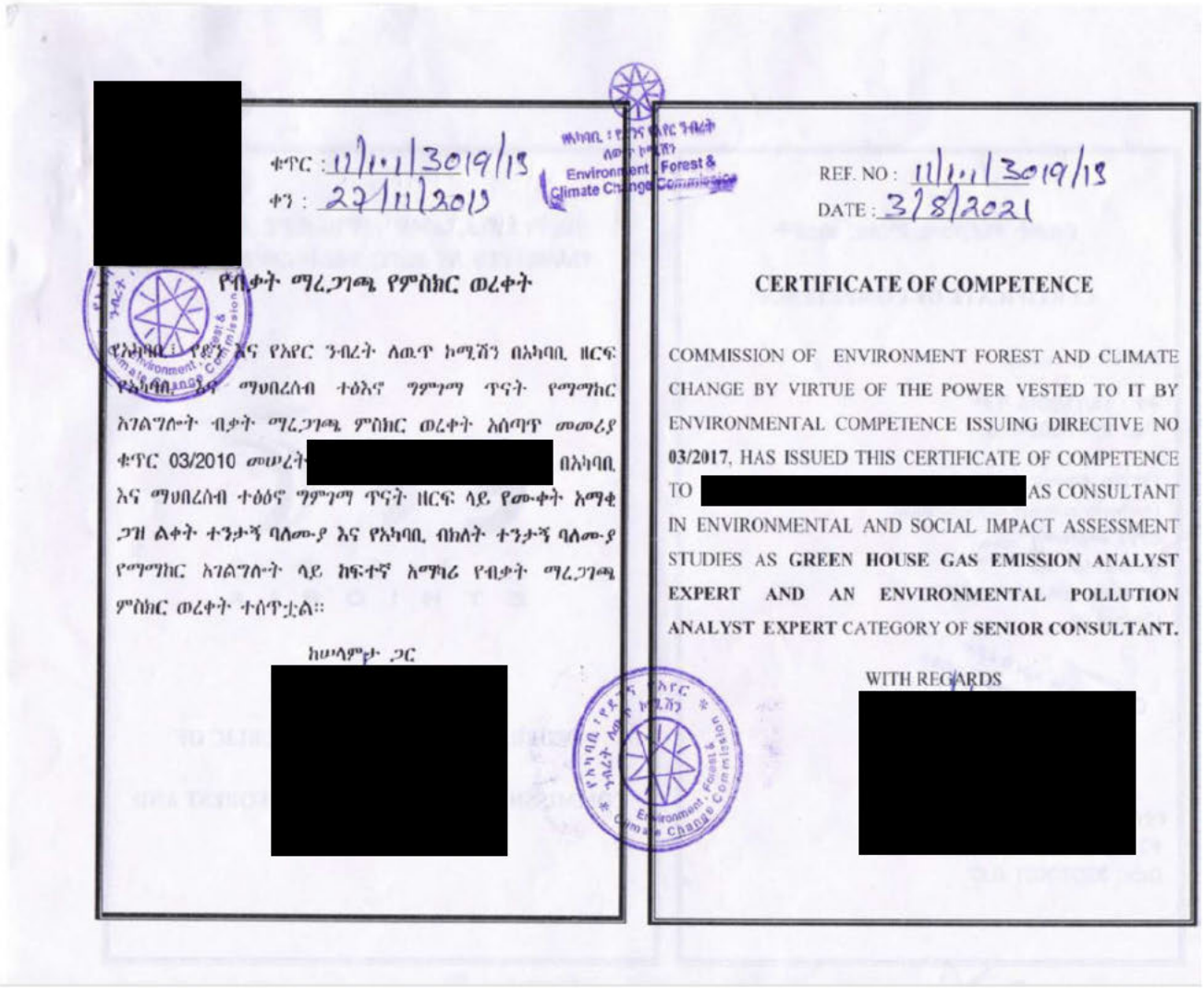
ANNEX II: CV AND COMPETENCY CERTIFICATE OF CONSULTANTS

1. [redacted] (Greenhouse gas emission control expert)

1.1 Personal Data

- Full name: [redacted] (Greenhouse gas emission control expert)
- Marital status:
- Age:
- Mailing address:
- Permanent address:
- Mobile:

[redacted]



[redacted]

ቁጥር : 11/1.1/3019/13
ቀን : 27/11/2019

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ፣ የደንና የአየር ንብረት ለዉጥ ኮሚሽን በአካባቢ ዘርፍ የአካባቢ ጉዳ ማህበረሰብ ተፅእኖ ግምገማ ጥናት የማማክር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የመሩቱት አማቂ ጋዝ ልቀት ተንታኝ ባለሙያ እና የአካባቢ ብክለት ተንታኝ ባለሙያ የማማክር አገልግሎት ላይ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO : 11/1.1/3019/13
DATE : 3/8/2021

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS **GREEN HOUSE GAS EMISSION ANALYST EXPERT AND AN ENVIRONMENTAL POLLUTION ANALYST EXPERT** CATEGORY OF **SENIOR CONSULTANT.**

WITH REGARDS

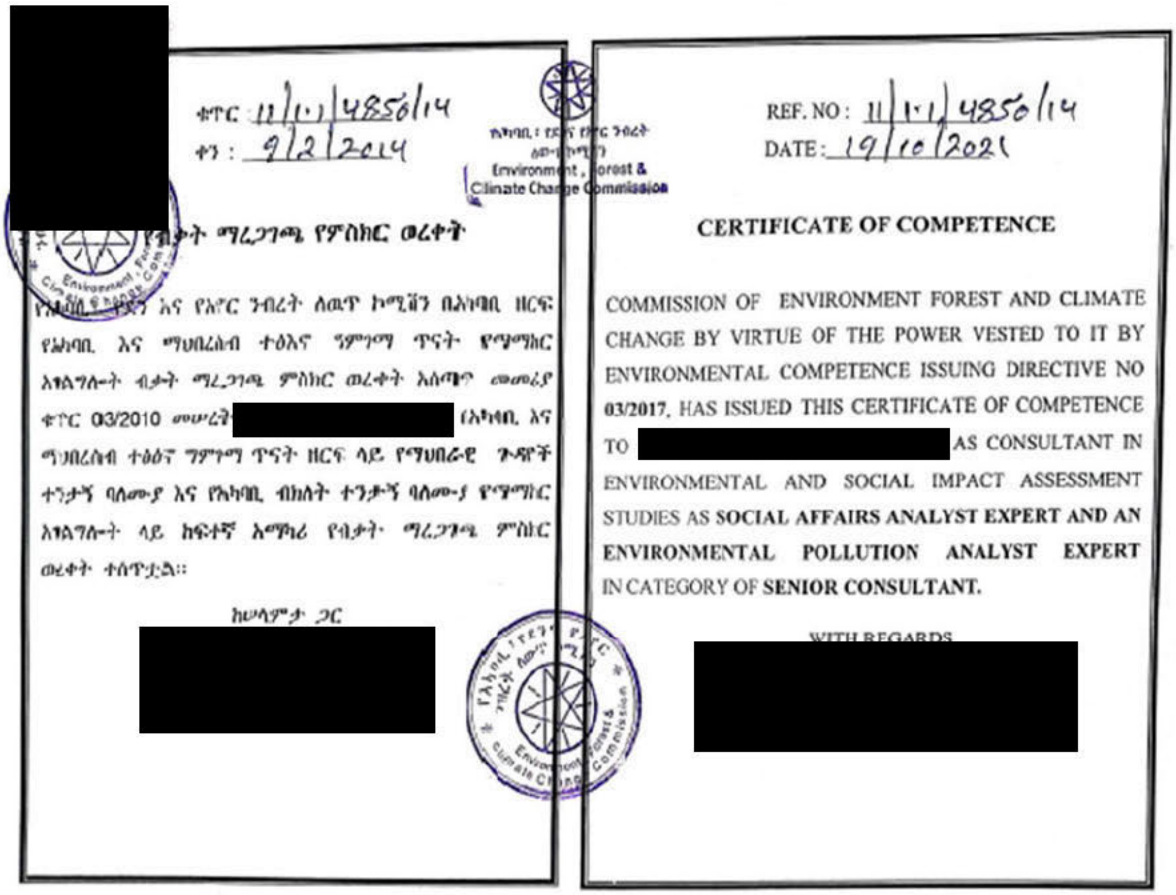
[redacted]

