CONSULTANCY SERVICES FOR FEASIBILITY STUDY, PREPARATION OF PRELIMINARY DESIGNS, DETAILED DESIGNS, SAFEGUARD DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE AND TRANSMISSION PIPELINES TO KILIFI AND GANDA TANKS

CONTRACT No.: KE-CWSB-102977-CS-QCBS

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT FOR THE PROPOSED BARICHO PLANT SOLARIZATION PROJECT

Latitude 3°07’ 33.33” S and Longitude 39°46’46.75” E.

Prepared By;

SARI CONSULTING LTD **in JV with** SGAPI **and** gath CONSULTING ENGINEERS

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DOCUMENT CONTROL

CONSULTANCY SERVICES FOR FEASIBILITY STUDY, PREPARATION OF PRELIMINARY DESIGNS, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE AND TRANSMISSION PIPELINES TO KILIFI AND GANDA TANKS (PHASE II)

EMPLOYER:

COAST WATER WORKS DEVELOPMENT AGENCY

CONSULTANT

SARI/SGAPI/GATH JV

DOCUMENT TITLE:

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT FOR THE PROPOSED BARICHO PLANT SOLARIZATION PROJECT

RECORDS FOR REVISION

VER.:	DATE:	DESCRIPTION:	PREPARED BY:	CHECKED BY:	APPROVED BY:
Draft	September ,2025	ESIA CPR Report			
1	October 2025	ESIA CPR Report			
2	November 2025	ESIA CPR Report			

SUBMISSION DETAILS

Certificate of Declaration and Document Authentication

This document has been prepared in accordance with the Environmental Management and Coordination (Amendment) Act 2015 and Environmental Impact Assessment and Audit Regulations, 2019

This report is prepared for and on behalf of:

LEAD EXPERT	**PROPONENT**
GATH CONSULTING ENGINEERS MUTHANGARI DRIVE OFF WAIYAKI WAY, NAIROBI, KENYA P.O. BOX 14279, 00800 WESTLANDS TEL: (254) 20 - 4441473 FAX: (254) 20 - 4443828 Email: gce@gathkenya.com **Name:……** **Designation:…….** **NEMA Reg. No.:……** **Signed: ……..** **Date:……**	**COAST WATER WORKS DEVELOPMENT AGENCY** POSTAL ADDRESS**:** P.O. BOX 90417-80100, MOMBASA TEL**:** 041-2315230 PHYSICAL ADDRESS: MIKINDANI STREET, OFF NKURUMAH ROAD, MOMBASA Email: **info@cwwda.go.ke** **Name:…….** **Designation:…….** **Signed:……** **Date:……**

DISCLAIMER:

This Environmental Impact Assessment Comprehensive Project Report is based on literature review and findings from field assessment. It is however, subject to conditions in the Environmental Management and Coordination Act 2015 Environmental Impact Assessment and Audit Regulations, 2019 and World Bank Environmental and Social Safeguards

FACT SHEET

Program Name	Water and Sanitation Development Project (WSDP)
Assignment Name	Consultancy Services for Feasibility Study, Preparation of Preliminary Designs, Detailed Designs, Safeguards Documents and Tender Documents and Construction Supervision of Second Baricho – Kakuyuni Water Pipeline and Transmission Pipelines to Kilifi and Ganda Tanks
ESIA Report	Comprehensive Project Report for the Proposed Baricho Plant Solarization Project
Client	Coast Water Works Development Agency
Project Scope	A hybrid solarization is proposed to generate the required combined power of at least 8.345MW and appropriate/equivalent solar assembly and accessories. The solarization will be clustered into 5 solar plants and implemented into Phase 1 and Phase 2. The proposed works for solarization of Baricho Plant under Phase 1 are summarized as follows; 1. Supply and installation of 6,717No. 650W Solar PV Modules to generate at least 4.366MW of Power from the respective solar plants 2. Supply and installation of battery storage for the respective solar plant 3. Supply and installation of the accompanying MPPT inverter system for each set of the pumps 4. Supply and Installation of the respective PV Disconnect Switch 5. Supply and Installation of Electrical cables and sundries 6. Construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. This will also include supply and mounting of the solar panels using solar cell brackets as detailed in the book of drawings 7. Installation of inverter cage 8. Construction of Civil works – Fencing of the solar power plant sites, related road works, and drainage works and equipment/control rooms.
Project Cost	KES 758,291,064.54
Project Location	Lango Baya Sub-County Kilifi County
Target beneficiaries	Malindi, Kilifi and Mombasa
Lead Expert	Dr. Stephen Chege Reg. No. 1580
Associate Experts	Sarah Karanja – 12660

ABBREVIATIONS & ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ARAP	Abbreviated Resettlement Action Plan
CBO	Community Based Organization
CESMMP	Construction Environmental and Social Management and Monitoring Plan
CPP	Consultation and Public participation
CPR	Comprehensive Project Report
COC	Code of Conduct
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CWWDA	Coast Water Works Development Agency
DCC	Deputy County Commissioner
DN	Nominal Diameter
EA	Environmental Assessment
EHS	Environmental Health and Safety
EIA	Environmental Impacts Assessment
EMCA	Environmental Management and Coordination Act
EMMP	Environmental Management & Monitoring Plan
EOC	Emergency Operations Coordinator
EPRA	Energy and Petroleum Regulatory Authority
ERP	Emergency Response Plan
E&S	Environmental and Social
ESAs	Environmental Sensitive Areas
ESMMP	Environmental and Social Management and Monitoring Plan
ESIA	Environmental and Social Impact Assessment
FGDs	Focus Group Discussions
GBV	Gender Based Violence
GoK	Government of Kenya
GO	Grievance Officer
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
HSP	Health and Safety Plan
ILO	International Labour Organization
JV	Joint Venture
KIMAWASCO	Kilifi-Mariakani Water and Sewerage Company
KPLC	Kenya Power and Lighting Company
KW	Kilo Watts
MAWASCO	Malindi Water and Sewerage Company
MoH	Ministry of Health
MPPT	Maximum Power Point Tracking
MW	Mega Watts
NEMA	National Environment Management Authority
NGAO	National Government Administration Officers

NGO	Non-Governmental Organization
NEP	National Environment Policy
NMK	National Museums of Kenya
OP	Operating Procedures
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PPEs	Personal Protective Equipment
PSEA	Prevention Against Sexual Exploitation and Abuse
RAP	Resettlement Action Plan
SARI/SGAP/GATH	Project Consultant
SEA	Sexual exploitation and Abuse
SH	Sexual Harassment
SOP	Standard Operating Procedure
STDs	Sexually Transmitted Diseases
VCT	Voluntary Counselling &Testing
WASREB	Water Services Regulatory Board
WB	World Bank
WHO	World Health Organization
WIBA	Work Injuries and Benefit Act
WRA	Water Resources Authority
WSDP	Water and Sanitation Development Project
WSP	Water Services Provider

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EXECUTIVE SUMMARY

E-1 Project Information

The Government of Kenya through Coast Water Works Development Agency (CWWDA) is undertaking the Second Baricho-Kakuyuni Pipeline Water Supply Project which is being implemented under the Water and Sanitation Development Project (WSDP) that is financed by the Government of Kenya and the World Bank. The Second Baricho-Kakuyuni Pipeline Water Supply Project is divided into three lots as follows:

- Lot 1 – Second Baricho – Kakuyuni Pipeline
- Lot 2 – Kakuyuni – Ganda Pipeline
- Lot 3 – Kakuyuni – Kilifi Pipeline.

In August 2020, CWWDA awarded the Contract for the ***Consultancy Services for Preparation of Preliminary Designs, Feasibility Study, Detailed Designs, Safeguards Documents and Tender Documents and Construction Supervision of Second Baricho – Kakuyuni Water Pipeline and Transmission Pipeline to Kilifi and Ganda Tanks*** to the Consortium of SARI Consulting Ltd in Joint Venture with SGAPI Srl and Gath Consulting Engineers.

In April 2025, following discussions with the Client, the Consultant prepared a Technical Paper on energy demand at Baricho water works. The energy demand for the pumping system was estimated to be about **5,220kW** which is wholly sourced from KPLC's grid power. The high energy demand has led to high energy costs for Baricho water works and there is need to consider alternative energy sources for the station. The most feasible alternative energy sources for the station is solar energy.

It is on this premise, that the Client requested the Consultant to further develop the Technical Paper into a design for *a Solar-Powered (Hybrid) Water Pumping System at Baricho Water Works.* This proposed project has been prepared in this context.

E-2 Project Justification and Benefit

The Baricho water works continues to face significant operational challenges due to high energy costs associated with grid-tied two-stage pumping of the water. High electricity costs represent a substantial portion of the facility's operational budget, placing financial strain on water service providers (Malindi WSP, Kilifi-Mariakani WSP and Mombasa WSP) and, by extension, on consumers in Kilifi and Mombasa counties.

The energy costs are reviewed by Energy and Petroleum Regulatory Authority (EPRA) to set and publish maximum wholesale and retail prices monthly, incorporating various cost components and margins to ensure stable and predictable pricing. In the recent past and following the regular reviews, the cost on energy has increased; the annual energy generated in Kenya has been

increasing by approximately 5% year on year since 2017 with the exception of the 2019/2020 financial year when the energy generated declined by 0.25% due to COVID-19 pandemic.

There is need to address the high energy costs and this will require collaborative approach, including investment in energy-efficient technologies and transitioning to renewable energy source such as solar. Reducing energy costs at Baricho is vital to improving the sustainability and affordability of water supply services across Kilifi and Mombasa counties.

E-3 Project Location

The Project Area is located in the Coastal region of Kenya within Kilifi County, one of the 47 counties in Kenya. The Baricho water works is located about 60 km West of Malindi Town and sources its water from the Baricho Aquifer along the bank of Sabaki River around coordinates 3°07' 33.33" S and: 39°46'46.75" E. From Malindi town, the water works are accessed off the C 103 road, Malindi – Sala Gate road, off at Baolala centre to Lango Baya.

E-4 Project Scope

To mitigate the above shortcoming of the system at Baricho water works, a hybrid solarization is proposed to generate the required combined power of at least 8.345MW and appropriate/equivalent solar assembly and accessories. Due to the budget constraints, the project will be implemented in two phases as highlighted in the table below. The solarization will be clustered into 5 solar plants located within the Baricho water works to power the respective set of pumps as outlined below;

Table E4-1: Proposed Interventions

Phase I Interventions	Phase II Interventions
• Solar Plant 1 – Malindi pumps (1.625MW)	• Solar Plant 2 - Mombasa Pumps (4.032MW) – under Phase II
• Solar Plant 3 – Borehole pumps in Pumping Station No. 4 (P4) i.e. Boreholes 1A, 2A and 3A (0.731MW)	
• Solar Plant 5 – Borehole pumps in Pumping Station No. 6 (P6) i.e. Boreholes 9, 10 & 11. (0.562MW)	
• Solar Plant 4 – Borehole pumps in Pumping Station No. 5 (P5) i.e. Boreholes 4A, 5, 6A, 6B, 7 & 8 (1.448MW)	

The proposed works for solarization of Baricho Plant under Phase I are summarized as follows;

- ✓ Supply and installation of 6,717Nr. 650W Solar PV Modules to generate at least 4.366MW of Power from the respective solar plants
- ✓ Supply and installation of battery storage for the respective solar plant
- ✓ Supply and installation of the accompanying MPPT inverter system for each set of the pumps
- ✓ Supply and Installation of the respective PV Disconnect Switch
- ✓ Supply and Installation of Electrical cables and sundries
- ✓ Construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. This will also include supply and mounting of the solar panels using solar cell brackets as detailed in the book of drawings
- ✓ Installation of inverter cage
- ✓ Construction of Civil works – Fencing of the solar power plant sites, related road works, and drainage works and equipment/control rooms.

The proposed hybrid system will use solar power during the day and grid-power during the night based on the water demand and pumping schedule. The energy load considered are for the pumping operations for the low-lift pumps (boreholes) and high-lift pumps (Malindi pumps). The Mombasa pumps solarization will be considered in Phase II of the project. The focus for this ESIA report is the proposed interventions under Phase I; the proposed hybrid solarization to generate the required combined power of at least 4,366,000 (4.366MW) and appropriate/equivalent solar assembly and accessories. Phasing of the project has been done because the available funding can only cater for the proposed phase I interventions. In addition, Phase II will require additional funding due to acquisition of land in the proposed site.

The project will also be implemented on land belonging to CWWDA at Baricho Water Works and there will be no Project Affected Persons hence no need for (A) RAP. A combined solar plant to generate the combined power of 4.366MW would require a land size equivalent to 10 acres at a single site while the clustered solar plants will require 1 – 3 acres per site which will be possible at Baricho water works as highlighted below;

- Malindi pumps solar plant – 3.5 acres
- P4 solar plant – 1.5 acres
- P5 solar plant – 3 acres
- P6 solar plant – 1.5 acres.

A walk through with the areas' LangoBaya CBO committee/leaders was carried out on August 14, 2025 (the same day as the meeting) and they verified the proposed site was not on private land.

E-5 Environmental and Social Baseline Conditions

There are many educational, health institutions and businesses within the project area. Land tenure in the project area is namely: Community land, freehold and Public land (government land). The permanent river around the project area is Sabaki River. The main economic activities around the project area is farming due to their proximity to the Sabaki River. There are also fishing activities and small businesses within the project area. From the field visits some quarries were observed inside the project site.

The vegetation in the Langobaya area of Kilifi County is primarily characterised by the Livestock-Millet zone agro-ecological conditions. The zone is semi-arid and suitable for dryland farming of drought-tolerant crops and livestock ranching. The predominant natural vegetation is grassland and bushland. The project area has mainly bushes and shrubs and there are no endangered plants and animals. The area being near the River Sabaki (lower River Athi) flood plain closer to the river system support distinct riverine vegetation and associated grasslands due to variations in groundwater levels. The biodiversity of the shrubs is dominated by arid adapted species. The main sensitive receptor in the area is the River Sabaki with different proximities to the various project sites as presented in the table below. The vegetation around Sabaki area includes palm trees, food crops grown by the community members using small-scale irrigation. River Sabaki is prone to flooding as witnessed in April 2018 when a major flood occurred and adversely affected existing boreholes in the region and facilities leading to closure of the whole Baricho plant. Power supply and pipelines were also washed away. As a mitigation measure, protection works have been undertaken since 2020 around the Baricho plant boreholes.

Table E5-1: Project Sites and Proximity to River Sabaki

Project Site	Proximity to River Sabaki
Malindi Pumps	1,500m
Pumping Station No. 6 (P6)	100m from the edge of the River
Pumping Station No. 4 (P4)	1,200m
Pumping Station No. 5 (P5)	800m

E-6 Policy, Legal and Administrative Framework

The main legislation that governs environmental management in Kenya is the Environmental Management & Coordination (Amendment) Act of 2015. EMCA calls for environmental impact assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions and empowers stakeholders to participate in sustainable management of the natural resources. Part V from Sections 42 – 57 deals with Protection and Conservation of the Environment while Part VI deals with Integrated Environmental Impact Assessment. Projects

likely to cause environmental impacts require that an environmental and social impact assessment study be carried out. It is under this provision that the current study has been undertaken because Legal Notice No, 32 and 34 of April 19, 2019 places the proposed interventions under the Medium-Risk Category requiring the preparation of a comprehensive project report.

The proposed project will also adhere to the World Bank's prevailing Operational Policies.

E-7 Stakeholder Consultations

Public Participation was held in August 14, 2025 to inform project stakeholders and the public regarding the proposed project scope, to explain the likely impacts (positive/negative) of implementing the project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project. The Table E7-1 below presents the meeting date and number of people in attendance.

Table E7-1: Meeting date and List of Participants

Meeting Date	Venue	Participants
August 14, 2025	Lango Baya Assistant Chief's Office	Male -50 Females – 37 Total - 87
		PLWD- 2No (1No male and 1No female)

The community raised several issues and the summary of issues that were raised across all the villages are presented in the Table E7-2 below**.**

TableE7-2: Summary of public comments during public participation

Comments	Responses
Job opportunities	• The community members were informed first priority for job opportunities both skilled and non-skilled workers will be given to the local community. • The community were requested to ensure they do the work assigned to them during construction diligently
Quality of works to guaranteed long term sustainability	• The Community members were informed there will be construction supervision to ensure the Contractor does the construction works as per the specification in the awarded contract.
Project commencement date	• The Community members were informed that the project was currently at the planning stage. The team was currently preparing all the necessary

Comments	Responses
	documentations and certifications that will be submitted to the Client and eventually to the Bank for approval before the works commences. The community members were informed that tentatively the project should commence in September 2025.
They were concerned about the pipe bursts and dilapidated water infrastructures within the region populations	• The Community members were informed continuous monitoring will be carried out to ensure the broken down facilities are repaired
High cost of water bills within the region especially Lango Baya	• The community were informed their suggestion will be taken into consideration and presented to the Client for their input and consideration.
Lack of CSR activities within Lango Baya	• The community were informed the CSR they have requested will be presented to the Client for consideration during the project implementation. The proposed CSRs included the following: ❖ A public watering point with free access to the community at the Assistant Chief's office ❖ Restoration of dilapidated Mondola tank within Lango Baya ❖ Rehabilitation and construction of an ablution block at the Assistant Chief's Office.
Project site location and boundaries	• The community were informed the project will be implemented within the Baricho Water Works land • A walk through with the areas Lango Baya CBO committee/leaders was carried out on August 14, 2025 (the same day as the meeting) and they verified the proposed site was not on private land

Consultations and structured questionnaires were administered to the key stakeholders on August 14, 2025 to solicit views regarding the project as well as its design. The consultations and questionnaires were administered through visiting the various key stakeholders' offices and a brief discussion regarding the project. The list of KIIs consulted is presented in Table E7-3 below:

Table E7-3: List of KII Consulted

Name	Designation	Department
Zeinab Musa Hassan	Environmental Officer	Kilifi County Government Environment, Forestry and Climate Change Department

David Lusava	Deputy County Commissioner	Interior
Isaac Chibule	Technical Manager	Malindi Water and Sewerage Company (MAWASCO)
Gona Mwembe	Technical Manager	Kilifi-Mariakani Water and Sewerage Company Limited (KIMAWASCO)
Timothy Mugo	Engineer	Mombasa Water Supply and Sanitation Company Limited (MOWASSCO)
Stephen K. Menza	Assistant Chief	administration
Baya Silas Kahindi	Officer in Charge Baricho Plant	Bulk Water Supply Unit (CWWDA)
Khilimu Mupe	Member	Youth Group LangoBaya Forum
Franklin Kainku	Member	LangoBaya Community Based Organization - Health Department
Samuel W. Baya	Project coordinator	Mkondoni Community Water Project
William S. Baya	Chairperson	LangoBaya CBO

E-8 Proposed Project Activities

The proposed project will involve the construction of a hybrid solar system and associated accessories. Before undertaking the works, the project will require the acquisition of Environmental Impact Assessment license and relevant construction permits such as the EPRA. Mobilization and Construction activities will follow and will involve the following activities:

- Site clearance and preparation.
- Survey works
- Transportation of equipment, and materials
- Supply and installation of battery storage system for the respective pumps
- Supply and Installation of the respective PV Disconnect Switch
- Construction of 1.5m – 3.5m of galvanized steel support structure
- Construction of Civil works – such as fencing and drainage works.
- Acquisition of materials from a reliable source and storage
- Mobilization of labour force
- Levelling of the site
- Supply and installation of Solar PV Modules
- Supply and installation of the accompanying inverters for each set of the pumps
- Installation of Electrical cables and sundries
- Installation of inverter cage
- Testing of the construction materials.

E-9 Project Impacts

The impacts, positive and negative, have been generated based on the analysis of the proposed environment in relation to the proposed project. The impacts have been segregated into four main phases: Pre-Construction Phase, Construction Phase, Operation Phase, and Decommissioning Phase. Impacts can be categorized into:

- Impacts on the biophysical environment;
- Health and safety impacts
- Social-economic impacts

Sections E-9.1 to E-9.6 below provides a summary of the project impacts both positive and negative discussed in this Report for the all the project phases.

E-9.1 Positive Impacts during Construction Phase

a) Employment Opportunities - The Project shall create job opportunities for both skilled and unskilled workers such as casual labourers, operators, electricians, welders and engineers who shall be engaged on-site for a specific duration that will improve standards of living from income earned
b) Creation of Wealth - The proposed project is expected to bring many opportunities in investment and procurement enabling community members to supply various goods and services to the project during the construction phase. This in turn will create wealth for the local communities.
c) Creation of a Market for Construction Materials - The project shall require materials, some of which shall be sourced locally and some internationally. This shall provide a ready market for suppliers in and outside the project area.
d) Economic Growth - Using locally available materials during the construction phase for example pipes and others; the project shall contribute towards growth of the country's economy by contributing to the gross domestic product.
e) Injection of Money into the Local Economy - A large sum of the Project money shall be released into the local economy due to the construction activities.

E-9.2 Positive Impacts during Operation Phase

- Creation of Employment for operators of the facilities.
- Creation of Wealth- The proposed project shall ultimately provide revenues to the beneficiaries and expand the wealth base for the nation. It shall pump both liquefied and tied up wealth hence making the nation gain.
- Improved Accessibility to Clean and Reliable Water Supply
- Capacity building
- Reduced cost of production and increased sustainability

- Source of clean energy

E-9.3 Positive Impacts during Decommissioning Phase

- Employment Opportunities - Temporary employment opportunities shall be created for the demolition of laid and constructed structures during the decommissioning works. Decommissioning activities shall include but not limited to campsite demolitions.
- Environmental Rehabilitation - Rehabilitation of site to ensure the site is left as natural as possible close or better than before.

E-9.4 Negative Impacts

The summary of negative impacts likely to be encountered during the project implementation period are highlighted in the table E9.1 below:

Table E9.1: Negative Impacts

Associated Impacts	Source of Impact	Significance	Mitigation Measures
Construction Phase			
Environmental Pollution (Noise and vibration, dust and soil pollution)	• Construction works such excavations, site clearings • Machinery and vehicles on site • Workers on site • Spillages from concrete works • Oil spillage from vehicles	• Moderate	• Early notifications should be made to the residents prior the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team. • Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. • Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions.

Associated Impacts	Source of Impact	Significance	Mitigation Measures
			• Strict protocols should be enforced for handling construction materials in powder form, such as covering of cement and sand during transportation • A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site. • In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection site.
Solid waste generation and wastewater management	• Construction works such excavations, masonry works • Food consumed on site • Material waste • Waste from the	• Moderate	• All solid waste will be collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as per the Waste Management Regulations 2006.
Health, Safety Risks & Worker's welfare	• Construction works that may result in slips, falls • worker welfare issues • Faulty machineries • Poor working conditions • Poor housekeeping	• Moderate to high	• Adherence to the OSHA Act 2007 • Provision of adequate drinking water and sanitation facilities • Provision of adequate and appropriate PPEs • Provision of adequate first aid kits and first aiders • Development of a site-specific Occupational Safety Action Plan

Associated Impacts	Source of Impact	Significance	Mitigation Measures
	• Poor storage of flammable materials • Faulty Electrical equipment		with details of PPE, emergency procedures, site restrictions, inspection routines, and roles/responsibilities • Training workers on Occupational safety and health impacts
Damage to property and public utilities	• Structure removal, property damage, excavation works,	• Moderate	• The Contractor to promptly repair and reinstate any damages done • Limit damage to property by observing construction area limits by clear demarcation • Formal request and engagement should be sought with relevant institutions such as Kenya Power and Lighting Company, data network companies before undertaking construction works;
Public health concerns	• Labour influx that may lead to spread of HIV/AIDS, STIs, and poor sanitation • GBV, SEA	• Minor	• Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS. • Provide VCT services on site and encourage workers to undergo the same. • Sensitization of workers and the community on GBV (SEAH) and the various forms.