2. [redacted] (M.A in Development Studies (Environment and Development))

2.1 Personal Data

- Full Name: [redacted] (Environmental pollution Analyst)
- Marital status:
- Age:
- Mailing address:
- Permanent address:
- Mobile:

[redacted]



ቁጥር 11/10/4850/14
ቀን : 9/2/2014

የአካባቢ፣ የደንና የአየር ንብረት ለውጥ ኮሚሽን
Environment, Forest & Climate Change Commission

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ፣ ደንና የአየር ንብረት ለውጥ ኮሚሽን በአካባቢ ዘርፍ የአካባቢ እና ማህበረሰብ ተዕእኖ ጥምጠማ ጥናት የሚመክር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] (አካባቢ እና ማህበረሰብ ተዕዕኖ ግምገማ ጥናት ዘርፍ ላይ የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ እና የአካባቢ ብክለት ተንታኝ ባለሙያ የሚመክር አገልግሎት ላይ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO: 11/10/4850/14
DATE: 19/10/2021

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS **SOCIAL AFFAIRS ANALYST EXPERT AND AN ENVIRONMENTAL POLLUTION ANALYST EXPERT** IN CATEGORY OF **SENIOR CONSULTANT.**

WITH REGARDS

[redacted]

3. [redacted] (Environmental health expert)

3.1 Personal Data

- Full name:
- Marital status:
- Age:
- Mailing address:
- Permanent address:
- Mobile:

[redacted]



ቁጥር 11/1/6466/14
ቀን: 3/5/2014

የአካባቢ ማፈጋገጫ የምስክር ወረቀት

[redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የአካባቢ ብክለት ተንታኝ ባለሙያ እና የአካባቢ ጤና ተንታኝ ባለሙያ የማማከር አገልግሎት ላይ ከፍተኛ አማካሪ የሚል ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO: 11/1/6466/14
DATE: 11/1/2022

CERTIFICATE OF COMPETENCE

ENVIRONMENTAL PROTECTION AUTHORITY

BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS AN ENVIRONMENTAL POLLUTION ANALYST EXPERT AND AN ENVIRONMENTAL HEALTH EXPERT IN CATEGORY OF SENIOR CONSULTANT.

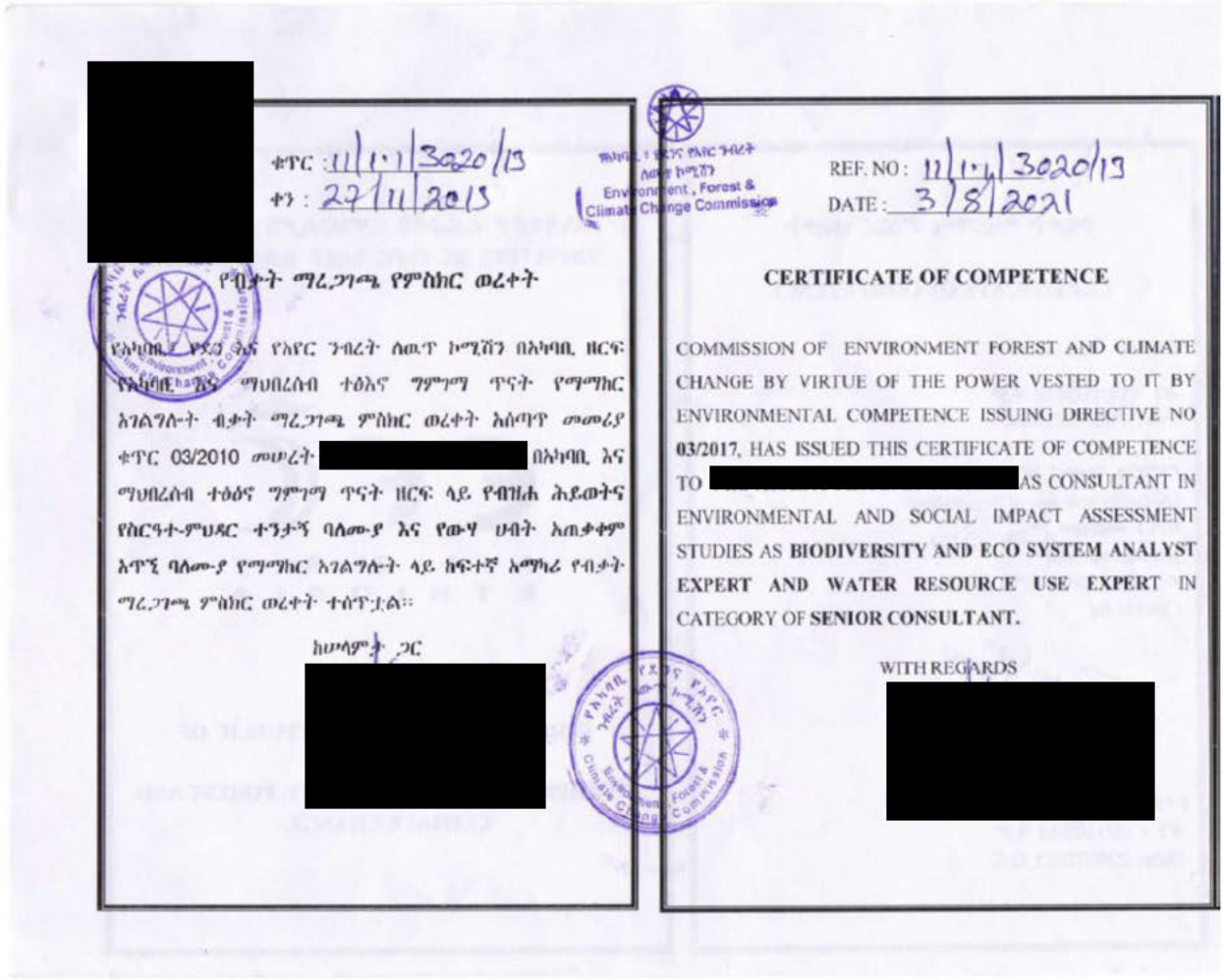
WITH REGARDS

[redacted]

4. [redacted] (Water resource use expert)

4.1. Personal data

- Full name: [redacted] (Water resource use expert)
- Marital status:
- Age:
- Mailing address:
- Permanent address:
- Mobile:



[redacted]

ቁጥር: 11/04/3020/13
ቀን: 27/11/2013

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ ደንና የአየር ንብረት ለዉጥ ኮሚሽን በአካባቢ ዘርፍ የአካባቢ እና ማህበረሰብ ተፅእኖ ግምገማ ጥናት የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የብዝሐ ሕይወትና የስርዓተ-ምህዳር ተንታኝ ባለሙያ እና የውሃ ሀብት አጠቃቀም አጥኚ ባለሙያ የማማከር አገልግሎት ላይ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO: 11/04/3020/13
DATE: 3/8/2021

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO **03/2017**, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS **BIODIVERSITY AND ECO SYSTEM ANALYST EXPERT AND WATER RESOURCE USE EXPERT** IN CATEGORY OF **SENIOR CONSULTANT.**

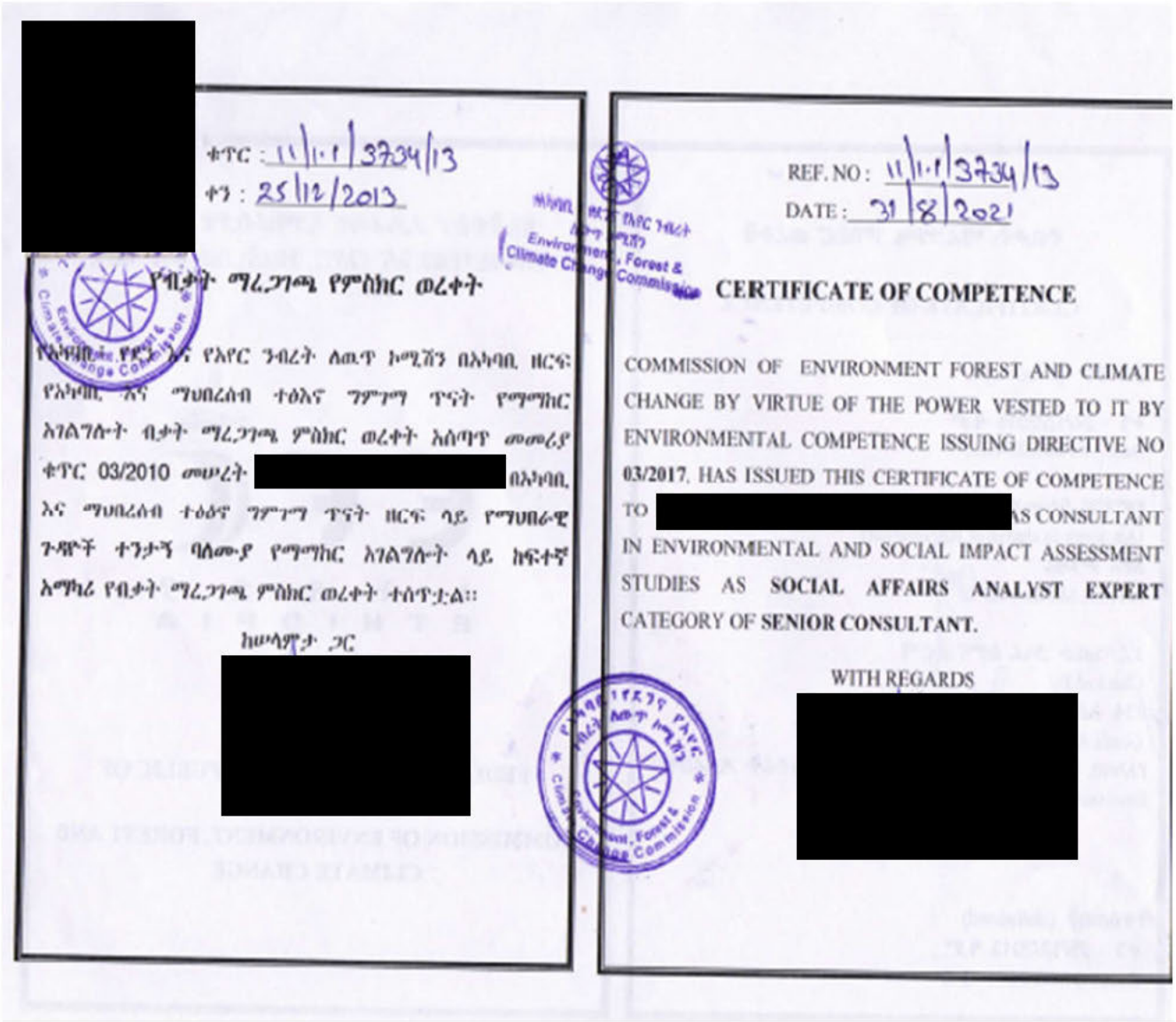
WITH REGARDS

[redacted]

5. [redacted] (MSc, Sociologist)

5.1. Personal data

- Full name: [redacted] (MSc, Sociology)
- Marital status: [redacted]
- Age:
- Mailing address:
- Permanent address:
- Mobile:



ቁጥር : 11/1.1/3734/13
ቀን : 25/12/2013

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ፣ የደን እና የአየር ንብረት ለዉጥ ኮሚሽን በአካባቢ ዘርፍ፡ የአካባቢ እና ማህበረሰብ ተፅእኖ ግምገማ ጥናት የማማክር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ የማማክር አገልግሎት ላይ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO : 11/1.1/3734/13
DATE : 31/8/2021

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS **SOCIAL AFFAIRS ANALYST EXPERT** CATEGORY OF **SENIOR CONSULTANT.**

WITH REGARDS

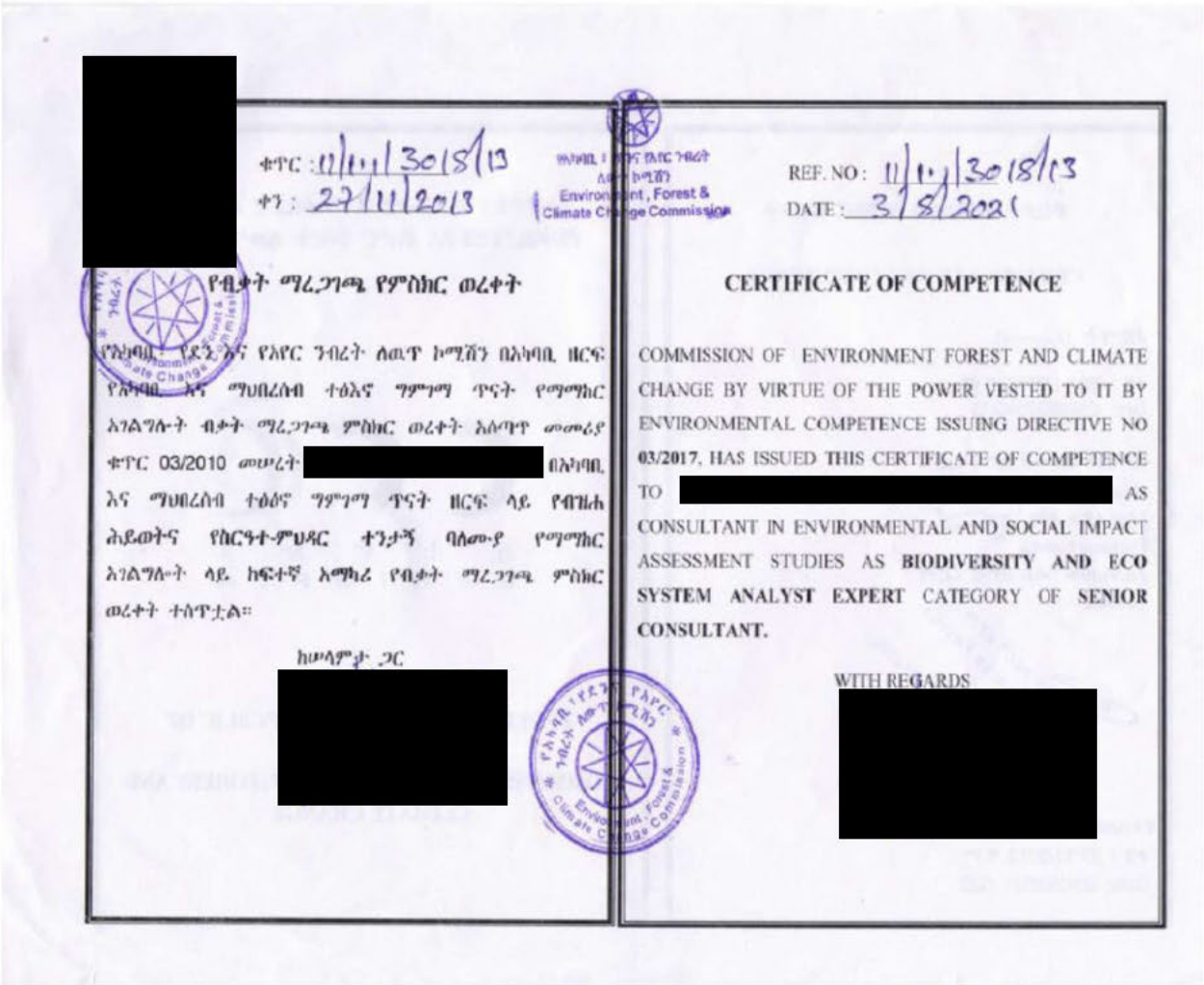
[redacted]

6. [redacted] (PhD, MSc, Ecology, Biodiversity Expert)