Associated Impacts	Source of Impact	Significance	Mitigation Measures
Impact on traffic and difficulty of access	• Construction works and Material delivery • Machinery and vehicles on site	• Moderate	• Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all. • The workers should receive requisite training especially on the operation of the machinery and equipment and those undertaking material delivery from licensed NTSA trainers. • Training workers on traffic management on site and availing trained traffic marshals along the un-named roads within the project area and within the project site
Labour related issues	• Labour influx, child labour, gender inequality, wage issues	• Moderate	• Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project. • The Contractor to develop a labour management plan
Security risks	• Vandalism and crimes	• Moderate	• Provision of security lighting within the project sites. • All workers should sign the code of conduct on site and ensure adherence. • The Contractor should prepare and implement a security management plan.
Operation Phase			

Associated Impacts	Source of Impact	Significance	Mitigation Measures
Operation Health, Safety hazards	• Cleaning activities of the panels that may lead to slips, falls • Faulty Electrical equipment • exposure to cleaning chemicals, • Electrical fire hazards	• Moderate to high	• Formulate and enforce stand operation and maintenance procedures (SOPs) including for cleaning and provide requisite PPE to the cleaners and operations and maintenance staff • Fire extinguishers should be located at identified fire points around the site. The extinguishers shall be appropriate to the nature of the potential fire. • First aid kit with adhesive bandages, antibiotic ointment, antiseptic wipes, aspirin, non-latex gloves, scissors, thermometer, etc. shall be made available. • Undertake workers training and awareness on the occupation safety and health risks and the SOPs
Risk of Theft of the Solar Panels	• Vandalism and crimes	• Moderate	• This shall require constant inspection by the Baricho Water Works officials • Conduct public sensitization programs on importance of not interfering with the installed facilities. • Engaging local CBOs, youth groups, women groups in management of the facilities to foster a sense of ownership and responsibility • Installation of adequate Solar security lighting • Proper barricading and having qualified security personnel.

Associated Impacts	Source of Impact	Significance	Mitigation Measures
Solar Waste Generation	• End-of-life of the solar Panels – Solar panels typically at least last 25 years. After that, they degrade and must be replaced. • Waste from inverters, mounting structures, and cabling. • Energy Storage Systems such as batteries that will be used with solar systems also contribute to e-waste	• Moderate	• Contract with companies holding a National Environmental Management Authority (NEMA) license and relevant experience for the handling, recycling, and disposal of solar waste material • Establish a specific waste management plan for managing electronic waste (e-waste) from solar panels and associated components, as these materials can contain heavy metals and other hazardous substances that may leak into the environment • Provide training for all project personnel on environmentally sound waste disposal and handling practices to ensure compliance with environmental standards and regulations.
Avi Fauna Impacts	• Lake effect of solar panels	• Low	• Insulate and properly sheath all overhead cables and connectors. • Regular cleaning of the solar panels
Decommissioning Phase			
Loss of jobs and income	• Completion of project	• Moderate	• Notify the employees in advance on the project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007;
Occupational Health and Safety	• Demolition works	• Moderate	• Provide the correct PPE for the workers when conducting the demolition activities;

Associated Impacts	Source of Impact	Significance	Mitigation Measures
			• Conduct training on health and safety procedures to the workers prior to commencement of demolition;
Solid waste generation	• Demolition works	• Moderate	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling.

E-10 Environmental and Social Management Plan:

An ESMMP has been developed whose pursuit can greatly improve the overall net effect of the project. The ESMMP highlights the project impacts, the mitigation measures, monitoring indicators, persons responsible including cost for implementation. The total estimated cost for the ESMMP implementation is **KES: 3,000,000** and the breakdown is provided in Chapter 8 Table 8-2, Table 8-2 and Table 8-3 of this report. This Report observes that the bulk of adverse impacts will manifest at the Construction stage in which case, the core effort in mitigation will be concentrated in the contract for construction. The contract for construction should bear clauses binding the contractor to implement impact mitigation as part of the civil works. Impacts likely to occur during operation phase were also identified and the Client should also include the cost of mitigation measures in their operational budget.

The following are the finding of the Environmental and Social Impact Assessment.

- The major positive impacts of this project will include improved health, air quality, employment opportunities, economic growth, technology, and knowledge transfer, as well as mitigating related adverse impacts.
- The project activities (construction and operation phase) are likely to cause, albeit on a small scale, interruptions with traffic, risk of accidents, emission of dust, waste generation and increase in noise and vibration, labour related issues and health and safety risks for workers and the community.

The study has proposed several measures including delineation of construction work areas, segregation of wastes to centralised waste collection point, risk assessment for all activities before working, provision of appropriate PPEs leading to reduction of environmental and social

negative impacts, noise abatement, waste management, reduction of soil erosion, and prevention of accidents and health hazards.

Monitoring has been identified as an important process in the implementation of the mitigation measures and protection of the environment of the project area since it will reveal changes and trends brought about mainly by construction activities

E-11 ESMP Implementation Framework

The following entities shall be involved in the implementation and monitoring of the ESMP as shown in the table below:

Table E11-1: Institutional Framework for ESMMP

No	Institution	Role & Responsibility in ESMP Implementation
1.	World Bank- Financier	• Provides financing and technical supervision. • Reviews periodic safeguard performance reports.
2.	Coast Water Works Development Agency (CWWDA) – Proponent	• Overall project proponent and accountable party for ESMMP compliance. • Provides resources for ESMMP implementation. • Receives and reviews reports from the Supervision Consultant and Contractor. • Ensures continuous stakeholder engagement and operationalizes the GRM. • Has independent Environmental, Social, Health & Safety (ESHS) experts to also guide the Consultant and Contractor in ensuring compliance on site.
3.	Baricho Water Works (Bulk Water Unit, under CWWDA)	Under Coast Water Works Development Agency (CWWDA) that will be responsible for: • Operating and maintaining solarization facilities during operation phase. • Implementing ESMP and monitoring measures during operations.
4.	National Environment Management Authority (NEMA)	• Reviews and approves ESIA report. • Issues ESIA License. • Conducts statutory compliance monitoring and enforcement. • Provides legal recourse through the National Environment Tribunal in case of unresolved grievances.

No	Institution	Role & Responsibility in ESMP Implementation
5.	County Government of Kilifi (Environment, Health & Planning Departments)	• Provides permits and approvals. • Offers technical support and advisory services. • Monitors compliance with county-level laws.
6.	Water Service Providers (MAWASCO, KIMAWASCO, MOWASSCO)	Under the leadership of the County Governments • Oversee water service delivery to consumers. • Monitor service quality, tariffs, and consumer complaints during operations.
7.	Ministry of Energy & EPRA	• Approves and licenses solar installations. • Provides technical compliance monitoring for energy systems. • EPRA sets standards and ensures quality control within the sector
8.	Contractor	• Prepares and implements the Construction Environmental & Social Management Plan (CESMP). • Ensures strict compliance with ESMP requirements on-site. • Appoints a qualified EHS Officer who undertake monitoring and implementing EHS requirements on site. • Submits monthly ESHS compliance reports to the Supervision Consultant.
9.	Supervision Consultant	• Provides independent oversight on Contractor's compliance. • Reviews CESMP and monitors daily ESMP implementation. • Conducts regular audits and site inspections. • Consolidates EHS monitoring reports and submits to CWWDA. • Facilitates grievance redress committees at site level.
10.	Water Resources Authority (WRA)	• Monitors water use and quality standards. • Ensures project activities safeguard groundwater and Sabaki River resources.

E- 12 Recommendations

The Consultant recommends the following:

- All the recommendations/ mitigations mentioned in the assessment should be financed, and incorporated in the construction and supervision contracts, technical specifications and the Bill of Quantities.
- The Project team should ensure continuous stakeholder engagement throughout all project phases. The cost should be included in the Bill of Quantities (BOQ).
- The Contractor will be required to prepare a Construction Environment & Social Management Plan (CESMP) which shall be approved by the proponent before the beginning of works.
- The proponent should set up a proper and applicable Grievance Redress Mechanism (GRM) for the project to deal with grievances and issues on the project.
- Periodic environmental and social monitoring is required by the project Proponent and supervision team to ensure that mitigation measures have been implemented to prevent or avert any negative impacts of the project.
- At project implementation stage, the Contractor to report monthly ESHS compliance to the project management team comprising of the Project Proponent and Supervision Consultant.
- On completion, CWWDA to commission an independent Consultant to undertake an Environment, Social, Health and Safety Audit as required by and Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019. The audit will identify nonconformities which the Contractor together with CWWDA will address through the defect liability period of the project. This audit will also form the basis of annual project self-audits by CWWDA.
- The proponent to Contract licensed waste handler for the disposal of generated solar waste during the operation phase.

E-13 Conclusion

The proposed project is environmentally, legally, and socially acceptable. The proposed project as noted from the assessment is likely to generate both positive and negative impacts within the project area. It is worth noting the potential significant environmental impacts can be adequately mitigated by the proposed measures, and it is the responsibility of the Proponent and all other Project Implementation Unit to ensure the measures are implemented and strict compliance during project implementation. An ESMMP has been prepared, and it includes: the impacts, the mitigation plan; the monitoring and enforcement requirements; and the responsible persons/organizations. The ESMMP been a dynamic document will form as a guide in the enforcement of the proposed mitigation measures and developing mitigation measures for emerging issues in the project areas.

It is based on the above, that it is recommended that the project be issued with the necessary clearance and licensing for the proponent to commence the project implementation.

CHAPTER 1: INTRODUCTION

The Government of Kenya through Coast Water Works Development Agency (CWWDA) is undertaking the Second Baricho-Kakuyuni Pipeline Water Supply Project which is being implemented under the Water and Sanitation Development Project (WSDP) that is financed by the Government of Kenya and the World Bank. The Second Baricho-Kakuyuni Pipeline Water Supply Project is divided into three lots as follows:

- Lot 1 – Second Baricho – Kakuyuni Pipeline
- Lot 2 – Kakuyuni – Ganda Pipeline
- Lot 3 – Kakuyuni – Kilifi Pipeline.

In August 2020, CWWDA awarded the Contract for the ***Consultancy Services for Preparation of Preliminary Designs, Feasibility Study, Detailed Designs, Safeguards Documents and Tender Documents and Construction Supervision of Second Baricho – Kakuyuni Water Pipeline and Transmission Pipeline to Kilifi and Ganda Tanks*** to the Consortium of SARI Consulting Ltd in Joint Venture with SGAPI Srl and Gath Consulting Engineers.

It is under this Consultancy Contract, that CWWDA have contracted the Consultant to undertake Detailed Designs, Tender Documentation, preparation of Safeguard Documents and Construction Supervision for the Proposed Baricho Plant Solarization Project.

1.1 Project Justification and Benefit

The Baricho water works continues to face significant operational challenges due to high energy costs associated with grid-tied two-stage pumping of the water. High electricity costs represent a substantial portion of the facility's operational budget, placing financial strain on water service providers (Malindi WSP, Kilifi-Mariakani WSP and Mombasa WSP) and, by extension, on consumers in Kilifi and Mombasa counties.

There is need to address the high energy costs and this will require collaborative approach, including investment in energy-efficient technologies and transitioning to renewable energy source such as solar. Reducing energy costs at Baricho is vital to improving the sustainability and affordability of water supply services across Kilifi and Mombasa counties.

The scope of works under this consultancy assignment is therefore to develop a sustainable, cost-effective solar-powered water pumping solution. To achieve the overall projects, the Consultant is to undertake the following tasks;

- Preliminary assessment and feasibility study for the proposed solar powered pumping system
- Engineering designs of the proposed system
- Preparation of safeguard documentations

- Preparation of tender documents and assistance during procurement
- Construction and installation Supervision of the proposed system
- Testing. Commissioning and handover of the system
- Post-installation monitoring and support

This is ESIA Comprehensive Project Report for the Proposed Baricho Plant Solarization Project

1.2 Objectives of the ESIA

1.2.1 General Objective

The purpose of an Environmental & Social Impact Assessment (ESIA) is to improve decision-making and to ensure that the project under consideration is environmentally and socially sound and sustainable.

This ESIA assessment has been conducted in compliance with the Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 32 of 2003 amended in 2009 established under the Environmental Management and Coordination Act (EMCA), 2015 of Kenya, and the World Bank's Operational Policies.

1.2.2 Specific Objectives of ESIA Investigations

This Environmental & Social Impact Assessment (ESIA) is expected to achieve the following objectives:

i. To present existing environmental, social and cultural setting of the target project area
ii. To identify potential environmental and social impacts (direct and indirect), including opportunities for enhancement; this includes the cumulative impact of the proposed project and other developments which are anticipated;
iii. To generate feasible alternative investments, sites, technologies, and designs,
iv. To provide preventive, mitigating, and compensatory measures
v. To provide detailed results of the public consultation and
vi. To prepare an Environmental and Social Management and monitoring Plan to mitigate the identified impacts so as to ensure sustainability of the proposed projects.
vii. To recommend cost effective measures to be implemented to mitigate against the expected environmental and social impacts

1.3 Project scope of works

The proposed works for solarization of Baricho Water Works is to generate the required combined power of at least 8.345MW and appropriate solar assembly and accessories. Due to the budget constraints, the project will be implemented in two phases as highlighted in the table

below. The solarization will be clustered into 5 solar plants located within the Baricho water works to power the respective set of pumps as outlined below;

Table 1-1: Proposed Solarization Interventions.

Phase I Interventions	Phase II Interventions
• Solar Plant 1 – Malindi pumps (1.625MW)	• Solar Plant 2 - Mombasa Pumps (4.032MW) – under Phase II
• Solar Plant 3 – Borehole pumps in Pumping Station No. 4 (P4) i.e. Boreholes 1A, 2A and 3A (0.731MW)	
• Solar Plant 5 – Borehole pumps in Pumping Station No. 6 (P6) i.e. Boreholes 9, 10 & 11. (0.562MW)	
• Solar Plant 4 – Borehole pumps in Pumping Station No. 5 (P5) i.e. Boreholes 4A, 5, 6A, 6B, 7 & 8 (1.448MW)	

The proposed works under Phase 1 are summarized as follows;

- Supply and installation of 6,717No. 650W Solar PV Modules to generate at least 4.366MW of Power from the respective solar plants
- Supply and installation of battery storage system for the respective pumps
- Supply and installation of the accompanying MPPT inverters system for each set of the pumps
- Supply and Installation of the respective PV Disconnect Switch
- Supply and Installation of Electrical cables and sundries
- Construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. This will also include supply and mounting of the solar panels using solar cell brackets as detailed in the book of drawings
- Installation of inverter cage
- Construction of Civil works – Fencing of the solar power plant sites, related road works, and drainage works and equipment/control rooms.

1.4 ESIA Approach and Methodology

The ESIA was carried out in line with the provisions of Environmental Management and Coordination Act (EMCA) 1999 as amended in 2015, the Environmental Impact Assessment and

Audit Regulations, 2003 as amended in 2019 and the World Bank's Operational Policies. Baseline data on project design was generated through discussion with the client and review of project documentation. Opinions formed were revalidated through fieldwork entailing site investigations and interviews with potentially affected people and secondary stakeholders.

To identify, predict, analyse and evaluate potential impacts that may emanate from the project, diverse study methods and tools including use of matrices, expert opinions and observations were employed. An Environmental and Social Management Plan comprising of an impact mitigation plan and modalities for monitoring and evaluation were then developed to guide environmental management during all phases of project development.

The assessment involved the following tasks discussed in the subsequent sections below.

1.4.1 Literature Review

The Consultant reviewed literature related to the proposed project and the project area. These included feasibility study and design report, project drawings, and other studies on physiography, geology, water resources and socio-economics of the project area. Legislation, policies and procedures in social and environmental management were also reviewed.

1.4.2 Environmental and Social Screening

Screening process was undertaken to decide whether the Proposed Solar-Powered System (Hybrid) at Baricho Water Works needed to be subjected to an ESIA study or not. The Environmental Management and Coordination Act (EMCA) 1999 as amended in 2015 specifies the projects which should be subjected to an Environmental Impact Assessment (EIA) before commencement of project activities. In this, schedule power and infrastructure projects are classified under medium risk projects requiring assessment of project likely environmental effects and suggesting mitigation measures before implementation.

Based on this classification, the proposed project was, therefore, subjected to an Environmental and social impact Assessment. Coast Water Works Development (CWWDA), herewith referred to as the proponent, appointed SARI/SGAPI/GATH JV to undertake the ESIA assessment and prepare an ESIA report in fulfilment of the EMCA and Environmental Impact Assessment and Audit Regulations, 2003 as amended in 2019. Social sreening was undertaken and a social screening report (see Annex 5) has been prepared separately and there is no need for conducting RAP since no economic or physical displacement is anticipated.

1.4.3 Environmental and Social Scoping

Scoping process involved the identification of significant environmental and social issues associated with the proposed works. The impacts of the proposed project were assessed through project site visits and the following;

- Evaluation of the location, extent of the solar power plant and the current land use of the affected area.
- Evaluation of the design and proposed construction activities, materials and methodology
- Engagements and consultations with key stakeholders and the Residents on the potential impacts related to project implementation activities and corresponding mitigation measures.

1.4.4 Baseline Data Collection

Baseline data was collected on the proposed project site and the area residents. Data collection began in August 12, 2025 and continued throughout the ESIA process.

The data collected was on aspects such as: topography, local flora and fauna, soils and geology, socioeconomics, existing and past activities including human settlements, local surface and ground water resources, waste management practices, and natural resources and cultural heritage aspects of the project areas.

1.4.5 Stakeholder Consultations

Stakeholder consultations were carried out to: inform project stakeholders of the proposed project; to explain the likely impacts (positive/negative) of implementing the project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project.

Administration of structured questionnaires to Key informants, to members of the public and 1No public meeting was held in the project areas on August 14, 2025 at LangoBaya Assistant Chief's office compound. Detailed outcome of consultation including stakeholders interviewed is discussed in chapter 6 of this report.

CHAPTER 2: PROJECT DESIGNS AND DESCRIPTION

The Project Area is located in the Coastal region of Kenya within Kilifi County, one of the 47 counties in Kenya. The Baricho water works is located about 60 km West of Malindi Town and sources its water from the Baricho Aquifer along the bank of Sabaki River around coordinates 3°07' 33.33" S and: 39°46'46.75" E. From Malindi town, the water works are accessed off the C 103 road, Malindi – Sala Gate road, off at Baolala centre to Lango Mbaya.

Figure 2-1: General Location for Baricho Water Works

2.1 Existing Water Infrastructure at Baricho Water Works

Baricho water works, located in the hinterland of Kilifi County along the Sabaki River, is one of the bulk water sources under CWWDA supplying water to Kilifi and Mombasa Counties. The water works sources its water from 11No boreholes segregated into two well fields; the upstream and downstream boreholes with 3No and 8No boreholes respectively. The current production of the Works stands at 112,000m^3/day.

The water from the boreholes is pumped into a holding tank of 5,000m^3 capacity where it undergoes Ca-hypochlorite disinfection and then it gravitates into a pump house with a 3,000m^3 sump tank. The Baricho pumping station consist of Mombasa and Malindi pump systems supplying water to Mombasa and Malindi towns via Nguu Tatu and Kakuyuni Reservoir respectively.

The Baricho water works is a pumping system which is fully powered on electric power from Kenya Power and Lightning Company (KPLC) electric grid via two primary sources;

i) KPLC 33 kV line originating from the Kilifi 132/33 kV substation located in Kilifi town, which is itself connected to the KPLC Rabai substation via a 132 kV line.

ii)33Kv line from Kakuyuni KETRACO 220/33 kV substation, situated 29 km from the Baricho pumping station. The Kakuyuni 220/33Kv sub station has its transmission line originating from Rabai Sub- station.

The station consists of the following main pumping components; -

a) Boreholes

The 11No boreholes are located along the Sabaki river bank and they are installed with pumps of respective power rating as tabulated below;

Table 2-1: 11No boreholes at Baricho water works with their respective pump rating

Location	#	Borehole No.	Pump Rating (kW)
Upstream Boreholes	1.	1A	150
	2.	2A	150
		2	No pump
	3.	3A	150
		3	No pump
Downstream Boreholes	4.	4	No pump
		4A	132
	5.	5	145
	6.	6A	145
		6B	185
	7.	7	145
	8.	8	145
	9.	9	115
	10.	10	115
	11.	11	115

b) Malindi Pumps

The Malindi pumps transmit water to Kakuyuni 2Nr. reservoirs via two rising mains. The old Malindi pumps transmit water to a 1,250m^3 Kakuyuni reservoir through a DN600mm steel rising main while the new 5,000m^3 is supplied water by the new Malindi pumps through a DN 800mm steel rising main.

Both new and old Malindi pumps have same power rating of 250kW and they pump water from the 3,000m^3 sump. Both set of pumps comprise of 3 pumps (2 duty, 1 standby) thus totalling to 6 pumps.

c) Mombasa Pumps

The Mombasa pumps comprise of 5 pumps (3 duty, 2 standby) with a power rating of 840kW each. They pump water to 22,500m^3 Nguu Tatu reservoir via a DN 800 – 600 mm rising main.

2.2 Pumping Configuration for the Boreholes

The 11No boreholes pumps water through 3No pumping station namely Pumping Station No. 4, 5 and 6 (P4, P5 and P6). The clustering of the boreholes into the respective pumping stations is as shown in the Table 2-2 below;

Table 2-2: Borehole pump clustering into respective pumping stations

#	Pumping Station	Borehole Cluster
1.	Pumping Station No. 4 (P4)	• Borehole 1A • Borehole 2A • Borehole 3A
2.	Pumping Station No. 5 (P5)	• Borehole 4A • Borehole 5 • Borehole 6A • Borehole 6B • Borehole 7 • Borehole 8
3.	Pumping Station No. 6 (P6)	• Borehole 9 • Borehole 10 • Borehole 11

Figure 2-2 overleaf presents the existing infrastructure at the Baricho water works.

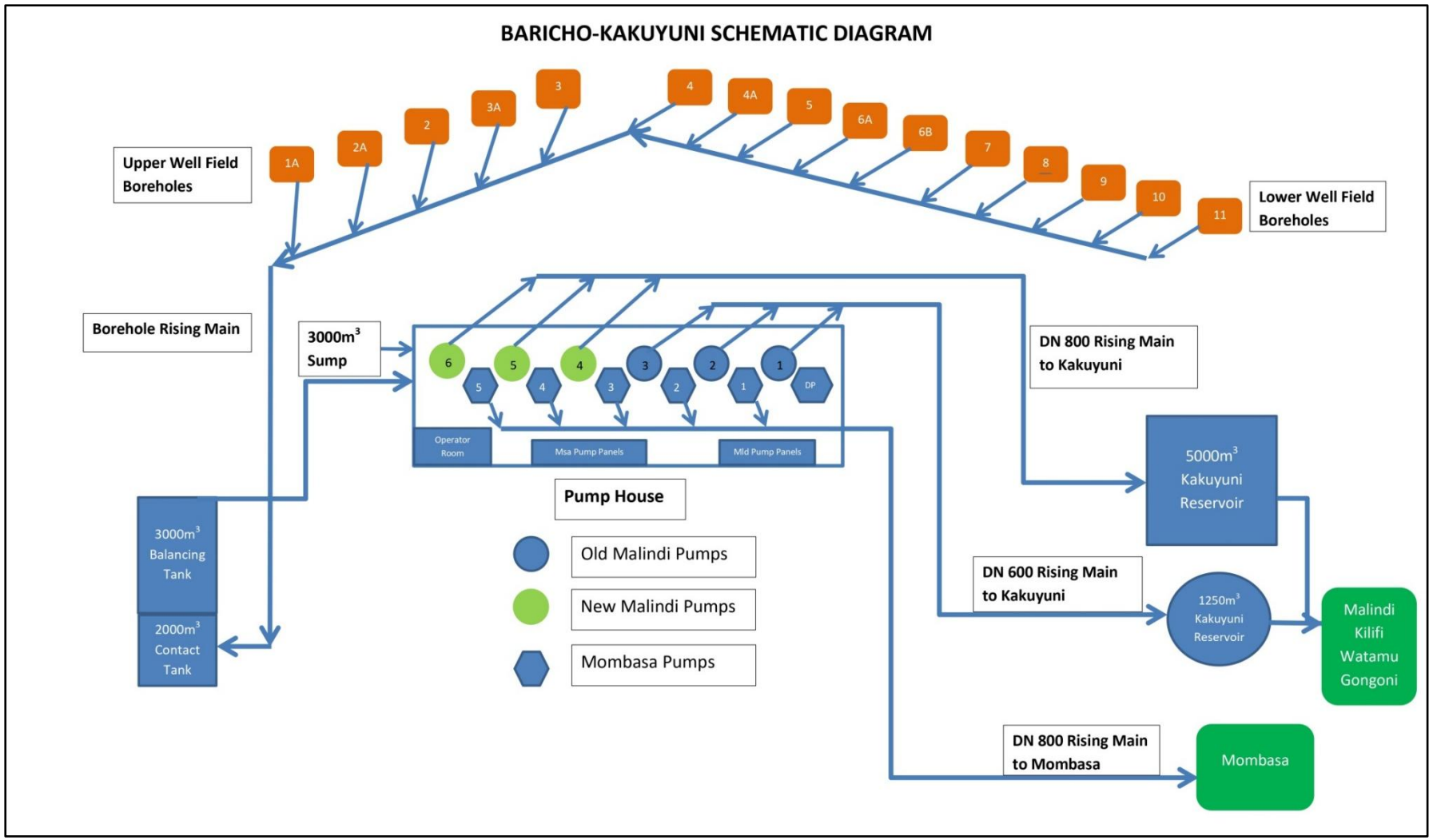

Figure 2-2: Schematic Diagram for the system at Baricho water works

2.3 Station Load Demand

The major power load demand for Baricho water works is for the pumps. Other power items include lighting and charging for offices and staff residential houses. Table 2-3 below shows the station load demand.