6.1 Personal Data

- Full name:
- Marital status:
- Age:
- Mailing address:
- Permanent address:
- Mobile:

[redacted]



[redacted]

ቁጥር: 11/10/3018/13
ቀን: 27/11/2013

የአካባቢ ደንና የአየር ንብረት ለውጥ ኮሚሽን
Environment, Forest & Climate Change Commission

REF. NO: 11/10/3018/13
DATE: 3/8/2021

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ፣ የደንና የአየር ንብረት ለውጥ ኮሚሽን በአካባቢ ዘርፍ፣ የአካባቢ እና ማህበረሰብ ተፅእኖ ግምገማ ጥናት የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የብዝሐ ሕይወትና የስርዓተ-ምህዳር ተንታኝ ባለሙያ የማማከር አገልግሎት ላይ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO **03/2017**, HAS ISSUED **THIS CERTIFICATE OF COMPETENCE** TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS **BIODIVERSITY AND ECO SYSTEM ANALYST EXPERT** CATEGORY OF **SENIOR CONSULTANT.**

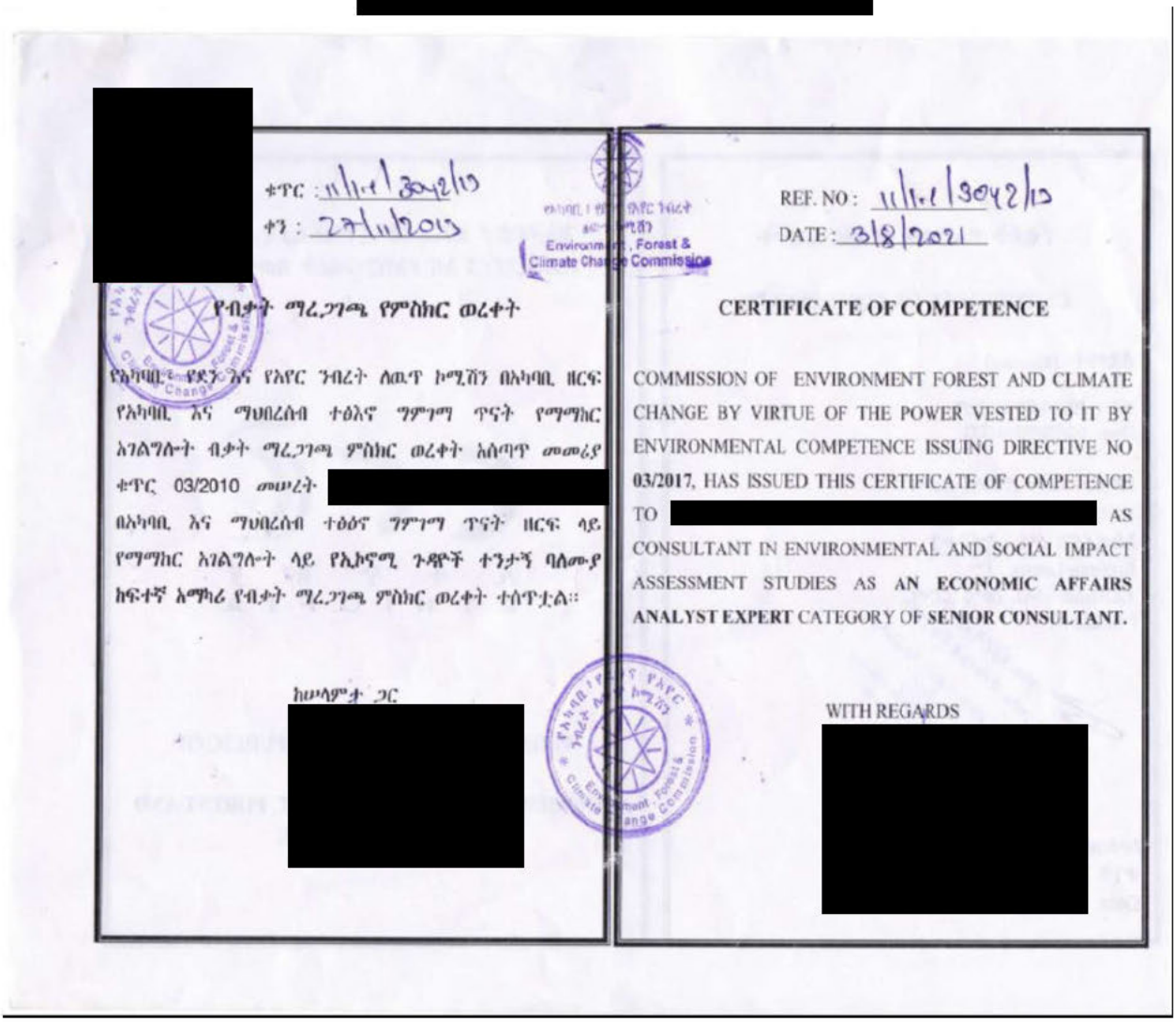
WITH REGARDS

[redacted]

7. [redacted] (MSc, Economic Expert)

7.1 Personal Data

- Full name: [redacted] (Economic expert)
- Marital status: [redacted]
- Age:
- Mailing address:
- Permanent address:
- Mobile:


[redacted]

ቁጥር: 11/1.1/3042/13
ቀን: 27/11/2013

Environment, Forest & Climate Change Commission

የብቃት ማረጋገጫ የምስክር ወረቀት

የአካባቢ፣ የደን እና የአየር ንብረት ለዉጥ ኮሚሽን በአካባቢ ዘርፍ፡ የአካባቢ እና ማህበረሰብ ተፅእኖ ግምገማ ጥናት የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት [redacted] በአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት ዘርፍ ላይ የማማከር አገልግሎት ላይ የኢኮኖሚ ጉዳዮች ተንታኝ ባለሙያ ከፍተኛ አማካሪ የብቃት ማረጋገጫ ምስክር ወረቀት ተሰጥቷል።

ከሠላምታ ጋር

[redacted]

REF. NO: 11/1.1/3042/13
DATE: 3/8/2021

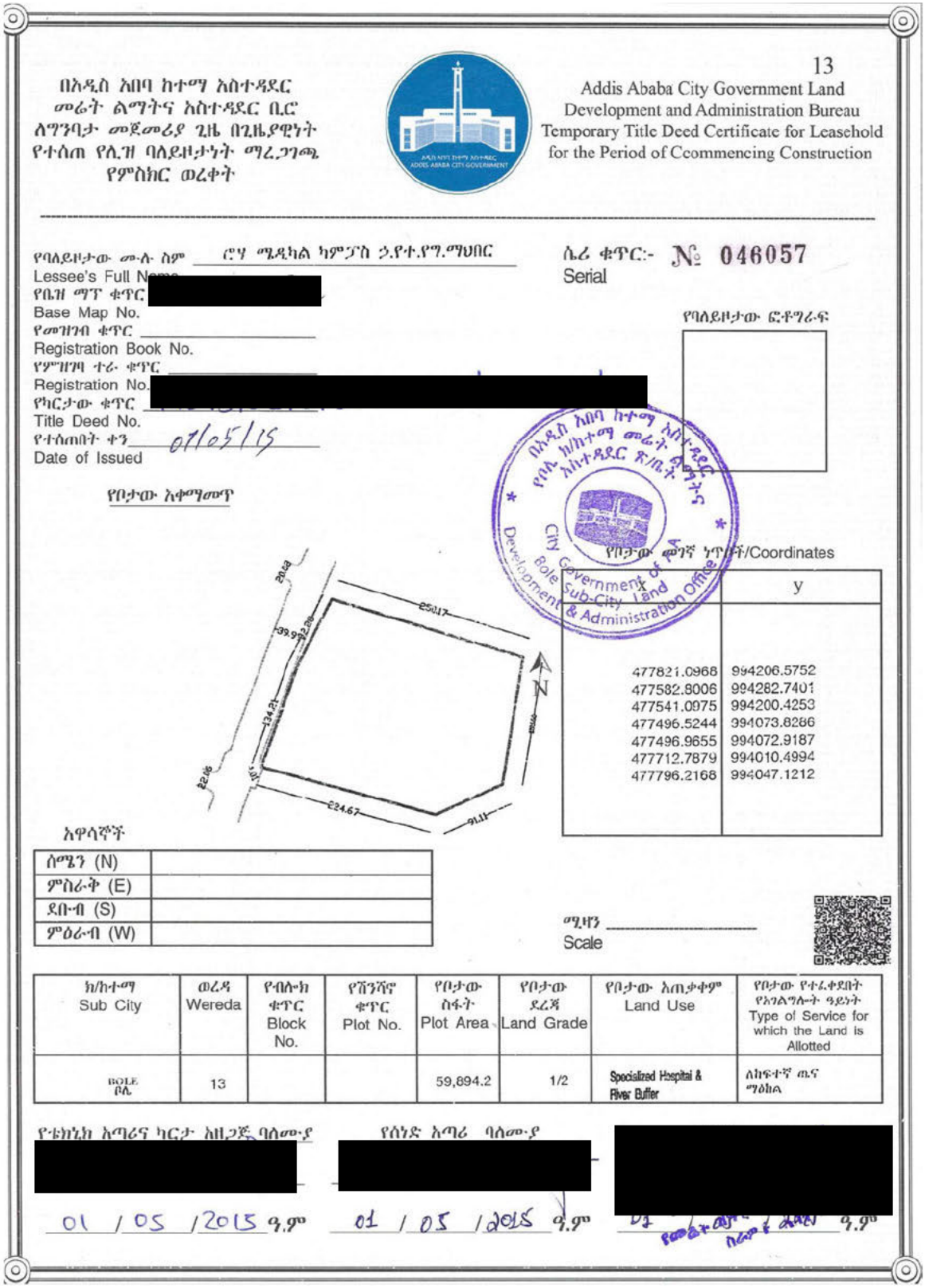
CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT FOREST AND CLIMATE CHANGE BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO [redacted] AS CONSULTANT IN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES AS AN **ECONOMIC AFFAIRS ANALYST EXPERT** CATEGORY OF **SENIOR CONSULTANT.**

WITH REGARDS

[redacted]

ANNEX III: LEGAL DOCUMENTS OF THE PROPONENT



በአዲስ አበባ ከተማ አስተዳደር
መሬት ልማትና አስተዳደር ቢሮ
ለግንባታ መጀመሪያ ጊዜ በጊዜያዊነት
የተሰጠ የሊዝ ባለይዞታነት ማረጋገጫ
የምስክር ወረቀት

13
Addis Ababa City Government Land
Development and Administration Bureau
Temporary Title Deed Certificate for Leasehold
for the Period of Ccommencing Construction

የባለይዞታው መ.ሉ ስም ሮሃ ሚዲካል ካምፓስ ኃ.የተ.የግ.ማህበር
Lessee's Full Name
የቤዝ ማፕ ቁጥር [redacted]
Base Map No.
የመዝገብ ቁጥር
Registration Book No.
የምዝገባ ተራ ቁጥር
Registration No. [redacted]
የካርታው ቁጥር
Title Deed No.
የተሰጠበት ቀን 01/05/15
Date of Issued

ሴሪ ቁጥር:- № 046057
Serial

የባለይዞታው ፎቶግራፍ

የቦታው አቀማመጥ

የቦታው ቁልፍ ነጥቦች/Coordinates

x	y
477821.0968	994206.5752
477582.8006	994282.7401
477541.0975	994200.4253
477496.5244	994073.8286
477496.9655	994072.9187
477712.7879	994010.4994
477796.2168	994047.1212

አዋሳኞች

ሰሜን (N)	
ምስራቅ (E)	
ደቡብ (S)	
ምዕራብ (W)	

ሚዛን
Scale

ክ/ከተማ Sub City	ወረዳ Wereda	የብሎክ ቁጥር Block No.	የሸንሻኖ ቁጥር Plot No.	የቦታው ስፋት Plot Area	የቦታው ደረጃ Land Grade	የቦታው አጠቃቀም Land Use	የቦታው የተፈቀደበት የአገልግሎት ዓይነት Type of Service for which the Land is Allotted
BOLE ቦሌ	13			59,894.2	1/2	Specialized Hospital & River Buffer	ለከፍተኛ ጤና ማዕከል

የቴክኒክ አጣሪና ካርታ አዘጋጅ ባለሙያ [redacted]
01 / 05 /2015 ዓ.ም

የሰነድ አጣሪ ባለሙያ [redacted]
01 / 05 /2015 ዓ.ም

[redacted]
ዓ.ም

ANNEX IV: STAKEHOLDER CONSULTATION

የሮሀ ሜዲካል ካፓስ የአካባቢ እና የማበረሰብ ተጽእኖ ግምገማ የማበረሰብ ምክክር ቃለ ጉባኤ

- የመሰብሰቢያ ቀን: 07/09/2013
- ሰአት: 3:00 እስከ 5:00
- ቦታ: ቦሌ ክ/ከተማ, ወረዳ 13, የምጣቶች ማእከል

አጀንዳ፦

1. ስብሰባዉን በአማሪ ድርጅቱ ተምካይ አላማዉን በመንገር ማስጀመር (የባላል አማሪ ድርጅት ተምካይ)
2. ስለፕሮጀክቱ ባህሪ ለተሰብሳቢዋ በሮሀ ሜዲካል ካምፓስ ተምካይ ለተሰብሳቢዉ ማሳወቅ (ሮሀ ሜዲካል ካምፓስ)
3. የማህበረሰብ ምክክር

3.1የፕሮጀክቱ አምንታዊ ተጽእኖዎች ላይ አስተያየት እንዲሰጡ የማበረሰብ ተምካዮችን መጋበዝ

3.2የፕሮጀክቱ አሉታዊ ተጽእኖዎች ላይ አስተያየት እንዲሰጡ የማበረሰብ ተምካዮችን መጋበዝ

3.3የማህበረሰቡ ተምካዮች የላቸዉን ማንኛዉም ስጋት እንዲገልጹ መጋበዝ

4. የምረዳ 13 የስራተኛ እና ማህበራዊ ጉዳይ ቢሮ ተምካይ አስተያየት እንዲሰጥ መጋበዝ
5. አዲስ አበባ ከተማ አስተዳደር የአካባቢ ጥበቃ እና አረንዴ ልማት ኮምሽን ተምካይ ከማህበረሰቡ እና የባለድርሻ አካላት ተምካይ አስተያየት እንዲሰጥ መጋበዝ
6. የሮሀ ሜዲካል ካምፓስ ተምካይ ማህበረሰቡ ባነሳቸዉ ጉዳዮች ላይ የማጠቃለያ ሀሳብ እንዲሰጥ መጋበዝ።
7. በአማሪ ድርጅቱ ተምካይ የማጠቃለያ ሀሳብ በመስጠት ስብሰባዉን መዝጋት

2. ዉይይት

2.1ስብሰባዉን በአማሪ ድርጅቱ ተምካይ አላማዉን በመንገር ማስጀመር (የባላል አማሪ ድርጅት ተምካይ) የባላል ተመሠረተ የመጠ ልጉ: ለተጠሩላቸ: በስብሰባቸ ላይ ያልተገኙ: በሀሳ: ላይ ሀሳባቸዉ: ያልተሰጠ: ሰዎች: ካሉ: ይህ: የአማበርቶን: ጥያቄ: ---