Table 2-3: Power load demand for Baricho water works

Pump	Load (kW)
Upstream Boreholes	450
Downstream Boreholes	1242
Mombasa High-lift	2520
Malindi Old System(DN 600)	500
Malindi New System(DN 800)	500
Total	**5,212kW**

Factoring in the power demand for offices and staff residential houses, the power demand for the station is about **5,220kW**.

2.4 Energy Costs

Currently, Baricho water works is fully powered from the grid and as a result the energy costs are high; the monthly power bills are averaging at Kshs 60,310,234.33 as highlighted in the Table 2-4 below;

Table 2-4: Monthly power bills for Baricho water works

#	Month	Energy Cost (Kshs)
1	Sep-24	61,082,254.00
2	Oct-24	63,822,468.00
3	Nov-24	61,249,994.00
4	Dec-24	57,832,488.00
5	Feb-25	56,884,541.00
6	Mar-25	60,989,661.00
	Monthly Average	**60,310,234.33**

The energy costs are reviewed by Energy and Petroleum Regulatory Authority (EPRA) to set and publish maximum wholesale and retail prices monthly, incorporating various cost components and margins to ensure stable and predictable pricing. In the recent past and following the regular

reviews, the cost on energy has increased; the annual energy generated in Kenya has been increasing by approximately 5% year on year since 2017 with the exception of the 2019/2020 financial year when the energy generated declined by 0.25% due to COVID-19 pandemic. (*Energy & Petroleum Statistics Report 2023, EPRA*)

To address the high energy costs, it is proposed to transition the Baricho system into a hybrid solar-powered system.

2.5 Shortcoming of the Existing System

From the preceding sections, the key shortcoming at Baricho water works is the high power costs for water pumping. CWWDA is incurring an average of Kshs 60,310,234.33 monthly on electricity bills. This has increased the operation and maintenance costs.

2.6 Proposed Intervention

To mitigate the above shortcoming of the system at Baricho water works, a hybrid solarization is proposed to generate the required combined power of at least 8.345MW and appropriate/equivalent solar assembly and accessories. The solarization will be clustered into 5 solar plants located within the Baricho water works to power the respective set of pumps as outlined below;

Table 2-5: Proposed Interventions

Phase I Interventions	Phase II Interventions
• Solar Plant 1 – Malindi pumps (1.625MW)	• Solar Plant 2 - Mombasa Pumps (4.032MW) – under Phase II
• Solar Plant 3 – Borehole pumps in Pumping Station No. 4 (P4) i.e. Boreholes 1A, 2A and 3A (0.731MW)	
• Solar Plant 5 – Borehole pumps in Pumping Station No. 6 (P6) i.e. Boreholes 9, 10 & 11. (0.562MW)	
• Solar Plant 4 – Borehole pumps in Pumping Station No. 5 (P5) i.e. Boreholes 4A, 5, 6A, 6B, 7 & 8 (1.448MW)	

The focus for this ESIA report is the proposed interventions under Phase I; the proposed hybrid solarization to generate the required combined power of at least 4,366,000 (4.366MW) and appropriate/equivalent solar assembly and accessories. Phasing of the project has been done

because the available funding can only cater for the proposed phase I interventions and that it can be accommodated within the land owned by CWWDA. In addition, Phase II will require additional funding due to acquisition of land in the proposed site around Baricho Water Works. The exact location for the proposed Phase II works have not been firmed at this stage.

The layout below shows the proposed works and their location within the Baricho water works.

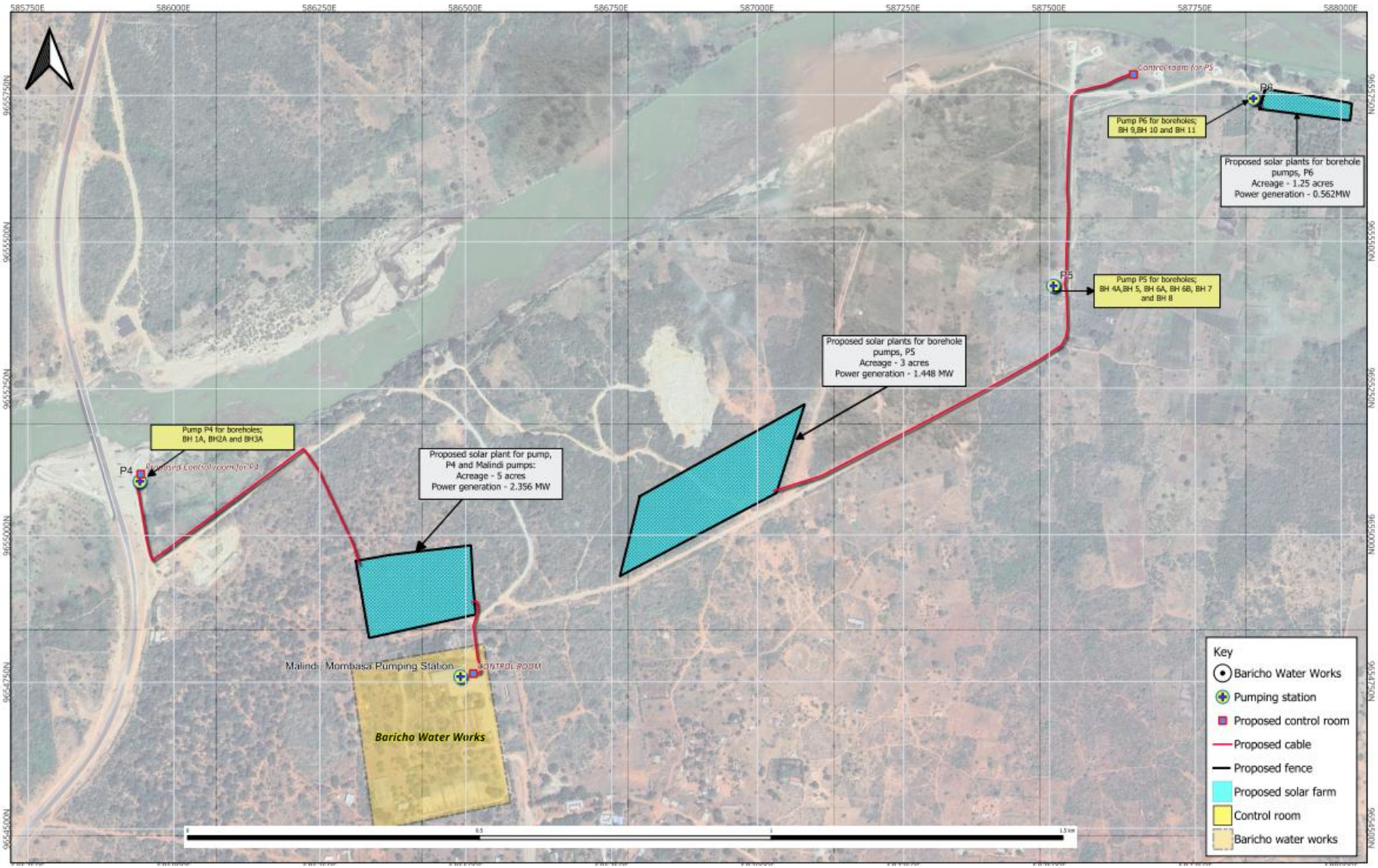

Figure 2-3: Schematic of the proposed solarization at Baricho plant

The proposed works for solarization of Baricho Water Works under Phase I are summarized as follows;

- Supply and installation of 6,717No. 650W Solar PV Modules to generate at least 4.366MW of Power from the respective solar plants
- Supply and installation of battery storage system for the respective pumps
- Supply and installation of the accompanying inverters for each set of the pumps
- Supply and Installation of the respective PV Disconnect Switch
- Supply and Installation of Electrical cables and sundries
- Construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. This will also include supply and mounting of the solar panels using solar cell brackets as detailed in the book of drawings
- Installation of inverter cage
- Construction of Civil works – Fencing of the solar power plant sites, related road works, and drainage works and equipment/control rooms.

The proposed hybrid system will use solar power during the day and grid-power during the night based on the water demand and pumping schedule. The energy load considered are for the pumping operations for the low-lift pumps (boreholes) and high-lift pumps (Malindi pumps). The Mombasa pumps solarization will be considered in Phase II of the project. The focus for this report is the proposed interventions under Phase I; the proposed hybrid solarization to generate the required combined power of at least 4,366,000 (4.366MW) and appropriate/equivalent solar assembly and accessories

The clustering of the solar plants will have the following key benefits;

- **Reduce the required land size per single site** – a combined solar plant to generate the combined power of 4.366MW would require a land size equivalent to 10 acres at a single site while the clustered solar plants will require 1 – 3 acres per site which will be possible at Baricho water works as highlighted below
    - **Malindi pumps solar plant – 3.5 acres**
    - **P4 solar plant – 1.5 acres**
    - **P5 solar plant – 3 acres**
    - **P6 solar plant – 1.5 acres**.
- **Reduce project cost due to reduced lengths of cables** – a centralized single solar plant would increase the cabling distance to transmit power to the various pumps. The proposed decentralized solar plants will be as close as possible to the respective pumping stations thus reducing the required cabling distance.

2.7 Proposed Project Activities

The proposed project will involve the construction of a hybrid solar system and associated accessories. Before undertaking the works, the project will require the acquisition of Environmental Impact Assessment license and relevant construction permits. Mobilization and Construction activities will follow and will involve the following activities:

- Site clearance and preparation.
- Survey works
- Transportation of equipment, and materials
- Supply and installation of battery storage system for the respective pumps
- Supply and Installation of the respective PV Disconnect Switch
- Construction of 1.5m – 3.5m of galvanized steel support structure
- Construction of Civil works – such as fencing and drainage works.
- Acquisition of materials from a reliable source and storage
- Mobilization of labour force
- Levelling of the site
- Supply and installation of Solar PV Modules
- Supply and installation of the accompanying inverters for each set of the pumps
- Installation of Electrical cables and sundries
- Installation of inverter cage
- Testing of the construction materials.

2.8 Project Cost

The cost estimates for proposed Solar-Powered System at Baricho Water Works have been prepared based on construction rates obtained from on-going and recent construction contract in Kenya and rate build up using current rates/quotations from reputable manufacturers and suppliers. The main works considered include supply and installation of solar panels, electrical cables and sundries, inverter system, support structure for mounting panels and accompanying civil works.

The cost estimates for the proposed works under this design are as summarized in Table 2-6 below.

Table 2-6: Cost Estimate for the proposed works

BILL No.	DESCRIPTION	AMOUNT (Kshs)
1.	Preliminary and General Items (P&G)	26,494,470.76
2.	Solar Plant 1 - Malindi Pumps (1.625MW)	206,251,550.00
3.	Solar Plant 3 - Pumping Station No. 4, P4 (0.731MW)	92,005,165.00
4.	Solar Plant 4 - Pumping Station No. 5, P5 (1.448MW)	216,144,950.00

BILL No.	DESCRIPTION	AMOUNT (Kshs)
5.	Solar Plant 5 - Pumping Station No. 6, P6 (0.562MW)	73,566,260.00
6.	Dayworks	3,608,250.00
7.	Operational Support	4,500,000.00
	Sub - Total 1	**622,570,645.76**
	5% CONTIGENCIES	**31,128,532.29**
	Sub Total 2	**653,699,178.05**
	16% VAT	**104,591,868.49**
	GRAND TOTAL	**758,291,046.54**

CHAPTER 3: ANALYSIS OF PROJECT ALTERNATIVES

3.1 Overview

Regulation 18(1) of Legal Notice 101, Environmental (Impact Assessment and Audit) Regulations in Kenya, specifies the basic content of an Environmental Impact Assessment Study / Project Report after which, subsection (i) requires an analysis of alternatives. Analysis of project Alternatives requires comparison of feasible alternatives for the proposed project in terms of: project site, project technology, Potential Environmental and Social Impacts, capital and recurrent costs, suitability under local conditions, and acceptability by neighbouring land users.

This chapter describes and examines the various alternatives considered during the design of the project. The consideration of alternatives is one of the proactive sides of environmental and social assessment required to enhance project design. This is achieved through examining options instead of only focusing on the more defensive task of reducing adverse impacts of a single design option.

The alternatives that were considered for the project was focused on:

- Alternative Site
- Analysis of Alternative Materials and energy demand
- Proposed Project Option
- No Project Alternative

3.2 Alternative Site

This approach is geared towards optimizing the parcels of land under the ownership of CWWDA at the Baricho Water Works. The proposed project will be implemented on land under the ownership of CWWDA at the Baricho Water Works. This will ensure minimal to no disruptions to the community.

A combined solar plant to generate the combined power of 8.345MW would require a land size equivalent to 18.5 acres at a single site while the clustered solar plants will require 1 – 3 acres per site which will be possible and already identified at Baricho water works. A centralized solar plant to cover Phase I would require about 9.5 acres. In addition, a centralized single solar plant would increase the cabling distance to transmit power to the various pumps. The proposed decentralized solar plants will be as close as possible to the respective pumping stations thus reducing the required cabling distance.

There is no encroachment on the proposed site where the project will be undertaken under Phase I. A walk through with the areas' LangoBaya CBO committee/leaders was carried out on August 14, 2025 (the same day as the meeting) and they verified the proposed site was not on private land.

The Phase II of the project will require about 9 acres at a single site and this will be acquired during the Phase II implementation. At the onset of Phase II, the RAP report will be updated accordingly with the necessary details to acquire the required land.

The table below shows the land requirement for each solar plant

Table 3-1: Summary of power generation and required land size of land (acres)

Solar Plant Cluster	Target Pumps	Power generation (MW)	Number of 650W Panels Required (No.)	Required size of land (acres)
1	Malindi Pumps	1.625	2,500	3.5
2	Mombasa Pumps	4.032	6,204	9
3	P4 BH – 1A, 2A & 3A	0.731	1,125	1.5
4	P5 BH – 4A, 6A, 6B, 7 & 8	1.448	2,228	3
5	P6 BH – 9, 10 & 11	0.562	864	1.5

3.3 Analysis of Alternative Materials and energy demand

The size of solar system depends on the amount of power that is required (in watts), hours of operation per day and the amount of solar radiation (energy) available in a particular area. The proposed solar system is to power the pumping of boreholes and Malindi pumps during the day i.e. 6 – 8 hours per day with power storage.

The recommended solar panels are monocrystalline type with a rating of 650 watts. The total open circuit voltage should be as close as possible to the maximum voltage input for the pumping inverter for the system to achieve optimum results.

Inverters are critical component of the solar PV system which converts the direct current (DC) generated by the solar panels into alternative current (AC) suitable to the end-user consumption in this case, the pumping motors. This design proposes to use MPPT inverter system adequately sized for the respective pumps. The power supply will be provided from a hybrid system – solar with power storage to stabilize the power generation (during the day) and KPLC's grid (during the night). The power supply required has been assessed based on the pumping requirement for the boreholes and Malindi pumps for daytime operation. In addition, other site-specific auxiliary power requirements for office and residential house lighting have been included. The peak power supplied has to be able to supply peak pump start-up load for the last pump in consideration

3.4 No Project Alternative.

This "no project alternative" implies maintenance of the status quo. That is, the proposed project is not implemented and mechanisms currently being used for water supply are

maintained. While this approach may incur fewer costs and negative impacts, it may not fully address the long-term goal of improving overall water supply, access and reliability within the areas of Malindi, Kilifi and Mombasa. This was not a favourable alternative to adopt.

3.5 Proposed Project Option

This alternative involves the implementation of the proposed project. By adopting this alternative the project may result in both positive and negative impacts towards the environment and the community. This alternative is likely to have the greatest implications on socio-economic environment of the area and surrounding communities.

The benefits of this alternative will include but not limited to:

- Employment opportunities for skilled and non-skilled workers
- Injection of money to the National economy
- Economic growth and creation of business opportunities
- Team building- Through the training or the practical aspect of the construction and operation phase of the project, the operators will be able to learn new skills.
- Supply of clean, safe and reliable water-With the project interventions, communities in Kilifi and Mombasa Counties will be able to access clean, safe, sustainable and reliable water.
- Reduced cost of production and increased sustainability- with solarization of the project there will be reduced cost of production by reducing its cost on electricity. With the use of both solar energy and grid power there will be increased sustainability of the project.

From the above analysis of alternatives, implementing the project is the most viable option that should be adopted since it has more positive impacts to the environment and the community in the project area with minimal and temporary negative impacts that can be minimized or avoided with the implementation of the proposed mitigation measures in the ESMMP. The project implementation will incorporate the considerations highlighted above except the no project alternative.

CHAPTER 4: ENVIRONMENTAL AND SOCIO - ECONOMIC BASELINE CONDITION

4.1 Project Location

The Project Area is located in the Coastal region of Kenya within Kilifi County, one of the 47 counties in Kenya. The Baricho water works is located about 60 km West of Malindi Town and sources its water from the Baricho Aquifer along the bank of Sabaki River around coordinates 3°07′ 33.33″ S and: 39°46′46.75″ E. From Malindi town, the water works are accessed off the C 103 road, Malindi – Sala Gate road, off at Baolala centre to Lango Mbaya. The figure 4-1 below shows the general location context for the water works;

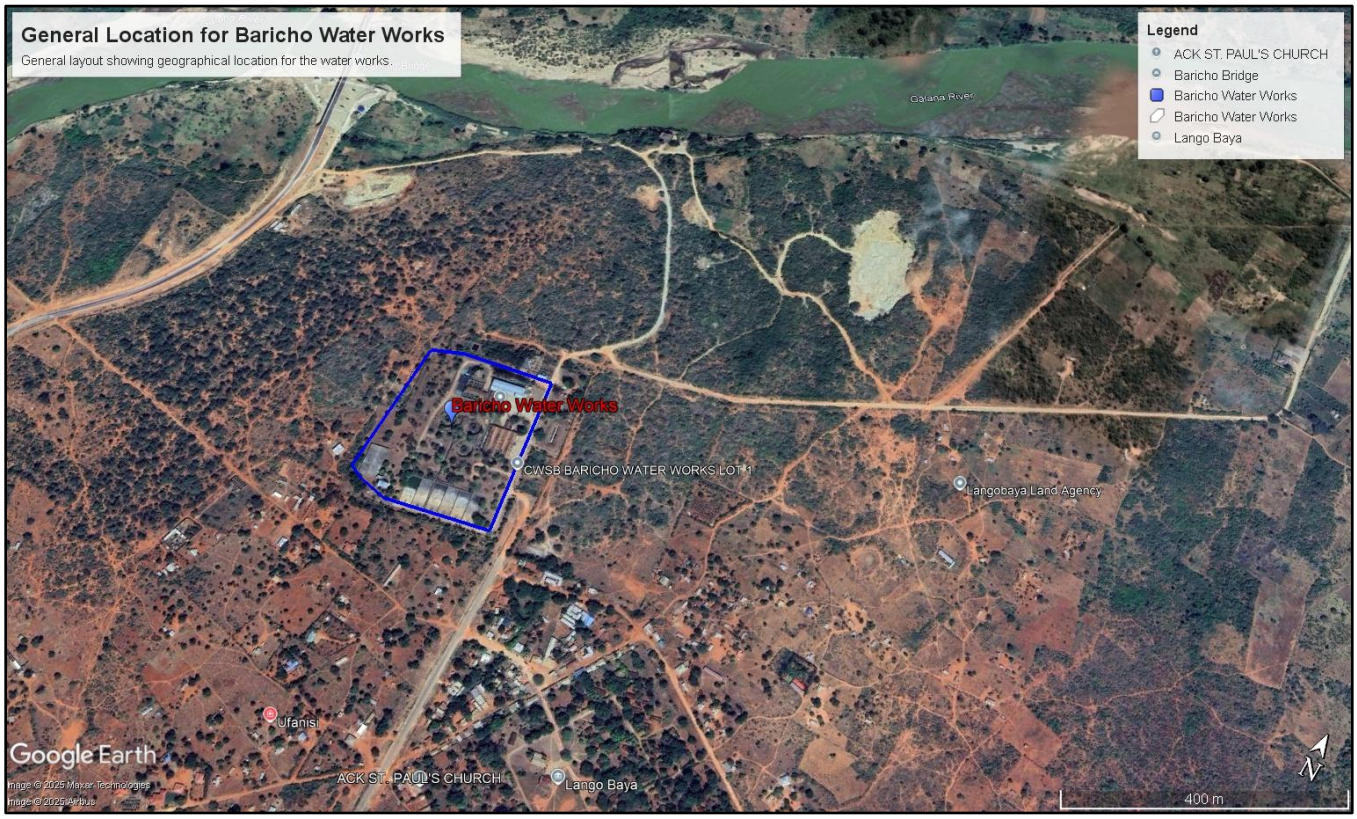

Figure 4-1: General location for Baricho Water Works.

4.2 Environmental Characteristics of the Project Area

4.2.1 Physical and Topographical Feature

Kilifi County has four major topographic features. The first one is the narrow belt, which forms the coastal plain ranging in width from 3 to 20 km. The Coastal Plain lies below 30 m above sea level with a few prominent peaks such as Mwembetungu Hills on the western boundary.

The Coastal Plain are several creeks with rich marine swamps that are endowed with mangrove forests and present great potential for marine culture. This zone is composed of marine

sediments including coral, limestone, marble, clay stones and alluvial deposits that support agriculture.

The second topographical feature is the Foot Plateau that lies to the West of the Coastal Plain. It is characterized by a slightly undulating terrain that falls between 60 and 150 m altitude and slopes towards the sea. A number of Dry River courses transverse the surface with underlying Jurassic sediments consisting of shells, sandstones and clays. The zone is covered by grassland and stunted shrubs.

The third topographical feature is the Coastal Range, which falls beyond the Foot Plateau between 150 to 450 m altitude and has distinct low range sandstone hills. The fourth feature is the Nyika Plateau, which rises from 100 to 340 m above sea level covering about two thirds of the County area on its western side. This plateau is characterized by a low population density, thin vegetative cover, shallow depressions and gently undulating terrain. It constitutes the arid and semi-arid areas of the county, which are suitable for ranching. The drainage pattern of the county is formed by one permanent river, a number of ephemeral rivers and streams, which drain into Indian Ocean. The permanent river is Sabaki River.

4.2.2 Climatic Conditions

Kilifi County has a bimodal rainfall pattern with average annual precipitation ranging from 300 mm in the hinterland to 1,300 mm in the coastal belt. The coastal belt receives an average annual rainfall of about 900 to 1,300 mm while the hinterland receives average annual rainfall of about 300 to 900 mm. The short rain season is experienced in the months of October, November and December while the Long rains are experienced in the months of March–April and May. The short rains are important to the hinterland for pasture regeneration and water recharge while the long rains are important in the coastal area for crop production.

The annual mean evaporation ranges from 1800 mm along the coastal strip to 2200 mm in the Nyika plateau in the hinterland. The highest evaporation rates are experienced during the months of January to March. The annual temperatures range from21°C to 30°C in the coastal belt and between 30 and 34°C in the hinterland. The county experiences a very significant wind field with relatively moderate wind speeds ranging from 4.8 Km/h along the coastal strip to 12 km/h in the hinterlands.

4.2.3 Water and Sanitation Services

The project area receives its water from the Baricho well fields. This water supply is however inadequate to meet the demands of the area, which is mainly because of the growing population and frequent power blackouts due to high electricity bill.

The proposed interventions under this project will yield improved and minimize water supply interruptions.

To enhance sanitation, the sector undertook the following: Allocated 14 acres of land for the sluge treatment facility (4 acres in Mtwapa, 2 acres in Mtondia, 4 acres in Watamu and 4 acres in Malindi) alongside purchasing Four (4) “honey suckers”. To enhance environmental governance, the sector Conducted EIAs for county projects as well as sensitized 52% of the population on waste 28 management against a target of 38% between 2017 and 2022, in addition compliance to environmental guidelines went up from 55% to 63% between the same years (Kilifi County Integrated Development Plan (CIDP) 2023-2027)

4.2.4 Biological Environment

There will be minimal disturbance during the construction and operation phase. The main vegetation within the project area are natural bushes and shrubs which will be destroyed during bush clearing. There are also fruit trees such as palm trees and mango trees around P6 project site.