በዚህን መሰረት ካሉት ይህ የአማበርቶን ጥያቄ ---

የሮሀ ሜዲካል ካፓስ የአካባቢ እና የማበረሰብ ተጽእኖ ግምገማ የማበረሰብ ምክክር ቃለ ጉባኤ

- የመሰብሰቢያ ቀን: 07/09/2013
- ሰአት: 3:00 እስከ 5:00
- ቦታ: ቦሌ ክ/ከተማ, ወረዳ 13, የምጣቶች ማእከል

2- አሳንፀፅኗቱ ግሀፃ አተሰጣሪው በሮሀ ሚዲካል ካምፓስ ተወካይ አቶ [redacted] ገለፃ አድርገዋል። ተወካዋ: የሮሀ ሚዲካል ካምፓስን: በአቶ: ካንሳስ በኋላ: ከ7000 የሥራ ዕድል: ካቡቷል: ግዙ ግንባታው በ2022 ሥራ ሲጀምር ሲንዲሁም: አስተዳደሩ: አገልግሎት ማሳንም: ከሣናቶች, አሕጓናት; የካንሰር: ሕንፃር ሲንዲሁም: የሚዲካል ካምፓስ ሲያሳፀፅ አወዳፊቱም ከ4500 ሠራተኞች የሥራ: ዕድል: ሳፊንሺል: የሀገር በቀል ዘፀችን ሳተሳታፅ። የሮሀ ሚዲካል ካምፓስ ሆስፒታሉን በማም ሲሳያል ካምፓሱ ፆችሳቃቸን በአከለ በማሳእከፍል: መፀፃ ከመንገድ የማለአወንጂ ሲመጡት ካምፓሱ ብልጠወት: መዳሽህ (10,000) ሕዝብ: ሲንዲጠያለተናሳደ- ካገለፅ በኋላ: ከጠሩሉት ግንኙቻች መፀፃሕ ለመለጠት ቃለ ጉባኤው ተቋጧጠዋል

3.1 የፕሮጀክቱ ሲመንቻው ተጽኖችች: ለሳ: ለሳ: አሳተያየት የማህበረሰብ ተወካዮች መጠየቅ

ካማህበረሰቡ: የለለጠ ሀሣቦች: - ተፈናቃዮች: ሰንመሀገጠ ለህተትለለ ያለንው 70 ለችች ብቻ ነው:: የሮሀ ሚዲካል መጀመሪ: ጥሩ ነው አፅጀመው: ሳንችባር አለው ሲሉ ሔለዉ ተሣታፊ: ሰንዴ ሀገር ለናለጠ ሕዝቡ: ለጠቀም ጠጣ ዴሉ ሳለችል ሆኖም: ሳችን የለፈናቀለነውን ዘንች: የሥራ ዕድል ጣጣንም በፊት ለለጠ: ሳገግል ሔለዉ ጠያቂ ባለ ሀለፒቶል ሣዘሀ ቦታ: ለመሠረት አሕጠረለው: ምን ታለፃል? ሔለዉ ተሣታፊ: ሰኔ በሮሀ ሚዲካል ለሳ ምንም ተቃውሞ የለችም: ነገር ግንበሠራዊው በጣም ተንሳፅ ነጠረበት: በዚህ ንድግ መህበረሰብ አሳተዕፅ። ሔለዉ ተሣታፊ ባለ ሀለፒቶል ሣዘሀ መሠረት ሲንዲሳሉ: ነገር ግን: ሰኔ ሳይ ሣዘሀ መሠረት ላይ: ሲንፍችው ቻችን ተቀጥረን መሠራት ሳለጠን ሣለጠጠ ሰንሰጠሪያ: ሰኔ ንድና ሰፊ ሲንዲ ዴችለን: ሔለዉ ተሣታፊ ባለ ሀን ሲሰገችሁ: ለለለጠጠችሁን በጣም አመለሳናለሁ ጠለፃል። ሔለዉ ሲለጸያት የለጠሪ መጀመሪያ ቃለ ተገገፅን: ነገር ግን ፅቃ ሠናወጣ ሳፊንደዘን ሀሣቅጠር በአለቴ ሳዘ ሲንዲንለናቃል ተፈርጋል የመሠረፃ ለፊሳያት ለ4 ሽ ተመሣሣይ ሀሣቦችና ችለተያዩችች አገላፃል።

የሮሀ ሜዲካል ካፓስ የአካባቢ እና የማበረሰብ ተጽእኖ ግምገማ የማበረሰብ ምክክር ቃለ ጉባኤ

- የመሰብሰቢያ ቀን: 07/09/2013
- ሰአት: 3:00 እስከ 5:00
- ቦታ: ቦሌ ክ/ከተማ, ወረዳ 13, የምጣዱች ማእከል

3·2- የፕሮጀክቱ አወንታዊ፡ ተጽዕኖች ላብ፣ አሉታዊ ተጽዕኖች፣ እንቅስቃሴው የማህበር ተወካዮች ወይጠሃ፡-

ሳቋማ በረሓ፡ ተወካዮች ስጋት፡ ስጉት፡- እንዴት፡ መንግስት አዛዥች አያሉማ፡ ሌላው ሳዛህ ስተ ተወሰዱን፡ ጂኦግን፡ እንዴት የጉም እንጣሳሰን፡ ሴጎት፡ ተሳታፊ፡ ስዚህ፡ ስተ፡ ተመሰሳተን፡ እንዴት ማቻን፡ ጂየናርግ፡ ሳለር፡ ሳንጉ አለለማችሁሁንም, አሰቴ ነ ባን የንሰ ፕሮም፡ ሳለለስች፡ አሉታዊ፡ ተጽዕኖ፡ ጂሳያተሳሰ።

*የባዛር ኢማሳሪ ተወካይ መጠቢለስን፡ በመሬገን፡ ለመጎተ የሆነ ተሳታፍነታችን አረጋግተው፡ ለፋ ያለ ሀሳባቸውን አጠቃሪተው ገፀያሳ።

3·3- ያመነመለለ ተወካዮች ያለጉዳት መንደራችንም ሥጋት አንዴገፅ መጋለጥ የመሳህበረሰብ ሥጋት፡- የሥራ ኢድሉን፡ በዘመድ፡ ሊለጥ ሰፋለፅ፣ ከሚፅ፡ የተጎሩባ፡ ችግር አፅተመሰሳጉታችሁሁንም; የአካሳ አንሳፊ፡ ችግር አለለን፡ የሚሉ ስርዝ ያሉ የሥጋ አለተያየታ፡ ተጠራርተው ተጠቁሟል።

4- ያወሪዳ 13 የሠራተኛ ማህበሩ ጉዳዛ፡ ስር ተወካይ አለተያየታ እንዴያስገ መጋለጥ

ግሩፍ፡ በላይ፡ ለይ፡ ስራዎች የምለጠው አለተያየታ፡ በአካባቢው አካባቢዎች፡ የሥራ ኢድሉ፡ ላሁኑ ችግር ስጀመር ስተለጠሰ፡ መሰሳው ነው። አየች በሄዴ ቋጥር፡ የሴፅ ችግር ለለመረመር፡ የአካለስር ነዋሪዎች፡ የሴዴት፡ ተመቃሚነት እንቅፋት። ለገጥመው ብችሳለ፡ በመለስ፡ ለፋ ያለ፡ አለተያየታ፡ በመለጠን እንግሳሩቸው፡ ቋሚ ተጠቁሟል።

-3-

የሮሀ ሜዲካል ካፓስ የአካባቢ እና የማበረሰብ ተጽእኖ ግምገማ የማበረሰብ ምክክር ቃለ ጉባኤ

- የመሰብሰቢያ ቀን: 07/09/2013
- ሰአት: 3:00 እስከ 5:00
- ቦታ: ቦሌ ክፍለ-ከተማ, ወረዳ 13, የምጣኖች ማእከል

5- የአዲስ ሕጠማ ሀተማ ጽሕተዲደር የአካባቢ ጥበቃ ሂና ጽረንጀ ፍጠን ሃወሽን ተወግዲ ኮማህበረሰቡ ሂና ቦንሉ ፍርኅ ጽሕፈት ተወግዲ ጽሰተጀቦች ጽንዲሰዮ መጋጠሃ

- ሲህ የተፈናቀለውን ሕዝጠ የመኪሉተው ገለይርሽ ጽካሕጉ ወጅ ማህበረሰቡ ቀርበው ጽሰፅዕጀውን ጽጉመጠ ሲደረግላቸው ጽጉመጠ ሲጀረግም ሃጠሙ ማዲናጉ ጽጽሉ ሂዲጀረግ በሂሃሉ መሰጎር ሀተቶች ሲነርበቶች = በመሰረጉ ሰፍ ማጠረረያ ሕንጉ ው ሀሣበቸው ጽመቋሰሂፍ.

6- የeሀ መዲካፍ ሳምፓስ ተወሳሲ ማህበረሰቡ ገዳቦች ሳሲ የመመቋሰያ ሀሣጠ ጽንጂሰዮ ገጋበጉ

* የeሀ መዲካፍ ሳምፓስ ተወሳሲ — [redacted] የመጽመሪያ ቀጽጠኒያ የመረመጣቸው ሰeሀ ተፈናቃሲ ሳው። ቀጽካሰ ሰወርዲው ሳው። ሲህን ሳሽናንታጋር ጽየተወያየን ጽንሄዲጠታሕን። ሳሣን በተመሰሳጠ መንግሰት ጀመቻፅ ሰርሆን ጽኖ ያሰጠሳው በንወር ውስጥ ሰወሩ ሳሲሰ ሰወሩ ሳፈሰ ሳው። የሳንክ ጽሳወጣ ም ሳቅጠናል

- ሳዘያ በሂሰ መሎ የታሰበውን ሳቅያ ጽንሰመጠሕን።
- የሳተክ ቢቻችን በተመሰሳጠ የተወሰነ ውጋቅ ጽናዲሳሕን።
ጽሳዲሀው ሰሰዘጣ ሰሰሚገባው 112,000 ሺV ጠር ጽንሰጣሕን።
- ሽር ቢጀ ሰሳቸው ጠር 50,000 ሲሰማፅ ሲህው በጀንቅል ተጣቀቻ ሰተመሰዘገቡት ገቻ የመሰለን ሳው። በመቅጣሰዉ ሳያመጣ ሳቅያው ሲሠማፅ
- ተሳሳሲን በተመሰሳጠ በዚህ ሳቅያ መሰጣጠቻ ጽሽፅሳጠቻው ፅፍጠና ማን ጽንሰማሕን መሠጠቻው ሳቻሳፅ።

የሮሀ ሜዲካል ካፓስ የአካባቢ እና የማበረሰብ ተጽእኖ ግምገማ የማበረሰብ ምክክር ቃለ ጉባኤ

- የመስብሰቢያ ቀን: 07/09/2013
- ስአት: 3:00 እስከ 5:00
- ቦታ: ቦሌ ክፍለ ከተማ, መረዳ 13, የምጣቶች ማእከል

ካፊተሪቋንር ቦቀጠለ:- ሄኖ የሚመለከታቸን መሬቶን ወሰዳን የርሃ ጠረዲካፍ ካምፓኒ መሠራች አለሆኑ ሌሎችን ንግሮች ከመመለከተው የመንግስት አካላ ማሳወቅ ነው። ሌላው ካ65 ማመች በካባ ሄዱሚ ካለችው ሃሳፍንችን በመከልከሉ ተጠቃሚ ሠር 30000 ነንጂለጣቸው ታሳቧል።
ሄንለሣች አመንደቡ ካዋፍዎች ቅግው በካጠቃቸ ፅኳ ጣንጋዝ ጣቦይ ሀሪሌሪ የመያ ሠመ አመሸፈን የሚሆን ክፍያ ወጪሀሳቸው።
- አዛፍ በተቆጠረው በተመዘገበው መሠረት ቆንጣማ ሃሰይሳኑ።
- ሳንጥር በተመለከተ:— በመርሃ በቅጽው ተጠተፅ ሪሆነፅ።
- የንግድ ቤችን በተመለከተ 50,000 ሠር ታሳቦለቸዋል።
- አሠፃፅችው የሠሪ ነፃፅ ሳሬጥ ሪፅ።
- የቋርፈታ ስሚ ኦካፅ ተቋቁሟፅ።
- የተጠሪዮችን ግሳ ክፍያ በተመለከተ በዚህ ክፍያ ወሰን ሄሰተግተው በጣን ተሠካየው በመግልያቸው ማህበረሰቡ በመፅህ አይሀ ችሬታቸውን በሄለተያዩት ገፅያሳፅ።
- የርሀ ሚዲካፅ ካምፓኒ ተሠግሳ አማህበረለት ለገፅያ።
- በሄኖ በሳፅ ካለሳ ነንጂገለፅሳት የቅሬታ አሠሚ ሳይ አንለ ችሬታቸሁ ሄሳርቦና ሳተሳኑታል ለለቁ።
- በአጠቃለሳ አቀረቡት ኦለያዩችን ጥያቄዎች የርሃ ሚዲካፅ በቋ ማጠረዩ በለጠ አሣሰጣቸውን ኦለመቻሳቸው።
ሻ በሄማህበ ዳርጉት ተሠግሳ በሳፅ የማጠቃለያ ሀሣሳ ካለመ በኋለ ቀጣህበረሰቡን ተሠካዎችን በዚህ አማለሳ የተገኘች ንጹፅ መሠረች አማለሳው ዘግተዋል።

ዳ5

Public Consultation participants of ROHA Medical Campus, ESIA study

- Meeting date: 15/05/2021
- Time: 9:00 AM to 11:00 AM

Place: Bole Sub-City, Woreda 13, Youth center

	Name of participant	Organization/Position	E-mail address	Tel./Fax	Signature
1	[redacted]			[redacted]	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

Public Consultation participants of ROHA Medical Campus, ESIA study

- Meeting date: 15/05/2021
- Time: 9:00 AM to 11:00 AM

Place: Bole Sub-City, Woreda 13, Youth center

34	[redacted]		[redacted]
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			

Public Consultation participants of ROHA Medical Campus, ESIA study

- Meeting date: 15/05/2021
- Time: 9:00 AM to 11:00 AM

Place: Bole Sub-City, Woreda 13, Youth center

71	[redacted]				[redacted]
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					
101					
102					
103					
104					
105					
106					

ANNEX V: NATIONAL EMISSION STANDARD

Emission Limit Values for Inorganic Gaseous Substances

The concentration of the total of the following inorganic gaseous chemicals in Class I shall not exceed 5 mg/Nm^3, that of those in Class II shall not exceed 30 mg/Nm^3 and that of those in Class IV shall not exceed 3500 mg/Nm^3.

Class	Parameter	Mass concentration per substance
I	• Arsine • Cyanogen chloride • Phosgene • Phosphine	
II	• Bromine and its gaseous compounds, as HBr • Chlorine • Hydrocyanic acid • Fluorine and its gaseous compounds, as HF • Hydrogen sulfide	
III	• Ammonia • Gaseous inorganic compounds of chlorine, unless included in class I or class II, as HCl	
IV	• Sulphur oxides (sulphur dioxide and sulphur trioxide), as SO_2 • Nitrogen oxides (nitrogen monoxide and nitrogen dioxide), as NO_2	

1. Emission Limit Values for Organic gaseous substances

Organic substances, which are categorized into classes I, class II and class III in Annex 1, shall not exceed the following mass concentrations:

Class	Mass concentration
I	50 mg/Nm^3
II	200 mg/Nm^3
II	300 /Nm^3

Inorganic Particulate Matter

The concentration of neither of the following chemicals in Class I shall exceed 0.5 mg/Nm^3, the concentration of the total of the chemicals in Class II shall not exceed 10mg/Nm^3, and the concentration of the total of chemicals in Class III shall not exceed 20 mg/Nm^3.