There is no endangered fauna or endangered animals within the project area.

Figure 4-2: Shrubs within the project site and Palm trees around P6 site

4.2.5 Sensitive Receptors

The project area has mainly bushes and shrubs and there are no endangered plants and animals. The main sensitive receptor in the area is the Sabaki River with different proximities to the various project sites as presented in the table 4-1 below. The vegetation around Sabaki area includes palm trees, food crops grown by the community members. River Sabaki was prone to flooding as witnessed in April 2018 when a major flood occurred on the Sabaki River and adversely affected existing boreholes in the region and facilities leading to closure of the whole Baricho plant. Power supply and pipelines were also washed away. As a mitigation measure, protection works have been undertaken since 2020 around the Baricho plant boreholes.

Table 4-1: Project Sites and Proximity to River Sabaki

Project Site	Proximity to River Sabaki
Malindi Pumps	1,500m

Project Site	Proximity to River Sabaki
Pumping Station No. 6 (P6)	100m
Pumping Station No. 4 (P4)	1,200m
Pumping Station No. 5 (P5)	800m

4.2.6 Land Tenure and Ownership

In Kilifi County, landlessness is a challenge to some households. It is estimated that 11.3 per cent of the households in the county are landless according to the data available in the lands office. Many of these people are squatters on privately owned land. Majority of the residents don't have title deeds and live in communal lands. The area is both moderately and in some areas sparsely populated.

The project will be implemented on land under the ownership of CWWDA at Baricho Water Works. There is no encroachment on the proposed site where the project will be undertaken under Phase I. A walk through with the areas' LangoBaya CBO committee/leaders was carried out on August 14, 2025 (the same day as the meeting) and they verified the proposed site was not on private land.

4.3 Socio Economic information of the Project Area

4.3.1 Administration

The project area is located within Lango Baya Location.

4.3.2 Health

LangoBaya has limited access to public healthcare with two government owned facilities: Bao Lala Health Centre and Marikano Dispensary. All referral cases are taken to Malindi Sub County Hospital. In addition to the public health centres, the area is also served with private facilities, the most prominent being Tafiq Hospital.

4.3.3 Economic Activities

The main economic activities around the project area is farming due to their proximity to the Sabaki River. There are also small businesses within the project area. From the field visits some quarries were observed inside the project site.

Figure 4-3: quarry within the project site

4.3.4 HIV/AIDS Prevalence

The HIV epidemic continues to disproportionally impact the socio-economic spectrum of the entire county. The county has HIV prevalence of 4.5%. However, sub counties such as Malindi, Kilifi North and Kilifi South have an average of over 10% in HIV prevalence. The county thus is grappling with the rapid increase in the new infections amongst adolescents and young people. This exemplified by the fact that over 50% of new HIV infections occur amongst adolescents and young people aged between 15-24 years. Multiple factors including the tourism industry, drug and substance abuse, peer influence, risky sexual behaviors and inadequate employment opportunities drive HIV/AIDS new infections among young men and women in the county. By December 2015, 31,630 people were living with HIV and over 19% were adolescents and young people aged 15-24 years. Significant to note is the fact that the reduction in AIDS related deaths and the increase in new infections amongst adolescents and young people has significantly increased the total number of Persons living with HIV (PLHIV), translating into an increased treatment burden for the county. Most of the HIV financing by both the county government and development partners has been redirected to care and treatment programs which have result to improved health outcomes of PLHIV (KENPHIA, 2018). The HIV prevalence among women in the county is higher (10.7%) than that of men (4.6%), indicating women are more vulnerable to HIV infection than men in the County. HIV prevalence reduced from 4.2% to 3.5% due to interventions put in place in identification, diagnosis, initiation and retention to treatment. Among the general population the proportion diagnosed with malaria reduced from 7.2% to 4.7% against a target of 2% due to scale up of malaria prevention measures[1].

[1] Kilifi County Integrated Development Plan (CIDP)

4.3.5 Transport and communication

The key roads within Baricho are currently under the jurisdiction of the Kenya Rural Roads Authority (KeRRA) and Kenya National Highway Authority (KeNHA). The major road in the area is the Malindi-Salgate road of bitumen standard. There are also several unnamed roads within/ to access the project site.

Figure 4-4: Unnamed road within the Baricho Plant

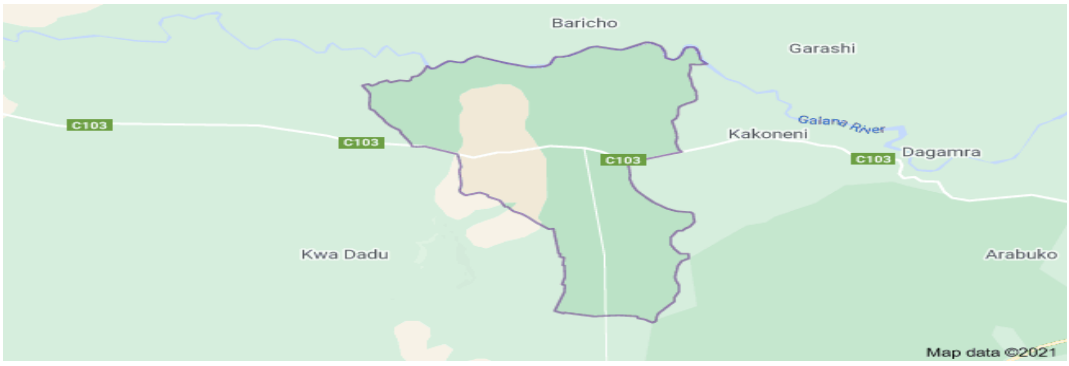

Figure 4-5: Map showing the road Networks within the Project Area

(Source: Google Maps: https://www.google.com/maps/place/Baricho+Bridge/@-3.0527752,39.5589958,10.3z/data=!4m5!3m4!1s0x183e173ad72e4cd9:0xf05cc1e95e37fc9b!8m2!3d-3.1219679!4d39.7726016)

4.3.6 Ethnicity

The Mjikenda are the predominant community in the project area specifically the Giriama community. Other ethnic communities also form part of the population. They include Nilotic communities such as luo, and Bantu Communities such as Taitas, Kikuyu, Kamba, Luhyas.

4.3.7 Culture

The project area and Kilifi County area in general is a multicultural, made up of primarily the, Mijikenda, Waswahili among other tribes from the entire country. The area has a rich history that feeds into its culture.

4.3.8 Education

The nearby schools within the project area include Maji Langobaya Primary, LangoBaya Secondary School, Flora ECDE LangoBaya, and Mambo Sasa Nursery School (Tiziana Nursery School), LangoBaya. The project area also has a tertiary institution nearby, Weru Technical and Vocational College

Being a rural area; the levels of education are relatively low, with majority of the population having achieved primary and secondary education. However, there is a high dropout rate due to early marriages or lack of interest of parents to invest in education, particularly in the informal areas forcing some youth to seek casual jobs and being vulnerable to poverty.

CHAPTER 5: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Introduction

Development of infrastructure projects is dealt with under several laws, By-laws, regulations and Acts of parliament, as well as policy documents and it is not possible to bring all these statutes under one heading. This chapter therefore outlines the policy, legal, regulatory and institutional framework for Environmental Management in Kenya and applicable World Bank policies which calls for compliance by all development projects.

5.2 Environmental Policy Framework

Policy framework	Objectives	Relevance
National Land Policy	Chapter 4 of the land policy under Environmental Management Principles, the policy provides actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution. For the management of the urban environment, it provides guidelines to prohibit the discharge of untreated waste into water sources by industries and local authorities; it also recommends for appropriate waste management systems and procedures, including waste and wastewater treatment, reuse and recycling. The policy goes further to advocate for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has been indicated as	The project proponent shall implement the ESMMP to ensure that the environment within project area and adjacent areas is not polluted by the subsequent activities during construction and operational phases.

Policy framework	Objectives	Relevance
	key in the monitoring and protection of the environment. Chapter 4 further advocates for the Implementation of the polluter pays principle which ensures that polluters meet the cost of cleaning up the pollution they cause, and encourage industries to use cleaner production technologies	
Kenya Vision 2030	This is the current national development blueprint for the period 2008 to 2030. The vision has three pillars – economic, social, and political. It is recognized that Kenya is a water-scarce country but stated (Kenya, 2007: 115) that the Vision for the water and sanitation sector is "to ensure water and improved sanitation services availability. The Kenya Vision 2030 aspires for the country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications.	The proposed project is in line with the vision 2030 as it will lead to improved water availability in the target population in Malindi, Kilifi and Mombasa and their surrounding environs. The project will promote green renewable energy through adoption of solar power
National Gender and Equality commission Act 2011	This Act establishes the National Gender and Equity Commission, a successor of the Kenya National Human Rights and Equality Commission, with the objectives of promoting gender equality and freedom from discrimination against all; women, men, persons with disabilities, youth, children, the elderly, minorities and marginalized communities.	In his requirement to hire the local labour, the Contractor will be obligated to hire his workforce in a gender sensitive way that includes and promotes equal opportunities for both men and women.
The Policy on Gender and Development	The National Policy on Gender and Development is consistent with the Government's efforts of spurring	This law will be of relevance to the Contractor in ensuring that all genders are given an equal

Policy framework	Objectives	Relevance
	economic growth and thereby reducing poverty and unemployment, by considering the needs and aspirations of all Kenyan men, women, boys and girls across economic, social and cultural lines. The overall objective of the Gender and Development Policy is to facilitate the mainstreaming of the needs and concerns of men and women in all areas in the development process in the country.	opportunity during recruitment during the construction phase and operation phase of the project. The employers will also provide adequate facilities for all genders within the project site.
National Environment Policy	The objectives of the Policy include developing an integrated approach to Environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools.	The Project shall implement the Environmental and Social Management and Monitoring Plan (ESMMP) to mitigate the impacts of the resulting impacts during the construction and operational phases of the Project;
HIV/AIDS Policy	This policy shall provide a framework to both the project proponent and contractor to address issues related to HIV and AIDS. In Summary, the policy provides a mechanism for: • Setting Minimum Internal Requirements (MIR) for managing HIV and AIDS • Establishing and promoting programmes to ensure non-discrimination and non-stigmatization of the infected; • Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS; • Ensuring adequate allocation of resources to	The Policy will be complied with during implementation of the Project. The contractor will provide condoms both male and female in the sanitary facilities, Sensitize workers on the need to refrain from risky behaviours; provide HIV/AIDS awareness training and VCT/HCT services, to staff and the local community members and monitor the efficacy of the awareness created during construction of the project and to provide unskilled labour force to the locals to minimize labour influx.

Policy framework	Objectives	Relevance
	HIV and AIDS interventions; • Guiding human resource managers and employees on their rights and obligations regarding HIV and AIDS.	
Kenya Youth and Development Policy 2018	This policy is designed to scale up youth empowerment interventions as well as the youths' value contribution to nation building. The priorities that are set out in the policy are: alignment of the youth programmes to the Big Four Agenda of Government (2018-2022), Kenya Vision 2030 and its Medium-Term Plans, the Constitution (2010) and the Sustainable Development Goals (SDGs) (2030). Its main objective is to mainstream youth issues in all sectors of national development, on both the micro and macro levels, at national and county levels, within the public, private sectors, families and civil society.	The project should ensure that youth are given priority to participate in the project through employment and delivery of goods and services.

5.3 Overview of Relevant Legislation

5.3.1 Constitution of Kenya

Article 42 of the Kenyan Constitution, under the Bill of Rights, provides that every Kenyan has a right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislation and other measures.

Part II of Chapter 5 of the Constitution (Environment and Natural Resources), (I) the State clearly undertakes to carry out the following:

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection and conservation of the environment; Protect genetic resources and biological diversity;
- Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment

Part (II) “Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Chapter 5 on Land and Environment emphasizes on the following:

- Land use and management shall by law benefit local communities
- Community land is protected from encroachment by State.
- Law shall protect Rivers, forests and water bodies.
- Equitable access to land.
- All lawful land rights are secured; only someone who has stolen land needs to worry.
- County governments will manage land in trust of the people according to the constitution.

Relevance

The constitution of Kenya provides for sound management and sustainable development of all of Kenya's projects, both public and private investments. It also calls for the duty given to the project proponent to cooperate with State organs and other persons to protect and conserve the environment as mentioned in Part II. The policy requires development within the water sector in conjunction with power and infrastructure projects are classified under medium risk projects requiring assessment of project likely environmental effects and suggesting mitigation measures before implementation. This ESIA study is addressing both the environmental and social issues by developing environmental and social management plan that will be adopted during the entire project period.

5.3.2 The Environmental Management and Coordination (Amendment) Act, 2015.

The Act provides for the establishment of a legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. Just as in the new constitution, Part II of EMCA confers to every person the right to a clean and healthy environment and to its judicial enforcement. The new Constitution and EMCA therefore obligates the project's Executing Agency and Contractor to work in a clean environment and not to contravene the right of any person within its zone of influence, to this entitlement. EMCA has provided for the development of several subsidiary legislations and guidelines which govern environmental management and are relevant to the project implementation. These include:

a) Environmental Management and Co-ordination (Strategic and Integrated Environmental Assessments and Environmental Audits) Regulations, 2025.

The Environmental Impact Assessment and Audit Regulations state in Regulation 3 states that "the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V of the Act.

Part III of the Regulations indicates the procedures to be taken during preparation, submission and approval of the environmental project report.

Part 4(1) of the Regulation further states that: "no Proponent shall implement a project"

a) Likely to have a negative environmental impact; or

b) For which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulation.

Relevance

This Comprehensive Project Report has been compiled to comply with EMCA and the regulations highlighted.

b) The Environmental Management and Coordination (Waste Management) Regulations, 2006 Legal Notice No. 121

These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September, 2006. The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- Domestic waste;
- Industrial waste;
- Hazardous and toxic waste;
- Pesticides and toxic substances;
- Biomedical wastes; and
- Radioactive waste.

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

I. Improvement of production process through
   - Conserving raw materials and energy;
   - Eliminating the use of toxic raw materials and wastes;
   - Reducing toxic emissions and wastes.

II. Monitoring the product cycle from beginning to end by
   - Identifying and eliminating potential negative impacts of the product;
   - Enabling the recovery and re-use of the product where possible,
   - Reclamation and recycling and
   - Incorporating environmental concerns in the design and disposal of a product.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non- hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Relevance

The proposed project, during construction phases will generate wastes which will need to be disposed of as per the guidelines in the regulations.

c) The Environmental Management and Coordination (Water Quality) Regulations, 2006 Legal Notice No. 120

These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No.36, and Legal Notice No. 120 of 29th September, 2006. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells and other water sources).

It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

Relevance

The proponent should ensure that waste is handled, stored, transported and disposed as per this regulation.

d) The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Legal Notice No. 61

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 1999 as amended in 2015. The regulations provide information on the following:

- Prohibition of excessive noise and vibration;
- Provisions relating to noise from certain sources;
- Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and Noise and excessive vibrations mapping.

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be

made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 meters from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, No person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub-regulation 4, such permit shall be valid for a period not exceeding three months.

Relevance

The Contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the construction phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles.

e) The Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 Legal Notice No. 160

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea. Lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA, 2015.

Relevance

During the construction phase of proposed project, there will be minimal removal of the existing natural vegetation since the main vegetation in the area is bushes and shrubs.

Other relevant EMCA 2015 to be considered during construction and operation of the project are;

- Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009.
- The Environmental Management and Coordination (Controlled Substances) Regulations, 2007 Legal Notice No. 73.

Relevance

EMCA 2015 and above listed regulations shall form the main statutory instruments which will guide the implementation of the project so that any likely adverse impacts that could be caused by the project are promptly mitigated as recommended in this assessment. This report is also in compliance with the requirement of the EIA/EA regulations 2003 as amended in 2019.

5.3.3 Sustainable Waste Management Act, 2022;

The Act provides for new governance framework in waste management with establishment of Waste Management Council, expanded role of County Governments and Extended Producer Responsibility Schemes. In addition, the Act prescribes the need to establish new infrastructure for waste management such as segregation at source, proper transportation, material recovery facilities, and closure of dumpsites, sanitary landfills, and national waste information system.

Relevance

The project will generate a lot of waste ranging from solid waste such as papers, plastic bottles, cement bags among others and wastewater will also be generated during the construction, operation and decommissioning phases. The Contractor will adhere to the laid out regulations. The Contractor will also engage a NEMA licensed waste handler to ensure proper disposal of waste

5.3.4 Water Act 2016

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water which he is authorized to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Agency.

Section 75 and sub-section 1 allows a licensee for water supply to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing water belonging to the licensee or which he is authorized to take for supply from being polluted. However, if the proposed works will affect or is likely to affect any body of water in the catchment, the licensee shall obtain consent from the Water Resources Authority.

Relevance

This Act shall be relevant during both construction and operation phases of the project whereby the contractor and proponent shall ensure that all relevant water resources are not polluted from both liquid and solid wastes.

5.3.5 Water Resources Regulations, 2021

These Regulations implement provisions of the Water Act, no. 43 of 2016. They shall apply to the regulation, management, use and development of all water resources, perennial or seasonal and including water resources of the territorial sea.

Matters covered by these Regulations include: prescription of water use activities; issue of approvals, permits and authorizations for water use and waterworks; guidelines on surface water, including declaration of a watercourse, wetlands, land reclamation, water use for irrigation and Works Associated for protection and control of fish; groundwater development, including borehole and issue of specific permits and authorizations; water quality monitoring and liquid waste disposal, including control of water pollution, water quality monitoring; inspection and controls concerning waterworks; water use charges, including penalties for misuse or for over-abstraction; roles and powers of water resource users associations and basin water resources committees; identification of protected and designated groundwater conservation areas; composition of reserve; categories of water sector professionals and contractors and issue of related permits and licenses.

Relevance

The project shall ensure adherence to the regulation especially during operation phase

5.3.6 Energy Act 2019

This is an Act of Parliament to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes. It is the Act that established the Energy and Petroleum Regulatory Authority (EPRA).

Relevance

The proposed projects involves installation of a hybrid solar system and associated amenities for pumping water at Baricho water works. The project will adhere to the stipulated regulation during construction and operation of the facilities.

5.3.7 Climate Change (Amendment) Act, 2023

The Climate Change Act aims to reduce vulnerability to climate change and improve our country's ability to take advantage of the opportunities that climate change offers. The Act is to be applied for the development, management, implementation, and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.

The Purpose and Objectives Clause of the Act (Part 1, Section 3) provides that-

(2) Without prejudice to subsection (1), this Act shall be applied to all sectors of the economy by the national and county governments to –

a) Mainstream climate change responses into development planning, decisions making, and implementation.
b) Build resilience and enhance adaptive capacity to the impacts of climate change.
c) Formulate programmes and plans to enhance the resilience and adaptive capacity of humans and ecological systems to the impacts of climate change.
d) Mainstream and reinforce climate change disaster risk reduction into strategies and actions of public and private entities.
e) Mainstream intergenerational and gender equity in all aspects of climate change responses.

Relevance

The development and implementation of the proposed interventions will contribute toward the stated objectives of the climate change act by mainstreaming climate resilience in the infrastructures. This involves adoption of the solar energy, a renewable source of energy in the operations of the Baricho Water Works Plant.

5.3.8 County Government Act No. 17 of 2012

Part II of the Act empowers the county government to be in charge of functions described in Article 186 of the constitution, (county roads, water and Sanitation, Health). Part XI of the Act vests the responsibility of planning and development facilitate the development of a well-balanced system of settlements and ensure productive use of scarce land, water and other resources for economic, social, ecological and other functions across a county. This arrangement has been adopted for interventions in order not to conflict with provisions of the Kenyan Constitution.

Under section 115, (1) Public participation in the county planning processes shall be mandatory and be facilitated through; (b) Provision to the public of clear and unambiguous information on any matter under consideration in the planning process, including;

i. clear strategic environmental assessments;
ii. Clear environmental impact assessment reports;
iii. Expected development outcomes; and
iv. Development options and their cost implications.

Relevance

This ESIA has been prepared in adherences to this act, public participations were undertaken to create awareness and to obtains communities views and suggestions on design and implementation of the sub project.

CWWDA should maintain a continuous engagement with the county Government of Kilifi.

The county government of Kilifi to support the client and also issue permits relevant to the project Contractor's like business permits and development approvals

5.3.9 The Physical and Land Use Planning Act, 2019

The Physical and Land Use Planning Act, 2019 is an act of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes. The Act provides a vital link with the Environment Management and Co-ordination Act. For example, Section 36 of the Act states that "In connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant will be required to submit together with the application an environmental impact assessment report". This reinforces EIA requirements under EMCA 2015

Relevance

The Act directs, regulates and harmonizes development and use of land over the Country. The large part of the project is designed to utilize land under the ownership of CWWDA at the Baricho Water Works. This was in an effort to avoid cases of acquisition of private property and resettlement complications.

The County Government of Kilifi will need to provide necessary approvals such as approvals for Contractor's temporary facilities.

5.3.10 Occupational Health and Safety Act (OSHA 2007)

This legislation provides for protection of workers during construction and operation phases. It is tailored at implementation of the EHS plan in compliance with the relevant sections of this Act. The EMP prepared under this assessment has provided for specific health and safety aspects to be complied with during implementation of the project.

Subsection 18 - Sanitary conveniences

Sufficient and suitable sanitary conveniences for persons employed in the factory/ work places shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences and where persons of both sexes are, such conveniences shall afford proper separate accommodation for persons of each sex.

Subsection 21 – Prime movers

Every flywheel directly connected to any prime mover and every moving part of any prime mover, shall be securely fenced, whether the flywheel or prime mover is to be situated in an engine –house or not. Head and tailrace of every water wheel and of every water turbine shall be securely fenced. Every part of electric generators, motors and rotary converters and every flywheel directly connected thereto shall be securely fenced unless it is in such a position or of such construction as to be safe to every person employed or working in the premises as it would be if securely fenced.

Subsection 22 -Transmission Machinery

(1) Every part of transmission machinery shall be securely fenced unless it is in such a position or of such construction as to be safe to every person employed or working in the premises, as it would be if securely fenced.

(2) Efficient devices or appliances shall be provided and maintained in every room or place where work is carried on by which the power can promptly be cut-off from transmission machinery in that room or place.

(3) Every machine intended to be driven by mechanical power shall be provided with an efficient starting and stopping appliance, the control of which shall be in such a position as to be readily and conveniently operated by the person operating the machine.

Subsection 25 - Construction and maintenance of fencing

All fencing or other safeguards provided in pursuance of the foregoing provisions shall be of substantial construction, constantly maintained, and kept in position while the parts required to be fenced or safe guarded are in motion or in use except when any such parts are necessarily exposed for examination and for any lubrication or adjustments shown by such examination to be immediately necessary.

Subsection 13 – Cleanliness

Every factory/work place shall be kept in a clean state and free from effluent arising from any drain, sanitary convenience or nuisance.

Section 51- Air pollution

Preventive measures shall be put in place during operation of the project to prevent fumes and exhaust gases from entering into the atmosphere.

Relevance to the Project

Contractor will be required to register site as a work place with the local county directorate of occupational safety and health services (DOSHS) in line with this Act. The Act provides Occupational Health and Safety guidelines which shall be followed by both the Contractor and Supervising Consultant during implementation of the project in order to avoid injuries and even loss of life to workers and neighbouring community.

5.3.11 Work Injury Benefits Act (WIBA) 2007

It is an act of Parliament to provide for compensation to workers for injuries suffered in the course of their employment. It outlines the following:

- Employer's liability for compensation for death or incapacity resulting from accident;
- Compensation in fatal cases;
- Compensation in case of permanent partial incapacity;
- Compensation in case of temporary incapacity;
- Persons entitled to compensation and methods of calculating the earnings;
- No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury;
- Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.

Relevance

The Contractor will need to abide by all the provisions of WIBA and maintain an appropriate insurance cover throughout the active construction period.

5.3.12 The Public Health Act (Cap.242)

Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

Relevance

The Act provides guidelines to the Contractor on how he shall manage all wastes (Liquid and Solid Wastes) emanating from the project in a way not to cause nuisance to the community. This

Act during construction shall be read alongside the waste management regulations of EMCA 2015 for utmost compliance. The Act also shall be applied to ensure that the food that is provided to the workers during construction of the project meets the safety requirements.

5.3.13 Employment Act 2007

The Act declares and defines the fundamental rights of employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the foregoing. The Act provides for the basic minimum conditions of employment to include hours of work, water (for use at the place of work), food (employee properly fed) and medical attention.

Relevance

At construction stage, the project Contractor will hire both full-time and casual staff and the prevailing basic minimum conditions of employment will have to be observed.