Class	Substance
I	• Mercury and its compounds, as Hg • Thallium and its compounds, as Tl
II	• Lead and its compounds, as Pb • Cobalt and its compounds, as Co • Nickel and its compounds, as Ni • Selenium and its compounds, as Se • Tellurium and its compounds, as Te
III	• Antimony and its compounds, as Sb • Chromium and its compounds, as Cr • Easily soluble cyanides (e.g. NaCN), as CN • Easily soluble fluorides (e.g. NaF), as F • Copper and its compounds, as Cu • Manganese and its compounds, as Mn • Vanadium and its compounds, as V • Tin and its compounds, as Sn

ANNEX VI: ENVIRONMENTAL AND SOCIAL PERFORMANCE OF RMC

Impacts	Mitigation measure	Indicator	Actions taken	Remark
Displacement	• The dwellers should be consulted about the resettlement process. • RAP and livelihood restoration should be prepared for eight households. • The project is implementing a resettlement action plan that includes a livelihood improvement strategy for 129 households. The project will make livelihood assistance payment to informal settlers, provide skill training and hire persons from the locality during construction and operation of the medical campus. • Alternative resettlement sites should be immediately provided for displaced people, particularly for eight households. • Displaced people should be advised as to how to sustain livelihood activities: Specially the family to be resettled has shown interest towards livestock breeding.	• Presence of RAP • Number of households compensated • Implementation report and documentation • Livelihood training attendance roster and certificates	• RAP for the RMC Project was prepared • Livelihood restoration Assistance accounts ETB 6,175,000.00 • Financial compensation for displaced accounts ETB 14,561,800.00 • The sub city has provided land compensation for the legal households.	Compliant
Air Pollution	• Avoid unnecessary excessive vehicle movement and have proper schedule plan. • Limit vehicle speeds on non-surfaced roads. • Maintain equipment and vehicles in good working order to avoid excessive emission. • Excavated surface should be sprayed with water from time to time to reduce dust emission during operations. • Construction work should be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility. • Workers will be provided with PPE and the use of PPE shall be enforced. • Dumping of material from the heavy vehicles will be done from an appropriate height for less dust generation. • The heavy vehicles are the main sources for release of carbon monoxide and nitric	• Number of accidents occurred • Compliant record • Maintenance records • Volume of water used from the record	• Posting speed limits along the access road is a smart move for ensuring safety and minimizing risks • There have been no complaints about dust pollution • A licensed and Level I contractor on board for the project • The contractor	Compliant (Note: site visit is conducted during the rainy season)

	oxide, so to avoid the increase of pollutant in the site; the vehicles will be maintained properly and regularly. • Provision of face mask to workers to minimize inhalation of dust particles. • Low sulphur diesel should be used for running construction equipment and vehicles. • Vehicles carrying construction material and debris should be covered with tarpaulin cover. • Raw materials, excavated soil and other debris should be stored and transported under covered nets. • Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dust. • Enclosing the structures under construction with dust proof nets. • Regular maintenance and services of machines and engines as per the manual.		provided adequate PPE for construction workers • Using a garage for maintenance of machineries and cars	
Noise Pollution	• Routine timely maintenance of equipment as per the manual. • Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents. • Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided. • Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above. • Acoustic enclosures should be provided with DG (diesel generator) sets and machinery to control the noise levels at construction site. • Temporary noise barriers like barricades will be provided in the area which involves high noise generation during construction phase like excavation sites, demolition sites etc. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Construction works should be carried out only during the specified period/schedule.	• Compliant record • Presence of noise absorbing cover	• The generator at RMC construction site has a noise-absorbing cover, • Concrete filling activities at RMC take place during the daytime, • At RMC, there is no major noise source that exceeds the national limit requiring PPE, • The forest that is developed alongside the highway plays a crucial role in mitigating the noise generated by the heavy traffic. .	Compliant
Water resource	• Temporary storm water drains and rainwater harvesting ponds should be constructed so as to store rainwater for construction activities.	• Presence of temporary storm water drainage,	• Storm water drains and rainwater harvesting ponds	Partially compliant

Pollution	• Pollutant retention during runoff like filter strips are vegetated with grasses and groundcovers that filter and reduce the velocity of water and improve treatment. • Regular inspections at site to monitor leakages in water storage tanks. • Prevent piling up of excavated soil, raw material and construction debris at site by proper management and disposal. • Minimize run-off by using sprays for curing. • Construction of storm water drains along with sedimentation tanks with sandbags as partition to retain the soil particles from storm water drain. • Construction of soak pits/septic tanks to dispose-off the domestic wastewater generated from labour camps to prevent disposal of sewage in surface water bodies. • Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies. • Construction vehicles and machinery should be regularly serviced and checked for any leakage of oils.	• Presence of spill response plan • Presence of latrine and sanitary facility for construction workers • Good waste segregation and management practice (waste storage sites) • Presence of garage for construction machinery	were not constructed, • Wastewater from a concrete batching plant directly released into surface water, • Used oils are stored in an open area that lead to contaminated soil and water, • Waste segregation practices are partially implemented at RMC	
Soil Impacts	• Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation. • Avoid spilling leaking of chemical. • Soil conservation measures must be applied to the stockpiles to prevent erosion. Prepare trenches around the borrow area to prevent runoff entering a downstream area; Avoid rainy season excavation to avoid erosion. Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages. • Fuel storage area should be paved. • Construction debris should be stored under covered sheds and paved surfaces and should be disposed of regularly to designated sites. • Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the camp site. • Recyclable waste should be sold to the authorized dealers and the remaining should be disposed of at designated sites through local agencies responsible for waste management in the area, • There must be proper solid waste management practice (sorting, collection, transportation, reuse, recycle, recovery and disposal).	• Waste segregation and storage practices • Presence of spill response plan • Presence of paved fuel storage area	• No stockpile is observed during the site visit • Improper storage of used oils leads to spills at the garage.	

Biodiversity Impacts	• The project could mitigate this impact by delineating land areas within the project site that could be used to plant various indigenous tree species that will have significant biodiversity values and/or provide ecosystem services of significance at the local level, implementing measures to minimize habitat fragmentation such as biological corridors, and restoring habitats during operation and/or after operation of the project. • Protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. • Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible. • Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan. • Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. • Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.	• Area of green space reserved and number of trees planted • Presence of fences for the compound	• Land within the project site has been delineated, and 12,000 indigenous trees have been planted, which have significant biodiversity value.	Compliant
Utilities Impacts	• Employing water conservation techniques and only using the required amounts of water to prevent wastage. • RMC will have its own water supply borehole in addition to the municipal supply. • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible. • Using machines with power saving technologies i.e. high efficiency equipment. • Providing proper sanitary facilities for construction workers. • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.	• Volume of rain water used for construction purpose • Presence of borehole • Presence of sanitary facility for construction workers	• Daily monitoring of leaks is their water conservation technique • Borehole is not yet constructed at RMC • Sanitary facility is available for construction workers	Partially compliant
Traffic Impact	• Placing signs around the site notifying other vehicles about the heavy traffic and setting the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations. • Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations.	• Presence of traffic and access signs around the site • Absence of any construction material or activity outside the construction site	• Setting speed limits 15 km/hr to help in controlling the speed of vehicles, particularly in areas where there is high pedestrian	Compliant

	• Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.		or construction activity • Informs drivers of the specific conditions around the site, allowing them to drive more cautiously	
OHS Risks	• Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. • Regular provision of health and safety training for all workers. • Optimization of working schedule and work to minimize several material vehicle mobilization trips. • Regular inspection and scheduled maintenance of all equipment. • Ensuring all potential hazards such as movable machine parts are labeled. • Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. • Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials in the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the site, and workers in the site. • Providing firefighting equipment in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. • Labeling chemicals and material according to the risks they possess. • Creating safe and adequate fire and emergency assembly points and making sure they are well labeled. • Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbors. • Provision of first aid kit.	• Number of workers trained • Maintenance records • Type and number of PPE provided • Presence of readable signs in each site • Presence of firefighting equipment at store and in each vehicle • Presence of OHS officer • Presence of first aid materials proportional to the number of workers	• Potential risks to the organization, including safety hazards (Falls, car accidents, Electrocutions etc.) environmental impacts, and operational risks were identified • Awareness and education program is given for workers and visitors • Providing workers with adequate Personal Protective Equipment (PPE) and monitoring • Visible and readable signs were posted at construction site • Used oils were not labeled • First aid kit is available but lacks sufficient supplies	Adequate supply of first aid kit should be available based on the number of construction workers