5.3.14 Traffic Act 2012

This Act consolidates the law relating to traffic on all public roads. The Act also prohibits encroachment on and damage of roads including land reserved for roads. This project is under the provisions of this Act as it will utilize public roads in the delivery of materials.

Relevance

In line with the requirements of this Act, the Contractor will need to install and properly maintain all the necessary road signs while implementing the project.

5.3.15 HIV AIDS Prevention and Control Act (Act No. 14 of 2006) Revised 2012

This is an Act of Parliament to provide measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counselling, support and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.

Section 3 of the Act indicates the purpose of the legislation including public awareness and rights to people living with HIV/AIDS.

Relevance

This Act will ensure that the Contractor makes provision for VCT services for employees and locals, as well as promotes public awareness. This will go a long way in ensuring stigmatization of HIV and AIDS is reduced as well as managed during the construction period.

Public awareness shall be achieved through education, public campaigns even at workplaces. This Act's provisions then give the guidelines unto which the project shall follow in educating workers and staff and providing of incentives to combat HIV/AIDS.

5.3.16 The Sexual Offences Act 2006

This is an Act of Parliament to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes. The Act is a big step in the fight against sexual offences as it has strong punishment for criminals.

Relevant Sections in this Act include: -

- 24- Sexual offences relating to position of authority and persons in position of trust.
- 25- Sexual relationship which pre-date position of authority or trust.
- 26- Deliberate transmission of HIV or any other life threatening sexually transmitted disease.

Relevance

In the life cycle of the Project, the Act will be key in ensuring that no sexually offences are committed. The proponent and contractor shall sensitize his employees on the provisions of this Act and all persons employed under the project will be required to sign a code of conduct.

5.3.17 The Children Act, 2010

This Act protects the welfare of children within the Country. The Act identifies Children as a person below the age of 18 years old and protects them from exploitation.

Relevance

Of particular importance to this project, is section 10, which protects the child from:

- Economic exploitation (only the people above 18 years will be considered for job opportunities in the project).
- Any work that interferes with his/ her education, or is harmful to the child's health or physical, mental, spiritual, moral or social development

5.3.18 The National Museums and Heritage Act-Cap 216 (2006)

Kenya is rich in its antiquities, monuments, cultural and natural sites which are spread all over the country and the Act aims to preserve this national heritage.

The National Museums of Kenya is the custodian of the country's cultural heritage, its principal mission being to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world.

Through the National Museums of Kenya many of these sites are protected by law by having them gazetted under the Act.

- Section 30 of the Act requires all discoveries of buried artefacts to be reported to the NMK/GoK.

Relevance

In case of unexpected finds and discoveries of buried artefacts reporting to the NMK/GoK will be carried out.

Climate Change Act

5.4 Institutional Structure of the Water Sector

5.4.1 National Environment Management Authority (NEMA)

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory body on environmental management in Kenya under EMCA, 1999 as amended in 2015. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programs, plans and projects.

The project will be expected to get licence from NEMA following review of this report prior to commencement of any civil works.

5.4.2 Water Resources Authority (WRA)

The authority is responsible for sustainable management of the Nations Water Resources:

- Implementation of policies and strategies relating to management of water resources, Develop principles, guidelines and procedures for the allocation of water,
- Development of Catchments level management strategies including appointment of catchments area advisory committees,
- Regulate and protect water resources quality from adverse impact
- Classify, monitor and allocate water resources.

5.4.3 Water Services Regulatory Board (WASREB)

The regulatory Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya. The mandate of the regulator covers the following key areas:

- Regulating the provision of water and sewerage services including licensing, quality assurance, and issuance of guidelines for tariffs, prices and disputes resolution.
- Overseeing the implementation of policies and strategies relating to provision of water services licensing of Water Services Boards and approving their appointed Water Services Providers,

- Monitoring the performance of the Water Services Boards and Water Services Providers,
- Establish the procedure of customer complaints,
- Inform the public on the sector performance,
- Gives advice to the Minister in charge of water affairs.

5.4.4 Water Works Development Agencies

The WWDAs are responsible for the efficient and economical provision of water and sewerage services in their areas of jurisdiction. CWWDA is among the nine agencies established under the Water Act, 2016 and is mandated to:

- Plan and develop National Public Water Works for bulk water supply;
- Formulate Development and Investment Plans in liaison with county governments;
- Provide input to the national development and financing plan; and
- Provide technical assistance to Water Service Providers for county asset development
- CWWDA is the implementing Agency in this proposed project.

5.4.6 Water Services Providers

Water Service Providers are the utilities or water companies. They are under the leadership of the County Governments but have been commercialized to improve performance and run like business within a context of efficiency, operational and financial autonomy, accountability and strategic, but minor investment. KIMAWASCO, MOWASSCO and MAWASCO are the WSPs that will benefit out of this project from improved supply of water to their customer bases.

5.4.7 Ministry of Energy

Plays a role in setting policies and overseeing renewable energy projects such as solar projects

5.4.8 Energy and Petroleum Regulatory Authority (EPRA)

They are the primary regulatory body responsible for licensing manufacturers, importers, vendors, contractors, and installers of solar systems and components. EPRA sets standards and ensures quality control within the sector

5.5 Project Implementation Institutional Structure

CWWDA has established implementation units for the project with project engineers and a team of environmental and social safeguard experts in charge for various projects, the Agency hires on case-by-case basis the services of environment specialist to oversee implementation of the EMMSP developed for projects.

I. The Contractor

The Contractor will be required to have an Environmental Health and Safety Officer to advice on environmental components of the project implementation. Elements in the environmental and

social management plan are expected to be integrated in the project with appropriate consultations with CWWDA through the supervising environmental and social safeguard expert.

II. **The Supervising Consultant**

The supervising Consultant will be engaged by CWWDA (as the project proponent) to ensure effective implementation of the environmental management plan. CWWDA has engaged the services of SARI/SGAPI/GATH JV to assist in supervision works.

SARI/SGAPI/GATH JV have an environmental and social expert who understands the details of the recommendations on environment management and especially the proposed action plans, timeframes and expected targets of the management plan. The environmental supervisor expert will also be the liaison person between the Contractor and CWWDA on the implementation of environmental concerns as well as issues of social nature associated with the Project.

5.6 World Bank's Environmental and Social safeguard Policies

Like in any project financed by, or with financial participation of, the World Bank, the environmental and social safeguards as defined in the World Bank's prevailing Operational Policies (OPs) for projects with High or Substantial environmental and social impacts. WB classifies its projects into four classifications: Category A, Category B, Category C and Category FI.

This project involves installation of a solar-powered hybrid system that will have significant positive effects on the environment and to the targeted beneficiaries. Adverse effects, if any, will be limited (some minor and temporally limited noise and dust during construction). Such effects can clearly be identified during the screening process and mitigated as described in EMMP and has been categorized as B.

Category B: A proposed project is classified as Category B if its potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.

The Table 5-1 below shows the applicable Operational Policies (OPs) to the proposed project: The following OPs will be triggered by the proposed project:

Table 5-1 : Operational Policies (OPs)

OP	Title	Comments
4.01	Environmental Assessment	Applicable. As a result of screening, the project was identified as a Category B project due potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures and other activities, as described
4.04	Natural Habitats	Not applicable.
4.09	Pest Management	Not applicable.
4.10	Indigenous Peoples	Not applicable.
4.11	Physical Cultural Resources	Not applicable. Several site visits conducted have not indicated the presence of any cultural (historical, archaeological) sites in the construction area. However, to manage "chance finds" an appropriate procedure is included in this ESIA (Annex 4). Such procedure to be followed by contractors during the construction phase.
4.12	Involuntary Resettlement	Not applicable
4.36	Forests	Not applicable.

The relevant International Labour Organization (ILO) Conventions that will be applicable to the Project are listed below:

1. ILO Convention 87 on Freedom of Association and Protection of the Right to Organize
2. ILO Convention 98 on the Right to Organize and Collective Bargaining
3. ILO Convention 29 on Forced Labour
4. ILO Convention 105 on the Abolition of Forced Labour
5. ILO Convention 138 on Minimum Age (of Employment)
6. ILO Convention 182 on the Worst Forms of Child Labour
7. ILO Convention 100 on Equal Remuneration
8. ILO Convention 111 on Discrimination (Employment and Occupation)
9. UN Convention on the Rights of the Child, Article 32.1
10. UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

The Project Contractor shall observe the Standard as presented in the ESMMP of the project to be enforced under the Works Contract.

CHAPTER 6: STAKEHOLDER CONSULTATIONS AND PUBLIC PARTICIPATION

6.1 Introduction

Timely, well-planned, and implemented public involvement and consultation is a vital component of a successful ESIA study. The Constitution of Kenya, 2010, Article 10 and 69 of the Constitution recognizes public participation as a principle of governance and gives the state a responsibility to encourage public participation in the management, protection and conservation of the environment.

According to Environmental Management and Coordination (Amendment) Act, 2015, and Environmental Impact Assessment and Audit Regulations, 2019, beneficiaries and members of the public living within new or improved project sites (both public and private) are consulted to seek their views and opinions regarding the projects before implementation.

Public consultations form a useful component for gathering, understanding, and establishing likely impacts of projects determining community and individual preferences and selecting alternatives. Through public participation, it is possible to enhance project designs and ensure sustainability of the projects, acquire high level of acceptance from the community and stakeholders, identify possible conflicts areas early, and accrue benefits to a wider section of the society.

The proposed project has incorporated public consultations to understand the local impacts, needs and thoughts and eventually incorporate them into the final designs and operations of the project.

6.2 Objectives of Key Stakeholders Consultation and Public Participation (CPP)

The objectives of stakeholder consultation and public participation include:

- Informing the public and relevant stakeholders regarding the project
- Improved Decision-Making from gathering diverse perspectives from the stakeholders:
- Increased stakeholder support during development and after completion:
- Enhanced Project acceptance and sustainability:
- Early stakeholder engagement allows for the identification and mitigation of potential risks and challenges before they escalate into significant problems.
- Improving transparency and accountability in decision making.
- Managing the community and stakeholder's expectations regarding the project
- Obtaining local knowledge regarding the project sites

6.3 Stakeholder Mapping

The identification of stakeholders for this Project followed the procedures outlined in the Environmental Management and Coordination (Amendment) Act 2015, Environmental (Impact

Assessment and Audit) (Amendment) Regulations, 2019 Guidelines, the Constitution of Kenya 2010. To meet best practice approaches, the following principles were applied for stakeholder engagement:

- Openness and life-cycle approach
- Informed participation and feedback
- Inclusiveness and sensitivity:
- Cultural appropriateness.
- Gender sensitivity.

The key stakeholder groups identified, consulted and informed about the project are presented in **Table 6-1**.

Table 6-1: Stakeholder Inventory

No.	Name	Category
Primary Stakeholders		
1.	Malindi Water and Sewerage Company (MAWASCO)	Water Service Provider
2.	Kilifi-Mariakani Water and Sewerage Company (KIMAWASCO)	Water Service Provider
3.	Mombasa Water Supply and Sanitation Company Water and Sewerage Company (MOWASSCO)	Water Service Provider
4.	National Government Administrative Office Deputy County Commissioners (DCC), Chiefs/ Assistant chiefs	National Government
5.	Environmental Officer	National Government
6.	Area Residents	Community
7.	Community Groups	Community
Secondary Stakeholders		
1.	County/sub county NEMA office	National/County Government Agencies and Ministries
2.	Physical Planning Officer	
3.	Sub-county Lands Registrar	
Tertiary Stakeholders		
4.	Non-Governmental Organizations operating in the project area • Mkondoni Community Water Project • LangoBaya CBO and Youth Group	In the following sectors: Environmental Management; Water; Sanitation; Vulnerable Groups

6.4 Stakeholder Consultation Activities

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives, and designing viable and sustainable mitigation and compensation plans. The consultations will take place throughout the planning phase and continue during the construction and operational phases of the project.

Table 6-2 presents an overview of the stakeholder activities that were /will be undertaken during the stakeholder engagement

Table 6-2: Stakeholder Consultation Activities

Phase	Activities
Phase 1: Stakeholder identification and preliminary consultation/scoping	• Stakeholder identification and categorization during the Project inception exercise • Preliminary consultation: liaison with National, County, and Local Institutions • Identification of key Project constraints
Phase 2: Information distribution and introductory Meetings	• Distribution of specialists and technical Information to the County Government administration, and other relevant stakeholders • Introductory meetings with local administration, Sub-Counties administrators and ward administrators, and relevant authorities.
Phase 3: Impact Identification and Development of Mitigation Measures	• Meetings with Local Administration in affected locations • Meetings and conducting Key Informant Interviews with members of sub-county and Ward administrators within the settlement • Conducting interviews with the community members • Dialogue and meetings with the above-identified stakeholders
Phase 4: Disclosure of the draft EIA	• Submission of ESIA Project Report to National Environment and Management Authority (NEMA) • Circulation of Project Report by NEMA to relevant Lead Agencies • Review and Incorporation of Lead Agencies' comments and revisions to ESIA • Collection and incorporation of comments and feedback. • Issuance of license
Phase 6: consultation during construction and operation	• Throughout the Project

6.5 Stakeholder Consultation

The main key informants targeted in the consultations were both Government and private institutions operating within the project area. Listening to stakeholder concerns and feedback is a valuable source of information that can improve project design and outcomes and help in identifying any impacts.

6.5.1 Key Informant Consultations

Consultations and structured questionnaires were administered to the key stakeholders on August 14, 2025 to solicit views regarding the project as well as its design. The consultations and questionnaires were administered through visiting the various key stakeholders' offices and a brief discussion regarding the project. The questionnaires initially gave introduction and created awareness to the respondents regarding the project. Afterwards, questionnaire enquired on acceptance of the project, anticipated positive and negative impacts, suggested mitigation measures as well as any suggestions and recommendations. Sample questionnaires have been attached in

MINUTES **SIGNED AND AGREED UPON BY:**

MINUTES SIGNED AND AGREED UPON BY:

CONFIRMATION OF MINUTES

FOR CHIEF/ASSISTANT CHIEF

Name: STEPHEN K. MENZA.

Designation: SNR. ASSISTANT CHIEF

Date: 30/9/2025

Sign:

ASST. CHIEF ENFORCEMENT SUB-LOCATION P. O. Box 1, MAUKU

FOR CONSULTANT - SARI CONSULTING JOINT VENTURE WITH SGAPI AND GATH CONSULTING ENGINEERS

Name: Sarah Karanja

Designation: ESHS

Date: 24.09.2025

Sign:

Attendance Sheets

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WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

CONSULTANCY SERVICES FOR PREPARATION OF PRELIMINARY DESIGNS, FEASIBILITY STUDY, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE PROJECT – PROPOSED HYBRID SOLARIZATION AT BARICHO WATER WORKS

LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement DATE: August 14, 2025

No.	Name	Organization	Designation	Gender		Persons Living With Disability (Yes/No)	Phone No	Signature
				F	M			
1.	Joseph Kalama	-	Community member		✓	NO	0728909748	[signature]
2.	WILLIAM S. BAYA	CBO	C/Person		✓	NO	0726162172	[signature]
3.	Peter Kinyanjui	SARI / SGAPI / GATH	Engineer		✓	No	0722103085	[signature]
4.	Sarah Komingia	SARI / SGAPI / GATH	ESHS	✓		NO	0703122837	[signature]
5.	Julia Wango	SARI / SGAPI / GATH		✓		Yes	0707 [illegible]	[signature]
6.	STEPHEN K. MENZA	INTERIOR	ASST. CHIEF		✓	NO	0724635562	[signature]
7.	Boniface Kogi	SARI / SGAPI / GATH	Engineer		✓	NO	0725942224	[signature]
8.								

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WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

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LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement DATE: August 14, 2025

No.	Name	Organization	Designation	Gender		Persons Living With Disability (Yes/No)	Phone No	Signature
				F	M			
1.	Clinton Khero				✓	NO	0798908899	[signature]
2.	Ezekiel Tumaini				✓	NO	0728376561	[signature]
3.	Bensluson Konde Tuwa	member CBO LB			✓	NO	072846349	[signature]
4.	Isaac Chaka	member CBO LB	I.T		✓	NO	0726967596	[signature]
5.	Juma Chhngawa				✓	NO	0769606485	[signature]
6.	Anderson Kithi Thoya				✓	NO	0700494195	[signature]
7.	Anderson Kalama				✓	NO	0797740908	[signature]
8.	Kahindi Randu M	member			✓	NO	0792667224	[signature]

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
9.	Kadzo Kadenge			✓		No		
10.	Herron Raraka				✓	No	0712415007	
11.	CHARLES KOMBE YERI				✓	No	0727141371	
12.	SIDI BAYA CHARO			✓		NO		S.B.
13.	DAMA CHARO KARISA			✓		No	0700221528	
14.	SERA KADENGE CHENGO			✓		NO	0708598690	
15.	LOVE KAHONZI DICKSON			✓		NO	0116433998	
16.	James DICKSON				✓	No	0743231740	
17.	Sharlet Bahati		Wife	✓		NO	0795562844	S.B
18.	Dhahabu Mnyazi		Business owner	✓		NO	0746122554	D.M
19.	Sidi Kahindi		farmer	✓		NO		
20.	BETTY CHAKA		Farmer	✓		NO	0725003878	
	J.K. Mose		farmer Boda	✓		NO NO	0100716813 0757962512	

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SARI SGAPI gath

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
21.	SINARA RANYU			✓		NO	0713631603	
22.	JOHN THOTA				✓	NO	0746816459	
23.	JUMWA GARAMA		Farmer	✓		No	0706064953	
24.	Florene Kadzo		Farmer	✓		NO	0714046539	
25.	Kahindi Kazungu				✓	No	0791032691	
26.	Katana Kalama				✓	No	0716650850	
27.	Hamisi Kahindi				✓	No	0715449801	
28.	DENIS KAZUNGU				✓	NO	0714497890	
29.	CHANGAWA KARISA				✓	NO	0799669310	
30.	Michael Kadzungu		Idle		✓	No	0106147026	
31.	CHRIS BARAKA		Farmer		✓	NO	0710268632	
32.	AMOS DANIEL		Farmer		✓	NO	0741940707	

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NAME	Designation	M	F	Disability	Phone No	Sign.
1. Justine Karonga	Business Owner	✓		NO	0798332497	
2. Garama Kansa	Business Owner	✓		NO		
3. Anderson	Shungu	✓		NO		
4 MOSES IHORISO		✓				
5 OMAR BAYA		✓				
6 Thomas Japhet		✓				
7 Edison Kambi	Cyber man	✓		N	0702596028	[signature]
8 John Yaa		✓		No	0705207845	[signature]
9 FRANCIS K BAYA	Farmer	✓		No	0743128251	[signature]
10 Mwalimu Kenga	Farmer	✓		No	0113973308	[signature]
11. Jumwa Kenyeri	Farmer		✓	No		[signature]
12. Katana Ngumbao	Cyber man	✓		Yes	0115083849	[signature]
13. Grace Kitsao			✓	No	0790876609	[signature]
Lilian kadzo	Farmer		✓	NO	0718761187	[signature]

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WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

CONSULTANCY SERVICES FOR PREPARATION OF PRELIMINARY DESIGNS, FEASIBILITY STUDY, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE PROJECT – PROPOSED HYBRID SOLARIZATION AT BARICHO WATER WORKS

LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement **DATE:** August 14, 2025

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
1.	Franklin Kaingu		Businessperson		✓		0711527146	[signature]
2.	Dama George Kitonga		farmer	✓				
3.	Esther Sona Kaloma		farmer	✓			0720827806	[signature]
4.	HADIJA MBITHA THETHE		Farmer	✓			0706600097	[signature]
5.	JOHNSON NZARO KAINGU		Teacher		✓		0728545980	[signature]
6.	Samuel Baya	Mkondoni C. water project	Eng.		✓		0712211594	[signature]
7.	LENA SUSAN WANJIRU		~~Business~~ Bussness Person	✓			0748119714	[signature]
8.	GLADYS T. IHA	AGR.	Agricultural officer	✓		NO	0728847432	[signature]

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
9.	Mkaze		farmer	✓		NO	.	sdl.
10.	John Munene		famer		✓	NO	0702011491	[signature]
11.	Daniel Ponda		Famer		✓	No	0705331267	[signature]
12.	Marry Kazungu		Farmer	✓		No	0701106077	[signature]
13.	Caliste		farmer	✓		NO	—	
14.	MBITHE DOUGLAS		FARMER	✓		No	0705310978	[signature]
15.	Seling		farmer	✓		NO	—	[signature]
16.	MAUREEN SIDI MAPINGA		Farmer	✓		NO	0798502253	[signature]
17.	Lucy Sidi Charo		Farmer	✓		NO	0745541789	[signature]
18.	EUSTINA MASIKA MICHAEL		Farmer	✓		NO	0741169128	[signature]
19.	KANZE JEFA		Farmer	✓		NO	—	[signature]
20.	EUNICE JUMWA KAHINDI		Farmer	✓		NO	0707223151	[signature]

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
21.	Jonathan		Business owner		✓	NO	0725321868	[signature]
22.	Samuel Garama		Pastor		✓		0729343400	[signature]
23.	Rodgers S. Mwambire		Pastor		✓		0727920151	[signature]
24.	JOSEPHINE KANZE			✓		NO	0727437302	[signature]
25.	JOSEPHINE KAHINDI			✓		NO	0711544791	[signature]
26.	Alex Changawa		Farmer		✓	—	0723282224	[signature]
27.	Fumbo Gladys		House wife	✓		NO	0746813876	[signature]
28.	EMMANUEL THUVA		farmer		✓	NO	0705192677	[signature]
29.	Dennis Thoya				✓	No	0791447196	[signature]
30.	NASIBU JAPHET				✓	No	0115423553	[signature]
31.	Adam Kahindi		)		✓	No	0795353051	[signature]
32.	KADII morris		farmer	✓		NO	0712018439	[signature]

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Annex 3 of this report. The summary of the Key stakeholders input is presented in Table 6-3 below:

Table 6-3: Summary of the Key Stakeholder consultation

Name	Designation	Department	Comments	Response
Zeinab Musa Hassan	Environmental Officer	Kilifi County Government Environment, Forestry and Climate Change Department	The project may affect farm land to pave way for the solar panels installation	▪ The project will be implemented on land under the ownership of CWWDA at Baricho Water Works
			Effects on general Baricho Water Works Operations - Solar power pumping stations are reliable and energy efficient hence reducing electricity bills	This will improve sustainability within Baricho Water Works
			The **positive** impacts of the project will include: ▪ Solar power will reduce the over dependency of electricity hence adopting green energy which is sustainable	This will improve sustainability within Baricho Water Works
			Negative Impacts ▪ Displacement and relocation of people	▪ The project will be implemented on land owned by CWWDA at the Baricho Water Works and there are no PAPs identified during the screening exercise
			Mitigation measures ▪ Compensation of affected people	▪ Adequate stakeholder engagement will be

Name	Designation	Department	Comments	Response
				conducted during project implementation. ▪ The project will be implemented on land owned by CWWDA at the Baricho Water Works and there are no PAPs identified during the screening exercise
			Project acceptance ▪ I support the project because it will be a game changer to high electricity bills water service providers are facing	
			Recommendations ▪ The project should ensure first priority is given to the locals during employment opportunities	▪ All recruitments will be made through the administration's office
David Lusava	Deputy County Commissioner	Interior	▪ Malindi Town is a tourist town and the proposed project will improve water supply thus improving hospitality sector.	-
			▪ The project is likely to affect the general operations of the Baricho Water Works through interruptions that may occur during the construction phase affecting water supply	▪ Construction activities will be limited to the proposed site. ▪ Coordination among all operators will be done to

Name	Designation	Department	Comments	Response
				ensure minimal to no disruptions of the normal operations services
			Impacts to cultural and historical heritage- construction activities may lead to damages of Kayas leading to conflicts with the Kaya elders	▪ The project will be implemented on land owned by CWWDA at the Baricho Water Works and there are no PAPs identified during the screening exercise hence there will be no damage to Kayas
			The positive impacts of the project will include: ▪ Job creation ▪ Improved businesses around the project area and Malindi from the purchase of goods and services	-
			Negative Impacts ▪ Minimal	
			Mitigation measures ▪ If any adverse impacts incur, mitigation measures should be developed and implemented	▪ Mitigation measure to prevent and minimize impacts will be developed
			Project acceptance	

Name	Designation	Department	Comments	Response
			▪ I support the project because it will address long-term water supply interruptions that have affected many businesses within the project area and surrounding environs	
			Recommendations ▪ The project should be implemented as it will also contribute in improving tourism and small agricultural projects	
Isaac Chibule	Technical Manager	Malindi Water and Sewerage Company (MAWASCO)	The Proposed project will improve the general operations within Baricho Water Works by cutting down the cost of operations and reduction in the power bills	
			The positive impacts of the project will include: ▪ Reduction of power bills and surges ▪ The project is a source of renewable energy hence promoting sustainable and environmentally friendly energy	
			Negative Impacts ▪ Waste from construction activities is likely to be generated ▪ During operations, waste may be generated from broken down solar batteries	▪ The Contractor will develop a waste management plan and contract a licensed waste handler for proper disposal of waste in designated areas
			Mitigation measures	

Name	Designation	Department	Comments	Response
			▪ Minimizing and ensure proper disposal of waste	▪ The operations manual should and will also include the management and disposal of solar batteries ▪ The Operators (Baricho Water Works) will work with licensed waste handlers for the disposal of solar batteries
			Project acceptance ▪ I support the project because it will improve the operations and water supply in the region	-
			Recommendations ▪ The project should be fast tracked and resources allocated to ensure timely implementation of the project	▪
Stephen K. Menza	Assistant Chief	Administration	There is no historical or cultural land site in the proposed site. In addition, land use will not be affected	▪
			The project is not likely to affect surface water, however, measures should be put in place to prevent run-off and erosion	▪
			The positive impacts of the project will include:	

Name	Designation	Department	Comments	Response
			▪ Improved environment from landscaping and filling of quarries within the project area ▪ Social – creation of employment opportunities ▪ Possible reduction in water bills due to reduced cost of operations	
			Negative Impacts ▪ Dust emissions during excavations and land clearing ▪ Social – closure of foot paths and roads to communal farmlands	The contractor will ensure implementation of mitigation measures such as dust suppression
			Mitigation measures ▪ Dust – appropriate dumping site for the excavated spoil and dust suppression through spraying of water on site ▪ Roads closure- The project team to create and construct strategic roads and access paths to farmlands	▪ Mitigation measures will be implemented
			Impacts to cultural heritage ▪ The project is likely to affect indigenous trees used for traditional medicine ▪ Displacement of wildlife ▪ Communities will lose grazing land	▪ The project will be implemented on land under the ownership of Baricho Water Works. ▪ There will be no endangered flora and

Name	Designation	Department	Comments	Response
				fauna that will be affected by the project. ▪ The main vegetation in the area are bushes and shrubs. Trees and grasses will be planted in the project area as a form of environmental restoration. ▪ Land will be utilized on land belonging to CWWDA at Baricho Water Works hence no public or private land will be affected
			Project acceptance ▪ I support the project because it will create job opportunities and ensure minimize interruptions of the water supply to the communities	
			Recommendations ▪ There is need for an efficient drainage system to avoid erosion and water logging in farmlands	

Name	Designation	Department	Comments	Response
Baya Silas Kahindi	Officer in Charge Baricho Water Works	Bulk Water Supply Unit and Management	Effects of the proposed project on land use: Positively ▪ The idle land will be utilized for something useful, roof top solar reduce pressure on land Negatively ▪ There will be land clearing and this may affect biodiversity ▪ The project will restrict future alternative land use on the proposed site	▪ Clearing will be restricted to the proposed project site ▪ The main vegetation in the area are bushes and shrubs. Trees or grasses may be planted in the project area as a form of environmental restoration.
			The effects on cultural and historical heritage Negatively - The project may affect buried artefacts if any exists Positively – if there existence of historical or cultural heritage they may be protected from vandalism	▪ The project team will adopt the Chance Find Procedure if cultural and historical heritage are discovered on site
			Impacts to general operations of the Baricho Water Works- Positively – reduction of power pumping bills, solar produces stable power suitable or pumping units	▪

Name	Designation	Department	Comments	Response
			Impacts to water hydro-geological (ground-water) or surface water resources Positively- solar reduces dependency on power intensive sources lowering strain on ground water and surface water	▪
			Impacts to general operations of Baricho Water Works Positively through reduction of power pumping bills and solar produces stable power suitable for pumping units	▪
			The positive impacts of the project will include: ▪ Reduce greenhouse gas emission. Solar power cuts reliance on fossil fuels, reducing CO_2 and air pollution ▪ Improved air and noise quality from low operational noise and no direct air pollution	
			Negative Impacts ▪ Land use change ▪ Habitat loss and fragmentation ▪ Temporary disruptions to the nearby residents ▪ Inequality issues- benefits may bypass local communities if jobs are not provided to the locals	

Name	Designation	Department	Comments	Response
			Mitigation measures ▪ Proper planning of the construction activities and ▪ Planting of trees in surrounding environs avoiding disruption to the solar panels ▪ Notification to the nearby residents regarding the construction activities ▪ First priority during job recruitment should be given to the local communities	▪ Continuous engagement with community will be conducted throughout the project period ▪ Notification will be made to residents regarding the construction activities that may result in disruptions
			Project acceptance ▪ I support the project because it will lead to improved operations	
			Recommendations ▪ The project should ensure first priority in the recruitment is given to the local communities both skilled and unskilled ▪ Planting of trees within the surrounding environs	▪ All engagements and recruitments will be made through the administration's office
Khilimu Mupe	Member	Youth Group LangoBaya Forum	▪ The project should consider involving CBOs in project management and operations through provision of storage water tanks	▪
			Impacts to general operations of the Baricho Water Works-	▪

Name	Designation	Department	Comments	Response
			Positively – reduction of power pumping bills	
			The positive impacts of the project will include: ▪ Creation of job opportunities	
			Negative Impacts ▪ Waste generation ▪ Dust generation	
			Mitigation measures ▪ Proper waste segregation & disposal ▪ Dust suppression through watering	▪ The project team will adhere to the proposed mitigation measures
			Project acceptance ▪ I support the project because it will lead to improved operations thus benefiting the community	
			Recommendations ▪ First priority in the recruitment of workers to be given to the local communities ▪ A CSR to be done within the project area	▪ All engagements and recruitments will be made through the administration's office
Franklin Kainku	Member	Lango Baya Community Based Organization Health Department	Effects of the proposed project on land use: Positively ▪ The idle land will be utilized for something useful, roof top solar reduce pressure on land	▪ The proposed site even by restricting other future developments, the proposed development projects will be beneficial

Name	Designation	Department	Comments	Response
			Negatively ▪ The project will restrict future alternative land use on the proposed site	to the operations of the Baricho Water Works plant
			The effects on cultural and historical heritage Negatively - The project may affect buried artefacts if any exists Positively – if there existence of historical or cultural heritage they may be protected from vandalism	▪ The project team will adopt the Chance Find Procedure if cultural and historical heritage are discovered on site
			Impacts to general operations of the Baricho Water Works- Positively – reduction of power pumping bills,	▪
			Impacts to water hydro-geological (ground-water) or surface water resources Positively affected no negative impacts	▪
			The positive impacts of the project will include: ▪ Reduced cost of power bills for Baricho Water Works ▪ Sustainable water supply	
			Negative Impacts	

Name	Designation	Department	Comments	Response
			▪ Labour influx leading to sexually transmitted diseases and early pregnancy ▪ Theft of the facilities	Recommended mitigation measures will be implemented. ▪ An ESMMP will be developed highlighting negative impacts and mitigation measures to be implemented
			Mitigation measures ▪ First priority and majority of the workers skilled and non-skilled to be sourced within the community ▪ Planting of trees in surrounding environs avoiding disruption to the solar panels ▪ Proper barricading and securing of the proposed site. ▪ Security guards to be employed on site ▪ Street lighting to be installed around the project area	
			Project acceptance ▪ I support the project because if properly implemented will improve water supply within the project area.	
			Recommendations ▪ Planting of trees within the surrounding environs	
Samuel W. Baya	Project Coordinator		Effects of the proposed project on land use: Positively	

Name	Designation	Department	Comments	Response
		Mkondoni Community Water Project	▪ The idle land will be utilized for something useful ▪ The value for land nearby will increase	
			The effects on ground water and surface water Constant over-abstraction may result in depletion of ground water affecting farmers downstream	▪ The water abstraction limits will be adhered to
			Impacts to general operations of the Baricho Water Works- Positively – reduction of power pumping bill thus promoting consistent supply of water	▪
			The positive impacts of the project will include: ▪ Reduce levels of crime rates and poverty through the creation of employment ▪ Improved local economic growth	
			Negative Impacts ▪ Land use change and clearing of land	
			Mitigation measures ▪ Proper planning of the construction activities	▪ Construction activities will be restricted to the proposed site

Name	Designation	Department	Comments	Response
			▪ Planting of trees in surrounding environs avoiding disruption to the solar panels ▪ Sensitization to the nearby surrounding communities	▪ The main vegetation in the area are bushes and shrubs
			Project acceptance ▪ I support the project because it will lead to improved operations and constant supply of water due to uninterrupted power	
			Recommendations ▪ The project should ensure first priority in the recruitment is given to the local communities both skilled and unskilled ▪ Youth involvement in the construction and operation of the facilities ▪ Establish Corporate social responsibility (CSR) factors especially by improving community water distribution systems such as the Mkondoni Community Water Project ▪ Establish security measures through fencing and provision of security lights in the project area due to the high insecurity issues.	▪ All engagements and recruitments will be made through the administration's office

Name	Designation	Department	Comments	Response
William S. Baya	Chairperson	LangoBaya CBO	Effects of the proposed project on land use: ▪ The clearing of land may lead to soil erosion	▪ Clearing will be restricted to the proposed project site ▪ Landscaping will also be carried out before installation of the land
			The effects on cultural and historical heritage Negatively - The project may affect buried artefacts if any exists	▪ The project team will adopt the Chance Find Procedure if cultural and historical heritage are discovered on site
			The effects on ground water and surface water Constant over-abstraction may result in depletion of ground water affecting farmers downstream	▪ The water abstraction limits will be adhered to
			Impacts to general operations of the Baricho Water Works- Positively – reduction of power pumping bill thus promoting consistent supply of water	▪
			The positive impacts of the project will include: ▪ Low running cost of production ▪ Frequent and constant supply of water for consumers	

Name	Designation	Department	Comments	Response
			▪ Possible security lighting systems for the nearby residents	
			Negative Impacts ▪ Clearing of land may lead to soil erosion ▪ Insecurity	
			Mitigation measures ▪ Planting of trees in surrounding environs avoiding disruption to the solar panels ▪ Provision of street lighting ▪ Provision of solar powered water pumps to the community for irrigation	▪ Construction activities will be restricted to the proposed site ▪ The main vegetation in the area are bushes and shrubs
			Project acceptance ▪ I support the proposed project	
			Recommendations ▪ Establish Corporate Social Responsibility (CSR) factors especially for the community ▪ Reduced water prices for domestic use ▪ Provision of irrigation machines to the community ▪ Insecurity issues are noted in the area. Safety measures should be established at the proposed site	▪ The ESIA Team informed the community their requests will be presented to the Client CWWDA for consideration and approval.

6.5.2 Public Participation

Public Participation was held on the August 14, 2025 to inform project stakeholders and the public regarding the proposed project scope, to explain the likely impacts (positive/negative) of implementing the project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project. The Table 6-4 below presents the meeting date and number of people in attendance.

Table 6-4: Meeting date and List of Participants

Meeting Date	Venue	Participants
August 14, 2025	LangoBaya Assistant Chief's Office	Male -50 Females – 37 Total - 87
		PLWD- 2No (1No male and 1No female)

The community raised several issues and the summary of issues that were raised across all the villages are presented in the

Table 6-5 below. Sample photos of the public participation meeting are presented in Figure 6-1 and detailed information on the public participations discussions has been presented in minutes (Annex 2) attached in this report.

	
Assistant Engineer addressing the meeting	Community members at the meeting

	
Assistant Engineer responding to questions at the meeting	The Assistant Chief addressing the meeting

Figure 6-1: Photos of the public participation meetings

Table 6-5: Summary of public comments during public participation

Comments	Responses
Job opportunities	• The community members were informed first priority for job opportunities both skilled and non-skilled workers will be given to the local community. • The community were requested to ensure they do the work assigned to them during construction diligently
Quality of works to guaranteed long term sustainability	• The Community members were informed there will be construction supervision to ensure the Contractor does the construction works as per the specification in the awarded contract.
Project commencement date	• The Community members were informed the meeting the project was currently at the planning stage. The team was currently preparing all the necessary documentations and certifications that will be submitted to the Client and eventually to the Bank for loan approval. In addition, the Consultant stated before commencement of the project, the community will be informed.

Comments	Responses
They were concerned about the pipe bursts and dilapidated water infrastructures within the region populations	• The Community members were informed continuous monitoring will be carried out to ensure the broken down facilities are repaired
High cost of water bills within the region especially Lango Baya	• The community were informed their suggestion will be taken into consideration and presented to the Client for their consideration
Lack of CSR activities within Lango Baya	• The community were informed the CSR they have requested will be presented to the Client for consideration during the project implementation. The proposed CSRs included but not limited to: ❖ A public watering point free access to the community at the Assistant Chief's office ❖ Restoration of dilapidated Mondola tank within Lango Baya ❖ Rehabilitation and construction of an ablution block at the Assistant Chief's Office.
Project site location and boundaries	• The community were informed the project will be implemented within the Baricho Water Works land • A walk through with the areas Lango Baya CBO committee/leaders was carried out on August 14, 2025 (the same day as the meeting) and they verified the proposed site was not on private land

6.5.3 Output of the questionnaire administered to members of the public

A structured questionnaire was also administered to solicit views regarding the project as well as its design. The questionnaire initially gave introduction and created awareness to the respondents regarding the project. Afterwards, questionnaire enquired on acceptance of the project and rating of the current water supply and anticipated negative impacts and suggested mitigation measures as well as any suggestions and recommendations. A total of 12No questionnaires were administered to the community members present during the public participation meeting held on August 14, 2025. The respondents were residents present during the meeting and they were grouped into small groups to ensure they all presented their views in the questionnaires. Below is a summary of the analysis.

A.1 Period of Settlement

The community members were asked how long they had been living within the villages in the project areas and from the graph below majority (all respondents) of the residents had been

living there for more than 10 years. They already have a grasp of the challenges within the project areas.

Figure 6-2: Years of residency

B.1 Proximity to the project area

The project team wanted to determine the residents' proximity to the project areas. From the graph below, majority of the residents, forty-two percent (42%) live more than 200 meters from the project site. Twenty-five percent (25%) live between 100-200 meters away, another twenty-five percent (25%) live less than 50 meters away and eight percent (8%) live 50-100m away from the project site.

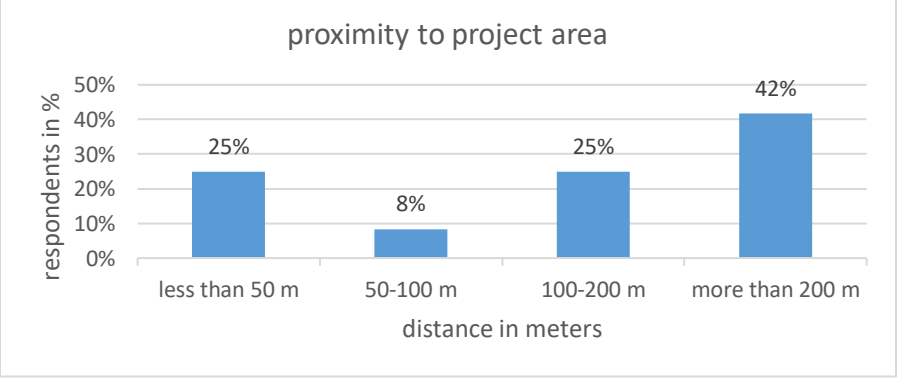


Figure 6-3: Proximity to project area

C.1 Land Tenure

The project team wanted to determine the main land tenure of the nearby lands to the project areas. From the graph below, fifty percent (50%) of the respondents' land tenure is freehold. Thirty-three percent (33%) stated the land is communal and seventeen percent (17%) stated the land is government owned.

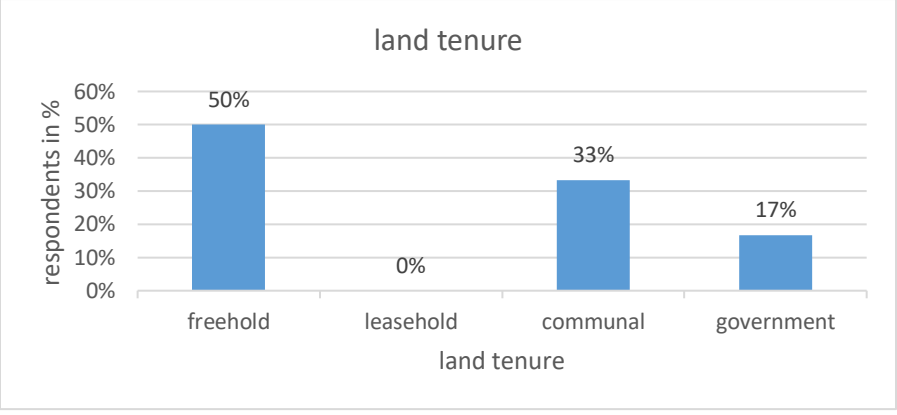


Figure 6-4: Land tenure

D.1 Availability of assets within the project site

The community members were asked if they had any assets within the proposed project sites. All respondents (100%) stated they did not have assets within the project sites.

E.1 Project awareness

The community members were asked if they were aware about the proposed project and from the graph below majority of the residents, ninety-two percent (92%) were aware and eight percent (8%) were not. With the stakeholder engagement and meeting conducted they were informed about the proposed project and its scope of works.

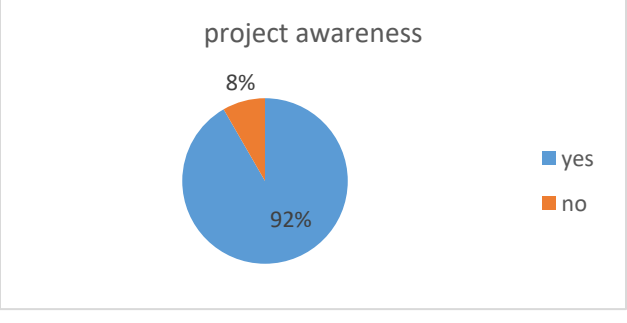


Figure 6-5: Project awareness

F.1 Project Support

The community members were asked if they would welcome the proposed project within the project area. All of the respondents were in support of the implementation of the project.

G.1 Impact of the project to cultural and historical heritage

The community members were asked if there were any impacts of the project and proposed site to the cultural heritage. Majority (92%) stated the project will not affect any cultural or historical heritage and eight percent (8%) stated it would. They cited there may be medicinal plants within the proposed site. If identified should be preserved during land clearing

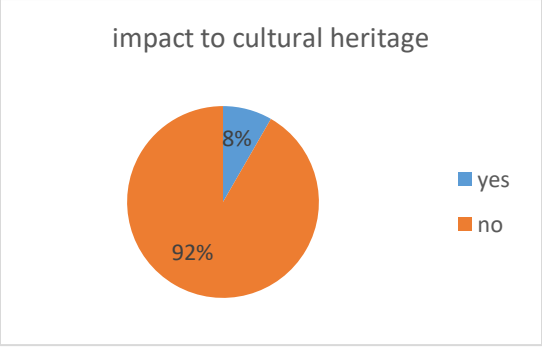


Figure 6-6: Impact to cultural heritage

H.1 Positive Impacts of the project highlighted by the community

Some of the benefits highlighted by the residents included but not limited to:

- Creation of job opportunities for the community especially the youths
- Availability of clean and adequate water
- Continuous and frequent water supply for the region
- Creation of markets for the construction materials
- Emergence of new business within the project area which will create income and in turn improve the standards of living for the people
- Reduced water bills for the community due to reduced cost of production
- Reduced power bills for Baricho Water Works
- Reduced power surges hence ensuring constant operations within the plant.
- Solar energy is a renewable source of energy hence promoting green energy

I.1 Negative Impacts of the project

Some of the negative impacts highlighted by the residents included but not limited to:

Negative Impact	Mitigation Measures
Waste generation during construction and operation	• A NEMA Licensed waste handler will be contracted for the disposal of waste • Waste bins will be made available on site
Oil spillages from the construction machineries	• Spill kits will be made available for the collection of oil during maintenance and repairs • Regular maintenance of vehicles and machineries will be carried out
Injuries and accidents for the community and workers	• Workers will be provided with appropriate PPES during project implementation • Proper barricading and fencing will be done to prevent entry of unauthorized personnel

Negative Impact	Mitigation Measures
	• Warning and information signages will be made available on site
Clearing of vegetation leading to erosion	• Land clearing will be limited to the proposed site • Land levelling will be carried out within the site to prevent erosion on site • Trees and grass to be planted within and near the project area
Substandard work during construction and operations	• Continuous supervision during construction to be done • An operation manual will be prepared for the management of the system • Operators will be trained how to operate and manage the system
Insecurity concerns	• The Project team to install security lighting within the project site • Proper barricading and fencing will be done to prevent entry of unauthorized personnel

J.1 Concern and recommendations

The community members raised some concerns regarding the project and gave suggestions on improvements to be made for the successful implementation of the project.

- They were concerned about waste to be generated during the construction period. The recommended proper waste disposal through segregation, recycling and engaging of licensed waste handlers who will dispose the waste in designated areas.
- Emphasis was made on having adequate stakeholder engagement throughout the project period and a grievance redress mechanism to be put in place.
- The community requested that priority in labour recruitment to be given to the locals especially the youth. They further requested involvement even in the operation and maintenances phases.
- Construction of standard facilities to ensure long term sustainability.
- Construction and provision of additional water distribution lines.
- Reduction of water bills for the community of LangoBaya.
- Proper drainages to be constructed to prevent soil erosion at the proposed site
- Provision of CSRs within LangoBaya area. The proposed CSRs included but not limited to:
  - ❖ A public watering point free access to the community at the Assistant Chief's office

- Restoration of dilapidated Mondola tank within LangoBaya
- Rehabilitation and construction of an ablution block at the Assistant Chief's Office

CHAPTER 7: IMPACTS IDENTIFICATION AND MITIGATION MEASURES

7.1 Introduction

This ESIA has been systematically conducted to determine whether the proposed Project shall have a diverse impact on the environment. The Environmental Management and Coordination Act (EMCA) No. 8 of 2015 provide the legal and statutory guidelines for the Environment and Social Impact Assessment process in Kenya.

The impacts in this Chapter have been generated based on the analysis of the proposed environment in relation to the proposed project. The impacts have been segregated into four main phases: Pre-Construction Phase, Construction Phase, Operation Phase, and Decommissioning Phase. Impacts can be categorized into:

- Impacts on the biophysical environment;
- Health and safety impacts
- Social-economic impacts

7.2 Definition and Classification of Environmental Impact

An environmental or social impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and widespread or local in the extent of their effect.

7.3 Impact Significance

The purpose of this ESIA CPR is to identify the significant impacts related to the project under consideration and then to determine the appropriate means to avoid or mitigate those which are negative. Significant impacts are defined, not necessarily in order of importance, as being those which:

- Area of public concern and importance.
- Trigger subsequent secondary impacts.
- Elevate the risk to life threatening circumstances.
- Affect sensitive environmental factors and parameters.

7.4 Impact Scoring and Rating Criteria

Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e., where there is uncertainty or insufficient information, the Environmentalist opted to err on the side of caution

7.5 Machinery to be used on site their Impacts and Mitigation measures

The following machines are likely to be used during construction of the proposed project. They include but not limited to; Butt fusion machines, backhoe, hand tools such as (striking tools like hammers, gripping and holding tools like wrenches, pliers, and digging tools like jembes, hoes, shovels and spade) concrete mixers, generators, and compactors. The table below shows their impacts and mitigation measures

Table 7-1: Machinery to be used on site their impacts and mitigation measure

Machinery	Uses	Potential Impacts	Mitigation Measures
Compactors	Used for compacting loose soils	Noise and vibration pollution	• Use vibration-dampening equipment such as silencers/mufflers • Workers to be issued with earmuffs • Schedule works and communicate prior to the community to minimize disruptions and avoid inconveniences to residents
		Hand-arm vibration syndrome	• Train workers and implement job rotation
		Trips and falls from the wires and during operation	• The Contractor to ensure there is adequate space where plate compactors will be used • Maintain a firm grip on the handles and keep a stable stance to manage vibrations effectively.
Concrete Mixers	Used for mixing Sand, Cement, Ballast and water	Dust and particulate pollution	• Use enclosed mixing areas • Workers to be issued with dust masks and heavy-duty gloves
		Soil pollution from cleaning of machines	• Avail the machine to existing carwash or service station for cleaning

Machinery	Uses	Potential Impacts	Mitigation Measures
		Risk of spills and wastage	• Construct a portable impermeable platform to be used for collection any excessive concrete mix. • Provide spill kits for machines like generators
Concrete Vibrator	Used for intense vibrations to compact concrete, ensuring a strong, durable, and smooth finish	Noise and vibration pollution	• Use vibration-dampening equipment such as silencers/mufflers • Workers to be issued with earmuffs and hard gloves • Schedule work to minimize disruptions • Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
Diesel Generators	Used for generating back-up power	Air pollution from emissions	• Use energy-efficient generators • Workers to be issued with masks
		Noise pollution	• Enclose generators to reduce noise • Workers to be issued with earmuffs/ear plugs

Machinery	Uses	Potential Impacts	Mitigation Measures
Hand tools such as (striking tools like hammers, gripping and holding tools like wrenches, pliers, and digging tools like jembes, hoes, shovels and spade)	Used for digging, breaking soft rocks, mixing and scooping and other masonry works	Ergonomic injuries	• Use safe and well-maintained tools • Broken tools should be replaced • Provision of appropriate gloves when using the tools • Proper housekeeping and storage of the tools • Provision of adequate first aid kit on site • Sensitization of workers on safe use of tools • Provision of appropriate PPEs i.e hand heavy duty gloves and safety shoes
Backhoe and excavators	Excavation works	Noise pollution	• Workers to be issued with earmuffs • Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
		Oil spills	• Proper maintenance and regular servicing at available fuelling/servicing stations
All the tools and equipment	Activities listed above	Machine failure and accidents	• Proper maintenance. • Operation by qualified staff only. • Inspection by a licensed government inspector

7.6 Sensitive Receptors

The project area has mainly bushes and shrubs and there are no endangered plants and animals. The main sensitive receptor in the area is the Sabaki River with different proximities to the various project sites as presented in the table 7-2 below.

Table 7-2: Project Sites and Proximity to River Sabaki

Project Site	Proximity to River Sabaki	Impacts	Mitigation Measures
Malindi Pumps	1,500m	• Impact from solid waste generation • Impact from oil spills from machineries and vehicles • Impact on vegetation (shrubs and bushes) and trees	• Proper waste management through engagement of a licensed waste handler • Provision of waste bins on site • Proper maintenance of machineries and vehicles on site • Use of spill kits for on-site repairs of machineries and vehicles • Planting of grass and trees within the project area
Pumping Station No. 6 (P6)	100m from the edge of the River		
Pumping Station No. 4 (P4)	1,200m		
Pumping Station No. 5 (P5)	800m		

7.7 Positive Impacts during Pre-construction Phase

7.7.1 Employment

Employment opportunities shall be created in the activities like surveying, material delivery, and manual labour shall be ongoing thus providing employment opportunities to many.

7.8 Pre-Construction Phase Negative Impacts

7.8.1 Influx of Workers from Other Areas

Development projects attract people from various communities in search of employment. This may result in an influx of workers within the project area and may lead to social conflicts.

Mitigation Measures:

- Effective community engagement and strong grievance mechanisms on matters related to labor.

7.9 Construction Phase Positive Impacts

The following are the positive impacts during construction phase of the proposed Project:

7.9.1 Employment Opportunities

The Project shall create job opportunities for both skilled and unskilled workers such as casual labourers, operators, electricians, welders and engineers who shall be engaged on-site for a specific duration. The workers are expected to gain skills and knowledge that they will use after the completion of the project to earn a living. The income gained form the job opportunities will improve the residents' standards of living

7.9.2 Creation of Wealth

The proposed project is expected to bring many opportunities in investment and procurement enabling community members to supply various goods and services to the project during the construction phase. This in turn will create wealth for the local communities. The construction phase shall attract temporary business such as food vendors who shall benefit from the trade by selling the food to the construction workers and promote already existing businesses in the area. This shall improve their living standards from their earnings**.**

7.9.3 Creation of a Market for Construction Materials

The project shall require materials, some of which shall be sourced locally and some internationally. These include cement, sand, hard-core and any other construction materials. This shall provide a ready market for suppliers in and outside the project area.

7.9.4 Economic Growth

Using locally available materials during the construction phase for example pipes and others; the project shall contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others shall attract taxes thus promoting economic growth.

7.9.5 Injection of Money into the Local Economy

A large sum of the Project money shall be released into the local economy due to the construction activities. During construction many downstream activities shall take place including but not limited to the following:

- Payments for skilled and unskilled labour;
- Purchases of construction materials; and
- Payments for local provisions including fuel, foods and accommodation.

7.10 Construction Phase Negative impacts

Negative determinations are made when activities or interventions will not have a significant effect on the environment, but for which a Determination of Categorical Exclusion does not apply. In this case, there will be no further action required.

Negative Determinations with Conditions are made when activities or interventions will not have a significant effect on the environment and/or when potential adverse impacts can be avoided or minimized by application of suitable mitigation measures.

The negative impacts identified fall under negative determinations with conditions.

7.10.1 Noise & Vibration

The site preparation and construction phases of the development may contribute to noise pollution within the project area. The cumulative impact of the construction activities occurring simultaneously may increase the noise and vibration levels in the project area. This is temporary, and the Contractor is expected to ensure the construction activities cause minimal noise disruptions. Areas likely to be affected are residents near the project site. The Contractor will be expected to comply with the mitigation measures listed below:

Mitigation Measures:

- Early notifications should be made to the residents prior the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team.
- Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
- Machinery, vehicles and instruments that emit high levels of noise shall be used at intervals and the workers shall work interchangeably to reduce the overall impact and exposure time. These pieces of equipment such as concrete vibrator, compressors, plate compactors and cement mixers etc (listed in Table 7-1) should also be used when the least number of residents can be expected to be affected, for example during periods where most residents are at work, school, weekends or holidays
- Establish channels for feedback and addressing of concerns raised by stakeholders promptly.
- Conduct quarterly assessments of noise levels to ensure they remain within acceptable limits. These assessments shall be done by an external health and safety expert.
- Provision of appropriate personnel protective equipment to the workers such as ear muffs and plugs.

- Conducting medical examinations(audiometry) by a Designated Health Practitioner for workers exposed to prolonged high noise levels

7.10.2 Dust Emission

Dust shall be emitted during excavation and related construction works. Air borne particulate matter pollution is likely to occur during excavation and during the transport of construction material such as cement. This is likely to affect site workers and the residents' health.

Mitigation Measures:

- Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions.
- Strict protocols should be enforced for handling construction materials in powder form, such as covering of cement and sand during transportation.
- Provision of PPE e.g. dust masks to workers.
- Reinstatement of disturbed areas once construction is completed.
- Minimizing the number of motorized vehicles in use on site.
- Conducting workers medical examinations (Pulmonary Function Test (PFT) or Spirometry) by a Designated Health Practitioner for especially for workers exposed to cement and dust.

7.10.3 Soil Pollution

Soil quality degradation is also likely to occur during construction because of spills from cement during concrete works and oil spills and even construction waste.

Mitigation Measures

- A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site.
- In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection site.
- During cement mixing, water management should be key to reduce runoff and unnecessary water wastages.
- Use of water sprays or dust suppression equipment around cement mixing areas will minimize airborne particles that could settle on soil causing pollution.

7.10.4 Solid Waste Generation and Waste Water Management

Solid waste generated during construction include papers used for packaging, plastics, cuttings and trimmings of materials among others. Excavated materials and spoil will also be generated from the construction activities. The Bill of quantities has provided for excavation and disposal of

excavated material and further for restoration of the area. In the Contractor's camp liquid waste from the kitchen and washrooms should be properly disposed to avoid pollution. It is expected that the Contractor shall ensure full compliance with the EMCA Waste Management Regulations of 2006 as well as implement the following mitigation measures: -

Mitigation Measures

- All solid waste will be collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as per the Waste Management Regulations 2006.
- Wherever possible, the Contractor should reuse and recycle waste generated on site.
- All personnel assigned to collect waste on site shall be provided with appropriate PPEs i.e. heavy-duty gloves, protective footwear, dust masks and aprons.
- A comprehensive site waste management plan shall be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage and segregation areas, collection and removal schedule and identification of approved disposal site by NEMA.
- The Contractor shall ensure workers are sensitized on proper waste management methods on site during construction.
- Construction of standards septic tank and timely exhaustion of waste when it is full to avoid spill offs

7.10.5 Site Related Oil Spills

During construction, oil spills may result from construction site equipment, which may affect the, soils, and surface as well as underground water ways (River Sabaki and Boreholes) in the area after being swept by rainwater and seep into the soil.

Mitigation Measures

- The Contractor should ensure that the employees on site are aware of the procedures for dealing with spills and leaks though induction, toolbox talks and safety trainings (the Contractor's EHSS shall propose a method of clean-up which shall be subject to approval);
- All vehicles and equipment should be kept in good working conditions and serviced regularly in service stations and fuelling stations selected by the Contractor
- The machineries and vehicles to be inspected by licensed government inspectors

- The Contractor to ensure spill kits are provided at the construction sites for machines like generators promoting efficient response to spills, minimizing environmental impact and ensuring workers' safety.
- Ensure fuels, oils, and lubricants are clearly labelled and stored in impermeable containers away from surface drains.

7.10.6 Impacts on Vegetation

Vegetation loss is expected to occur during site preparation. Clearing of vegetation such as grass, bushes and fruit trees around P6 may occur at the proposed sites. This may result in soil erosion. The Project team and Contractor to ensure minimal destruction of vegetation and adhering to the marked project site and finding alternatives whenever possible. The risk of destruction of vegetation in the project areas will be minimized by limiting site clearance and construction activities within the delineated construction work area.

Figure 7-1: Vegetation on site

Mitigation Measures

- Reinstatement of the project sites after completion of works
- The Contractor to adhere to the delineated construction work area.
- Planting of grass and trees in sites identified within the project area preferably schools, institutions where they can be secure and well maintained.
- Proper landscaping of the site before, during and after construction

7.10.7 Occupational Safety and Health impacts

7.10.7.1 Worker's Welfare

Due to the adverse project activities, there will be a lot of workers within the project area engaged in the construction activities. It is essential to ensure the workers' welfare needs are met on site

Clean drinking water is an essential component during construction works. Workers should be able to have access to clean and adequate drinking water to prevent situations such as dehydrations. Workers will likely experience fatigue on site especially during hot days. The workers should also be able to take rests and have access to resting areas to prevent situations such as fainting and heat strokes. Clean and adequate gender segregated sanitation facilities will also be a requirement to cater for the welfare of workers and the project team

Mitigation measures

- Conducting workers pre-employment and periodic medical examinations by a Designated Health Practitioner. This will include general medical examinations, specialized tests depending on the workers job description such as Pulmonary Function Test (PFT) or Spirometry for workers exposed to cement and dust, audiometry amongst others as prescribed in the OSHA ACT 2007, Medical Examination Rules, 2005 and Legal Notice No. 50 of 2022
- Provision of Labelled toilet facilities at a minimum ratio of Toilet per 30 workers (preferred 1:15) and the exact location of the toilets shall be approved by the Public Health Department prior to establishment.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site.
- Provision of adequate clean drinking water and drinking vessels should be made available on site.
- Provision of adequate resting areas and gender segregated changing station away from machinery for the workers to be accessed during breaks.
- Provide fully equipped First Aid Kits within the construction sites and ensure that at any moment during the works, there is a trained first aider on site. The ration of trained first aiders to worker will be as per defined by the OSHA First Aid Rules.
- Recording of all accidents, injuries and deaths that occur on site in the incident register, corrective actions for their prevention and investigated as appropriate.
- Contractor should have an up-to-date Work Injury Benefit Act (WIBA) and the Contractors All risk plan and ensure the insurance covers all workers throughout the construction period.
- The Contractor to have an agreement with local health facilities for the provision of emergency services
- Community members should be notified before work commences for them to be aware of the ongoing works and trained on the safety measures to be followed

7.10.7.2 Working At Height (WAH)

Working at height risks will arise during activities such as excavation, installation of solar panels, cable laying, and associated electrical works. The proposed project will involve construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. The ESIA notes that these activities may result in slips, falls, and falling objects that will lead to injuries and in extreme cases even fatalities if controls are not enforced.

Mitigation Measures

- Development of a site-specific Occupational Safety Action Plan with details of PPE, emergency procedures, site restrictions, inspection routines, and roles/responsibilities.

- Provision and enforcement of appropriate PPE (helmets, reflectors, safety boots, gloves, goggles).
- Use of safe access equipment such as stable scaffoldings, ladders, and hard barricades. Access ladders shall be provided to facilitate movement in and out of the trenches that may dug for the cables and mounting.
- Provision of safety harnesses for workers that will be Working at Height
- Induction and toolbox talks on WAH safety, first aid, and fire response.
- Continuous risk assessments and job safety analysis,
- Developing a health and safety policy to be adhered to by all the project team members
- Ensuring that the prepared code of conduct for staff is signed and adhered to.
- Provision of adequate warning and information signages

7.10.7.3 Electrical Hazards

Given the solarization involves high-voltage systems, electrical hazards pose serious risks such as electrocution, shocks, burns, or fire. Hazards may occur during panel installation, wiring, trench cabling, and generator operation and welding works**.**

Mitigation Measures

- Ensuring all electrical works comply with OSHA 2007 and Kenya's Energy regulations.
- Only qualified electricians and licensed installers should handle wiring and connections.
- Appropriate PPEs (electrical insulating hard gloves, safety shoes wear, overalls, eye and face protection such as flash-rated face shields or goggles) should be provided as established from risk assessment and enforce their usage.
- Regular inspection of equipment and cables for faults and wear.
- Availability of fire-fighting equipment near electrical installations.
- Display of **'**No Smoking' signs**,** and provision of adequate warning and information signages on electrical safety
- Proper labelling of flammable materials, and
- Establishing and clearly labelling emergency assembly points.
- Workers should be trained in fire safety and electrical emergency response**.**
- Ensuring that the prepared code of conduct for staff is signed and adhered to.

7.10.7.4 Ergonomic Impacts

Ergonomic risks may arise from manual handling of materials, use of hand tools, awkward postures, and repetitive tasks during construction. Workers may suffer musculoskeletal injuries,

hand-arm vibration syndrome, or fatigue if not managed properly. Creating a culture of safety is crucial to prevent injuries and maintain a healthy, productive site.

Mitigation Measures

- Use of safe, well-maintained tools and replacement of broken ones listed in Table 7-1.
- Training workers on proper lifting techniques and safe tool use**.**
- Implementation of job rotation to minimize repetitive strain.
- Provision of ergonomic PPEs such as heavy-duty gloves and safety shoes. Appropriate PPEs should be provided as established from risk assessment and enforce their usage.
- Ensuring proper housekeeping and tool storage to avoid strain and accidents.
- Adequate rest breaks, shaded rest areas, and hydration to reduce fatigue-related risks.
- Develop a site Occupational safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls adhering to guidelines in the OSHA Act 2007
- Ensuring that the prepared code of conduct for staff is signed and adhered to.

7.10.7.5 Fire Outbreak

Fire outbreak in the machinery being used is always a risk because there are flammable substances in use. Fire may also be caused by people smoking in non-smoking zones. Depending on the severity, fire can cause loss of life, disability, or property damage. Thus, precautions are necessary.

Mitigation measures

- Label all inflammable materials and store them appropriately
- Provision of adequate fire-fighting equipment capable of fighting all classes of fire
- Put — 'No Smoking' Signs in areas where inflammable are stored and designating smoking zones within the project areas with ash trays.
- Train workers on the use of fire-fighting equipment
- Develop an emergency response plan.
- Display emergency contacts on active sites
- Establish fire assembly points in every site.
- Avail inspected and appropriate fire extinguishers near generator and other flammable materials.
- Employ trained fire marshal in all active sites.

7.10.8 Social Conflicts and Community Risks

7.10.8.1 Liability for Damage to Private Property

During Construction there may be damage to private property that may not be foreseen especially during deliveries and general construction works. This is expected to be no to minimal impact.

Mitigation Measures

- The Contractor to promptly repair and reinstate any damages done to private property.
- Limit damage to property by observing construction area limits by clear demarcation.
- The workers should receive requisite training especially on the operation of the machinery and equipment.

7.10.8.2 Crime Incidences

The project area as reported by residents and from observations has incidences of crime such as theft. Construction materials need to be properly secured and safety measures established.

Mitigation Measures.

- Working with local committees e.g., *Nyumba Kumi* to provide security within the site in addition to the Contractor's own security.
- The Contractor should ensure the proper barricading of the site and deploy trained security personnel.
- Provision of security lighting within the project sites.
- All workers should sign the code of conduct on site and ensure adherence.
- The Contractor should prepare and implement a security management plan.
- Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the Contractor's personnel, and to preserve peace and protection of persons and property on and near the site.

7.10.8.3 Spread of HIV and AIDS

Construction workers and community members may be exposed to HIV/AIDS and other sexually transmitted diseases during the construction period due to interactions amongst themselves and from workers that may have migrated in the project area.

Mitigation measures

- Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS.

- Provide VCT services on site and encourage workers to undergo the same.
- Provision of protective devices such as condoms.
- Maximize hiring skilled and unskilled workers from the local community

7.10.8.4 Impact on Traffic and Difficulty of Access

There are several un-named roads within the project sites where the project team and equipment will use to access the sites. One of the impact is on human and other motorist using the roads especially during material delivery and movement of the project team within the project area. The impact is also expected within the project site between the project site vehicles and machineries during construction. The impact is expected to be minimal since the works will be confined within the Baricho Water Works project site. Safe workers transportation should be complied with. Majority of the workforce is expected to come from the respective project sites and will be reporting with their own means to and from site. Mitigation measures should be put in place to reduce the impacts.

Figure 7-2: Unnamed road within Baricho water works

Mitigation Measures

- Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all.
- The workers should receive requisite training especially on the operation of the machinery and equipment and those undertaking material delivery from licensed NTSA trainers.
- Training workers on traffic management on site and availing trained traffic marshals along the un-named roads within the project area and within the project site
- Sensitization shall be done to all workers on safe transportation and penalties for not adhering shall be communicated through inductions and toolbox talks.
- All motor vehicles should be road worthy and properly serviced inspected by a government inspector.
- Drivers should sign codes of conduct.
- The Contractor shall provide safe transportation of the skilled workers to site where need be since workers will be sourced locally. This will be by either contracting a licensed public service transport provider or using own vehicle that meets requirements for public transport.

- The workers shall be warned against hanging onto moving vehicles within the site and strict measures should be enforced

7.10.8.5 Interruption of Existing Installed Amenities

There are various installations which cross on the project sites/ along the access roads, among them are overhead utilities e.g. electricity, telephone links. These may be affected during installation of the solar cable lines and material delivery. These services are critical and have implications with spill over effects on the social and economic performance.

Mitigation Measures

- Formal request and engagement should be sought with relevant institutions such as Kenya Power and Lighting Company, data network companies before undertaking construction works;
- Timely reinstatement of damaged utilities

7.10.8.6 Labor influx

Large construction projects often require labour force and associated goods and services cannot be fully supplied locally for reasons such as worker unavailability and lack of technical skills and capacity. Majority of the labour force needs to be brought in from around the project area. This will minimize labour conflicts.

Mitigation Measures

- Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project.
- The Contractor to develop a labour management plan
- The Contractor to liaise with the local authorities and leaders in the recruitment of workers on site.
- The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws
- Effective community engagement and strong grievance mechanisms on matters related to labour
- All workers to sign employment contract including the Code of Conduct.
- The Contractor should develop their company's working policy that will be communicated to all workers and ensure compliance on site

- Sensitize workers on community based social behaviour and conduct.
- Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrates by the local communities
- Identification cards by workers seeking employment should be provided during recruitment
- The Contractor to adhere to the minimum wages requirement stipulated in the national laws at the time of construction (the regulations wage orders are usually changed by the National government)

7.10.8.7 Child Labor and Protection

The Children Act of Kenya prohibits Contractors from "employing children in a manner that is economically exploitative and detrimental to the child's education, harmful to the child's health or physical, mental, spiritual, moral, or social development". It is also important to be vigilant towards potential sexual exploitation of children, especially young girls. The Contractor should adopt a 'Child Protection Code of Conduct'; that all staff of the Contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour

Mitigation measures

- Ensure no children are employed on site in accordance with national labour laws.
- Ensure that any child sexual relations offenses among Contractors' workers are promptly reported to the police.
- Ensuring all workers sign and adhere to the code of conduct.
- Ensure that all the workers have national identification cards.

7.10.8.8 Gender Equity, Sexual Harassment

Construction workers who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behaviour, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. In large scale cases, male labour may also lead to an increase in exploitative sexual relationships whereby women and girls are forced into them.

Mitigation measures

- The Contractor should be required to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws where applicable.

- Strive for an equitable distribution of employment opportunities between men and women. Mainstream Gender Inclusivity in hiring of workers as required by Gender Policy 2011 and 2/3 gender rule;
- The Contractor should prepare and implement a gender action plan to include:
  - ✓ Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs
  - ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider
  - ✓ Provision of gender segregated sanitation facilities
  - ✓ Grievance redress mechanisms
  - ✓ Assessment of main risks (gender-based violence, sexual harassment) within and from the construction activities, as well as opportunities to promote gender equality
- The Contractor to ensure workers sign the SH CoC provisions, and ensure continuous enforcement and monitoring

7.10.8.9 Increased Gender Based Violence

There are various form of Gender Based Violence (GBV) such as physical, emotional, financial and psychological amongst others. Project team members been on a position of advantage, may exploit the local communities and practices either knowingly or unknowingly GBV on site. GBV cases may also be reported amongst the project team especially between supervisors and the workers. It should be noted GBV may be experienced by both males and females.

Mitigation Measures

- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project e.g. effective and on-going community engagement and consultation, particularly with women and girls;
- Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation
- Sensitization of workers and the community on GBV and the various forms.
- Having workers sign and comply with the code of conduct.
- All workers to sign a Code of Conduct for commitment to avoiding SGBV
- Heavy penalties to be enforced for workers found to have been the perpetrators in any form of GBV.

7.10.8.10 Sexual Exploitation and Abuse (SEA)

This impact refers to sexual exploitation and abuse committed by Project staff against communities and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.

Mitigation Measures

- Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMMP.

7.11 Operation Phase Positive Impacts

7.11.1 Creation of Employment

During operational phase, there shall be employment opportunities especially for those who shall be employed to manage and maintain the solar facilities. This shall improve the living standards of these employees.

7.11.2 Creation of Wealth

The proposed project shall ultimately provide revenues to the beneficiaries and expand the wealth base for the nation. It shall pump both liquefied and tied up wealth hence making the nation gain.

7.11.3 Improved Accessibility to Clean and Reliable Water Supply

The proposed project is intended to improve the accessibility, availability and affordability of water within the project areas.

7.11.4 Capacity Building

Through the training or the practical aspect of the construction and operation phase of the project, the operators will be able to learn new skills.

7.11.5 Reduced Cost of Production and Increased Sustainability

With solarization of the project there will be reduced cost of production by reducing its cost on electricity. With the use of both solar energy and grid power there will be increased sustainability of the project and also revenue from the cost of power bills that will be saved

7.11.6 Source of Clean Energy

Solar energy offers environmental advantages by producing clean energy and reducing greenhouse gas emissions. Additionally, the solar system offers increased reliability, and lower maintenance needs due to fewer mechanical parts.

7.12 Operation Phase Negative Impacts

7.12.1 Risk of Theft of the Solar Panels

Due to the solar panels high market value, people may be tempted to steal the solar panels and associated fittings and sell them. There is need to ensure proper security measures are put in place to reduce theft cases.

Mitigation Measures

- This shall require constant inspection by the Baricho Water Works officials
- Conduct public sensitization programs on importance of not interfering with the installed facilities.
- Engaging local CBOs, youth groups, women groups in management of the facilities to foster a sense of ownership and responsibility
- Installation of adequate Solar security lighting
- Proper barricading and having qualified security personnel.

7.12.2 Operation Health and Safety Hazard

Potential of exposure to safety events during operation activities such as slipping and tripping, exposure to cleaning chemicals, electrical fire hazards etc.

Mitigation Measures

- Formulate and enforce stand operation and maintenance procedures (SOPs) including for cleaning and provide requisite PPE to the cleaners and operations and maintenance staff
- Display hygiene posters to create awareness on good hygiene practices
- Ensure all works and storage areas are tidy, all material deliveries shall be planned to minimize accumulated materials.
- Fire extinguishers should be located at identified fire points around the site. The extinguishers shall be appropriate to the nature of the potential fire.
- First aid kit with adhesive bandages, antibiotic ointment, antiseptic wipes, aspirin, non-latex gloves, scissors, thermometer, etc. shall be made available.
- Undertake workers training and awareness on the occupation safety and health risks and the SOPs
- Provision of adequate and stable ladders

7.12.3 Solar Waste Generation

Solar waste refers to the discarded materials from photovoltaic (PV) panels, inverters, batteries, and other components of solar power systems at the end of their useful life or due to damage.

Solar waste mainly comes from:

1. End-of-life of the solar Panels – Solar panels typically at least last 25 years. After that, they degrade and must be replaced.
2. Waste from inverters, mounting structures, and cabling.
3. Energy Storage Systems such as batteries that will be used with solar systems also contribute to e-waste

Some solar panels contain lead, cadmium, and other hazardous substances that can leach into soil and groundwater if not handled properly.

Mitigation Measures

- Contract with companies holding a National Environmental Management Authority (NEMA) license and relevant experience for the handling, recycling, and disposal of solar waste material
- Establish a specific waste management plan for managing electronic waste (e-waste) from solar panels and associated components, as these materials can contain heavy metals and other hazardous substances that may leak into the environment
- Provide training for all project personnel on environmentally sound waste disposal and handling practices to ensure compliance with environmental standards and regulations**.**
- Where possible, use biodegradable chemicals for any required maintenance or cleaning to reduce potential environmental impacts.
- Have spill kits for collection of cleaning materials to prevent or minimize spills into the soils
- Panel Reuse and Repurposing- Reuse functioning but less efficient panels for off-grid or low-power applications**.** Repurpose old panels for use in non-critical systems.
- Using longer-lasting and more efficient solar panel

7.12.4 Avi Fauna Impacts

Birds may collide with solar panels, mistaking the reflective surfaces for water bodies. This phenomenon known as the *lake effect*. Birds could be also electrocuted if they perch on exposed live electrical components or power lines. Night lighting around the plant may disorient nocturnal species, attracting them toward the facility and leading to collisions. The birds flying over the panels may also poop and contribute to the dirt on the panels. It should be noted the panels will be installed on open field and their height will not affect the migratory of birds that may be around the project area.

Mitigation Measures:

- Insulate and properly sheath all overhead cables and connectors.
- Regular cleaning of the solar panels
- Use shielded, downward-facing, low-intensity lighting to avoid attracting nocturnal birds.

- Minimize lighting at non-critical areas of the site.

7.13 Decommissioning Phase Positive Impacts

7.13.1 Employment Opportunities

Temporary employment opportunities shall be created for the demolition of laid and constructed structures during the decommissioning works. Decommissioning activities shall include but not limited to campsite demolitions.

7.13.2 Environmental Rehabilitation

Rehabilitation of site to ensure the site is left as natural as possible close or better than before.

7.14 Decommissioning Phase Negative Impacts

7.14.1 Loss of Jobs and Income

The people that shall be employed to operate and maintain the water supply system shall lose their jobs immediately after the closure of the project. The loss of jobs shall have far reaching impacts as it shall lead to loss of income and social stress.

Mitigation Measures

- Notify the employees in advance on the project closure date and adequately compensate them;
- Dismissal procedures to be compliant with Employment Act, 2007;

7.14.2 Solid Waste Material

It is expected that large amounts of solid waste material arising during decommissioning shall include: stones, pipes, metal, plastic, equipment etc. The proper disposal of these materials is critical since accumulation of such waste may result in environmental pollution.

Mitigation Measures

- Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations;
- Segregation of waste to encourage reuse and recycling. All solid waste will be collected at a central location designated by the Contractor, using clearly labelled and color-coded containers within the site and campsite. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector by NEMA as per the Waste Handler regulation 2006.

7.14.3 Occupational Health and Safety

If not handled with care, the demolition of the campsite may lead to accidents to workers and the communities which poses as health risks to them. Machinery and equipment used for the same also possess as danger to the workers if not handled well and with the correct PPE.

Mitigation measures

- Provide the correct PPE for the workers when conducting the demolition activities;
- Conduct training on health and safety procedures to the workers prior to commencement of demolition;
- Proper plans should be made prior to demolition to contain the raw sewage and other waste water that poses as health risk to human beings and the environment, to prevent the workers and surrounding communities from getting into contact with it.

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Introduction

An environmental management plan has been developed to assist the Proponent in mitigating and managing environmental impacts associated with the life cycle of the project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the ESMMP. As such, the ESMMP will be subject to a regular and periodic review.

The ESMMP identifies management actions that need to be implemented in various phases of the proposed project life cycle as follows:

8.1.1 Planning and design phase

Refers to the stage when the feasibility studies are being undertaken, the project description is being developed and the proposed project is being designed. During this phase, the ESIA is completed and the license is applied for.

8.1.2 Construction phase

This shall commence after the proposed project license has been issued. The construction phase involves the development and construction of the project infrastructure.

8.1.3 Operations

This is the phase during which the proposed project shall be in operation and the targeted beneficiaries; shall start benefiting from the project. After construction, Coast Water Works Development Agency will operate and maintain the facilities under its Bulk Water Unit.

8.1.4 Decommissioning Phase

The decommissioning phase of a project includes restoring the environment to its original form once all the operational activities of the project have ceased. Some aspects of the project will require decommissioning including the Contractor's camp. Other project components including the existing utility facilities will be maintained/rehabilitated over time having served their useful life.

8.2 Objective of the ESMMP

The objectives of the ESMMP include:

- To monitor the implementation of mitigation measures against potential adverse impacts of construction and operation phases of the project to ensure that they conform and comply with relevant environmental and social policies, guidelines and legislation.
- To assess and document environmental concerns and appropriate protection measures; while ensuring that corrective actions are completed in a timely manner.

- Serve as a guiding document for the environmental and social monitoring activities for the supervising Consultant, Contractor and the Client management including requisite progress reports.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment and/or the affected population
- Provide instructions to relevant Project personnel regarding procedures for protecting the environment and minimizing environmental and/or the affected population effects, thereby supporting the Project goal of minimal or zero incidents.

8.3 Auditing of ESMMP

The Supervision Consultant and Employer shall conduct regular audits to the ESMMP to ensure that the system for implementation of the ESMMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The ESMMP being used is the up-to-date version.
- Variations to the ESMMP and non-compliance and corrective action are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints) is in place and other documentation related to the ESMMP; and
- Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued.

8.4 Management Responsibility of ESMMP

To ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations which will be involved in the project. The following entities should be involved in the implementation of this ESMMP as shown in the table below:

Table 8-1: Institutional Framework for ESMMP

No	Institution	Role & Responsibility in ESMP Implementation
1.	World Bank- Financier	• Provides financing and technical supervision. • Reviews periodic safeguard performance reports.
2.	Coast Water Works Development Agency (CWWDA) – Proponent	• Overall project proponent and accountable party for ESMMP compliance. • Provides resources for ESMMP implementation. • Receives and reviews reports from the Supervision Consultant and Contractor.

No	Institution	Role & Responsibility in ESMP Implementation
		• Ensures continuous stakeholder engagement and operationalizes the GRM. • Has independent Environmental, Social, Health & Safety (ESHS) experts to also guide the Consultant and Contractor in ensuring compliance on site.
3.	Baricho Water Works (Bulk Water Unit, under CWWDA)	Under Coast Water Works Development Agency (CWWDA) that will be responsible for: • Operates and maintains solarization facilities during operation phase. • Implements ESMP mitigation and monitoring measures during operations.
4.	National Environment Management Authority (NEMA)	• Reviews and approves ESIA report. • Issues ESIA License. • Conducts statutory compliance monitoring and enforcement. • Provides legal recourse through the National Environment Tribunal in case of unresolved grievances.
5.	County Government of Kilifi (Environment, Health & Planning Departments)	• Provides permits and approvals. • Offers technical support and advisory services. • Monitors compliance with county-level laws.
6.	Water Service Providers (MAWASCO, KIMAWASCO, MOWASSCO)	Under the leadership of the County Governments • Oversee water service delivery to consumers. • Monitor service quality, tariffs, and consumer complaints during operations.
7.	Ministry of Energy & EPRA	• Approves and licenses solar installations. • Provides technical compliance monitoring for energy systems. • EPRA sets standards and ensures quality control within the sector
8.	Contractor	• Prepares and implements the Construction Environmental & Social Management Plan (CESMP). • Ensures strict compliance with ESMP requirements on-site. • Appoints a qualified EHS Officer who undertake monitoring and implementing EHS requirements on site. • Submits monthly ESHS compliance reports to the Supervision Consultant.

No	Institution	Role & Responsibility in ESMP Implementation
9.	Supervision Consultant	• Provides independent oversight on Contractor's compliance. • Reviews CESMP and monitors daily ESMP implementation. • Conducts regular audits and site inspections. • Consolidates EHS monitoring reports and submits to CWWDA. • Facilitates grievance redress committees at site level.
10.	Water Resources Authority (WRA)	• Monitors water use and quality standards. • Ensures project activities safeguard groundwater and Sabaki River resources.

8.5 Emergency Procedure during Construction and Operation Phases of the Project

An emergency means unforeseen happening resulting in serious or fatal injury to employed persons or the neighbouring communities. In the event of an emergency during construction, the workers shall:

1. Alert other persons exposed to danger;
2. Inform the OSHA coordinator;
3. Do a quick assessment on the nature of emergency;
4. Call for ambulance.

When emergency is over the OSHA coordinator shall notify the workers by putting a message: "ALL CLEAR".

In the event of such an emergency during operation, the workers shall:

a) Alert other persons exposed to danger;
b) Ring the nearest police station and ambulance services.

The proponent has already put measures to respond to emergencies in their premises like alarms and a fire assembly point. The proponent also has trained first aiders and fire marshals who can assist in case of emergencies.

8.6 Environmental Social Management and Monitoring Plan

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts for the proposed project is provided below for the; Pre-construction Stage, Construction stage, Operational stage, and Decommissioning stage respectively

Table 8-2: Pre-Construction Environmental and Social Management and Monitoring Plan

Associated Activity	Management Actions	Target Areas& Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Documentation	• The Contractor to obtain required permits and licenses. This will Include: ➢ Workplace DOSHS Certificate and abstract ➢ Site registration with DOSHS ➢ Campsite NEMA License ➢ County Business Permit	Campsite Responsibility Contractor(s)	• Valid records of permits and licenses. Monitoring Frequency Until their validity date (after 1 year)	KES 100,000

Table 8-3: Construction Environmental and Social Management and Monitoring Plan

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Environmental Impacts					
Noise and vibration	• Early notifications should be made to the residents prior to the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team. • Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. • Machinery, vehicles and instruments that emit high levels of noise shall be used at intervals and the workers shall work interchangeably to reduce the overall impact and exposure time. These pieces of equipment such as concrete vibrator, compressors, plate compactors and cement mixers etc (listed in Table	Moderate	All work areas <u>Responsibility</u> Contractor(s)	• Reported complaints from neighbour community and institutions • Noise Measurements records of all the active sites • Availability of the Contractor's Noise/Vibration Management Plan. <u>Monitoring Frequency</u> thrice during construction	KES 80,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	7-1) should also be used when the least number of residents can be expected to be affected, for example during periods where most residents are at work, school, weekends or holidays • Establish channels for feedback and addressing of concerns raised by stakeholders promptly. • Conduct quarterly assessments of noise levels to ensure they remain within acceptable limits. These assessments shall be done by an external health and safety expert. • Provision of appropriate personnel protective equipment to the workers such as ear muffs and plugs. • Conducting medical examinations (audiometry) by a Designated Health Practitioner for workers exposed to prolonged high noise levels				
Dust Emission	• Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions.	Moderate	All work areas <u>Responsibility</u> Contractor(s)	• Records of PPEs issued to workers (Dust Masks)	KES 150,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Strict protocols should be enforced for handling construction materials in powder form, such as covering of cement and sand during transportation. • Provision of PPE e.g. dust masks to workers. • Reinstatement of disturbed areas once construction is completed. • Minimizing the number of motorized vehicles in use on site. • Conducting workers medical examinations (Pulmonary Function Test (PFT) or Spirometry) by a Designated Health Practitioner for especially for workers exposed to cement and dust.			• Records of the amount of water used for dust suppression • Photo Logs • Records of the number of vehicles available • Availability of water bowsers <u>Monitoring Frequency</u> Daily	
Soil Pollution	• A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site. • In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection site.	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	• Restoration of site after construction • Availability of drainage channels <u>Monitoring Frequency</u> Daily	As per the BOQ

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• During cement mixing, water management should be key to reduce runoff and unnecessary water wastages. • Use of water sprays or dust suppression equipment around cement mixing areas will minimize airborne particles that could settle on soil causing pollution				
Solid waste generation and wastewater management	• All solid waste will be segregated and collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as per the Waste Management Regulations 2006. • Wherever possible, the Contractor should reuse and recycle waste generated on site. • All personnel assigned to collect waste on site shall be provided with appropriate PPEs i.e. heavy-duty gloves, protective footwear, dust masks and aprons.	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision	• Number of complaints from community not happy with waste management of spoil material • Records for waste collection and disposal bins • NEMA licenced Waste handler <u>Monitoring Frequency</u> Daily	KES 150,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• A comprehensive site waste management plan shall be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage and segregation areas, collection and removal schedule and identification of approved disposal site by NEMA. • The Contractor shall ensure workers are sensitized on proper waste management methods on site during construction. • Construction of standards septic tank and timely exhaustion of waste when it is full to avoid spill offs				
Site Related Oil Spills	• The Contractor should ensure that the employees on site are aware of the procedures for dealing with spills and leaks though induction, toolbox talks and safety trainings (the Contractor's EHSS shall propose a method of clean-up which shall be subject to approval); • All vehicles and equipment should be kept in good working conditions and	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	• Availability of spill lit • Availability of impermeable containers for storage of fuels, oils, lubricants and chemicals are stored	KES 100,000 for machine inspection by government inspector &

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	serviced regularly in service stations and fuelling stations selected by the Contractor • The machineries and vehicles to be inspected by licensed government inspectors • The Contractor to ensure spill kits are provided at the construction sites for machines like generators promoting efficient response to spills, minimizing environmental impact and ensuring workers' safety. • Ensure fuels, oils, and lubricants are clearly labelled and stored in impermeable containers away from surface drains.			Monitoring Frequency – Daily	As per the BOQ
Impacts on vegetation	• Reinstatement of the project sites after completion of works • The Contractor to adhere to the delineated construction work area. • Planting of grass and trees in sites identified within the project area preferably schools, institutions where they can be secure and well maintained.	Minor	All work areas Responsibility Contractor(s) Supervision Engineer	• Number of trees planted • Photos of reinstated areas	KES 50,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Proper landscaping of the site before, during and after construction				
	• Environmental Audits		All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	• Audit reports Frequency • Towards project completion	KES 500,000
Occupational Safety and Health Impacts					
Workers welfare	• Conducting workers pre-employment and periodic medical examinations by a Designated Health Practitioner. This will include general medical examinations, specialized tests depending on the workers job description such as Pulmonary Function Test (PFT) or Spirometry for workers exposed to cement and dust, audiometry amongst others as prescribed in the OSHA ACT 2007, Medical Examination Rules, 2005 and Legal Notice No. 50 of 2022 • Provision of Labelled toilet facilities at a minimum ratio of Toilet per 30 workers (preferred 1:15) and the exact location of the toilets shall be approved by the	High	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	• Availability of sanitation facilities for males and females • Availability of drinking water and drinking vessels • Resting areas • Availability of fully stocked first aid kits • Available qualified first aiders <u>Monitoring Frequency</u> Daily	KES 450,000 As per the WIBA insurance

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	Public Health Department prior to establishment. • The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. • Provision of adequate clean drinking water and drinking vessels should be made available on site. • Provision of adequate resting areas and gender segregated changing station away from machinery for the workers to be accessed during breaks. • Provide fully equipped First Aid Kits within the construction sites and ensure that at any moment during the works, there is a trained first aider on site. The ration of trained first aiders to worker will be as per defined by the OSHA First Aid Rules. • Recording of all accidents, injuries and deaths that occur on site in the incident				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	register, corrective actions for their prevention and investigated as appropriate. • Contractor should have an up-to-date Work Injury Benefit Act (WIBA) and the Contractors All risk plan and ensure the insurance covers all workers throughout the construction period. • The Contractor to have an agreement with local health facilities for the provision of emergency services • Community members should be notified before work commences for them to be aware of the ongoing works and trained on the safety measures to be followed				
Working At Height (WAH)	• Development of a site-specific Occupational Safety Action Plan with details of PPE, emergency procedures, site restrictions, inspection routines, and roles/responsibilities.	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision team	• Available ladders • Appropriate signage's erected on site • Availability of appropriate PPES • Availability of safety harnesses	KES 150,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Provision and enforcement of appropriate PPE (helmets, reflectors, safety boots, gloves, goggles). • Use of safe access equipment such as stable scaffoldings, ladders, and hard barricades. Access ladders shall be provided to facilitate movement in and out of the trenches that may dug for the cables and mounting. • Provision of safety harnesses for workers that will be Working at Height • Induction and toolbox talks on WAH safety, first aid, and fire response. • Continuous risk assessments and job safety analysis, • Developing a health and safety policy to be adhered to by all the project team members • Ensuring that the prepared code of conduct for staff is signed and adhered to.			• Records of accidents and injuries • Training records <u>Monitoring Frequency</u> Daily	

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Provision of adequate warning and information signages				
Electrical Hazard	• Ensuring all electrical works comply with OSHA 2007 and Kenya's Energy regulations. • Only qualified electricians and licensed installers should handle wiring and connections. • Appropriate PPEs (electrical insulating hard gloves, safety shoes wear, overalls, eye and face protection such as flash-rated face shields or goggles) should be provided as established from risk assessment and enforce their usage. • Regular inspection of equipment and cables for faults and wear. • Availability of fire-fighting equipment near electrical installations. • Display of 'No Smoking' signs, and provision of adequate warning and information signages on electrical safety	Moderate	Target Areas All work stations Responsibility Contractor	• Availability of adequate and appropriate PPES	KES 100,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Proper labelling of flammable materials, and • Establishing and clearly labelling emergency assembly points. • Workers should be trained in fire safety and electrical emergency response. • Ensuring that the prepared code of conduct for staff is signed and adhered to.				
Ergonomic Impacts	• Use of safe, well-maintained tools and replacement of broken ones listed in Table 7-1. • Training workers on proper lifting techniques and safe tool use. • Implementation of job rotation to minimize repetitive strain. • Provision of ergonomic PPEs such as heavy-duty gloves and safety shoes. Appropriate PPEs should be provided as established from risk assessment and enforce their usage.	Moderate	Target Areas All work areas Responsibility Contractor	• Condition of tools • The state of housekeeping on site • Resting areas	Can be catered under workers welfare And KES 10,000 for maintenance of tools

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• Ensuring proper housekeeping and tool storage to avoid strain and accidents. • Adequate rest breaks, shaded rest areas, and hydration to reduce fatigue-related risks. • Develop a site Occupational safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls adhering to guidelines in the OSHA Act 2007 • Ensuring that the prepared code of conduct for staff is signed and adhered to				
Fire outbreak	• Label all inflammable materials and store them appropriately • Provision of adequate fire-fighting equipment capable of fighting all classes of fire • Put — 'No Smoking' Signs in areas where inflammable are stored and designating	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision team	• Incidence of reported cases of fuel leaks and fire incidences • No of available fire extinguishers and type • Training records on fire safety • Available designated smoking zones	KES 80,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	smoking zones within the project areas with ash trays. • Train workers on the use of fire-fighting equipment • Develop an emergency response plan. • Display emergency contacts on active sites • Establish fire assembly points in every site. • Avail inspected and appropriate fire extinguishers near generator and other flammable materials. • Employ trained fire marshal in all active sites.			<u>Monitoring Frequency</u> Daily	
	• Trainings and audits for the workers on Occupational Health and Safety, first aid and fire safety		All work areas <u>Responsibility</u> Contractor(s) Supervision team	• Training records and attendance • Training reports • Audit reports <u>Monitoring Frequency</u> • Frequently	KES. 400,000
Social Impacts					

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Liability for damage to private property	• The Contractor to promptly repair and reinstate any damages done to private property. • Limit damage to property by observing construction area limits by clear demarcation. • The workers should receive requisite training especially on the operation of the machinery and equipment.	Moderate	All work areas Responsibility Contractor(s) Supervision team	• Number of reinstatements conducted Monitoring Frequency Daily and on need basis	As per the BOQ
Crime incidences	• Working with local committees e.g., *Nyumba Kumi* to provide security within the site in addition to the Contractor's own security. • The Contractor should ensure the proper barricading of the site and deploy trained security personnel. • Provision of security lighting within the project sites. • All workers should sign the code of conduct on site and ensure adherence. • The Contractor should prepare and implement a security management plan. • Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the Contractor's	Moderate	All work areas Responsibility Contractor(s) Supervision team	• Fencing of the campsite and barricading active sites • No of crime cases reported • Security management plan Monitoring Frequency Daily	KES 200,000 security measures & As per Contractor's rates

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	personnel, and to preserve peace and protection of persons and property on and near the site.				
Spread of HIV/AIDS, and STI's	• Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS. • Provide VCT services on site and encourage workers to undergo the same. • Provision of protective devices such as condoms. • Maximize hiring skilled and unskilled workers from the local community	Minor	All work areas Responsibility Contractor(s) Supervision team	• HIV/AIDs Programme • Condom dispenser • No of sensitization meeting held, attendance sheet Monitoring Frequency Weekly	KES 100,000
Impact on traffic	• Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all. • The workers should receive requisite training especially on the operation of the machinery and equipment and those	Moderate	All work areas Responsibility Contractor(s) Supervision team	• Availability of adequate signages • Availability of a traffic management plan on site • Availability of temporary bridges with handrails	KES 100,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	undertaking material delivery from licensed NTSA trainers. • Training workers on traffic management on site and availing trained traffic marshals along the un-named roads within the project area and within the project site • Sensitization shall be done to all workers on safe transportation and penalties for not adhering shall be communicated through inductions and toolbox talks. • All motor vehicles should be road worthy and properly serviced inspected by a government inspector. • Drivers should sign codes of conduct. • The Contractor shall provide safe transportation of the skilled workers to site where need be since workers will be sourced locally. This will be by either contracting a licensed public service transport provider or using own vehicle that meets requirements for public transport.			• Trained traffic marshals • Provision and use of safety barrier/bollards <u>Monitoring Frequency</u> Daily	

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• The workers shall be warned against hanging onto moving vehicles within the site and strict measures should be enforced				
Interruption of existing amenities	• Formal request and engagement should be sought with relevant institutions such as Kenya Power and Lighting Company, data network companies before undertaking construction works; • Timely reinstatement of damaged utilities	Moderate	All work areas Responsibility Contractor(s) Supervision team	• Number and records of reinstatements done Monitoring Frequency Daily and on need basis	As per the BOQ
Labour Influx	• Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project. • The Contractor to develop a labour management plan • The Contractor to liaise with the local authorities and leaders in the recruitment of workers on site.	Moderate	Responsibility Contractor(s) Supervision team	• Availability of labour management plan • Availability of Contracts • Labour records Monitoring Frequency weekly	KES 80,000 for community engagement & As per the Contractors estimates

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws • Effective community engagement and strong grievance mechanisms on matters related to labour • All workers to sign employment contract including the Code of Conduct. • The Contractor should develop their company's working policy that will be communicated to all workers and ensure compliance on site • Sensitize workers on community based social behaviour and conduct. • Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrates by the local communities • Identification cards by workers seeking employment should be provided during recruitment • The Contractor to adhere to the minimum wages requirement stipulated				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	in the national laws at the time of construction (the regulations wage orders are usually changed by the National government)				
Child labour	• Ensure no children are employed on site in accordance with national labour laws. • Ensure that any child sexual relations offenses among Contractors' workers are promptly reported to the police. • Ensuring all workers sign and adhere to the code of conduct. • Ensure that all the workers have national identification cards.	Minor	Responsibility Contractor(s) Supervision team	• Availability of identification cards for all workers on site • Complains received by residents in regard to child labour Monitoring Frequency Monthly	No additional cost
Gender Equity & Sexual Harassment	• The Contractor should be required to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws where applicable. • Strive for an equitable distribution of employment opportunities between men and women. Mainstream Gender Inclusivity in hiring of workers as required by Gender Policy 2011 and 2/3 gender rule;	Moderate	Responsibility Contractor(s) Supervision team	• No of complaints received • Availability of gender action plan Monitoring Frequency Daily	No additional cost

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	• The Contractor should prepare and implement a gender action plan to include: ✓ Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider ✓ Provision of gender segregated sanitation facilities ✓ Grievance redress mechanisms ✓ Assessment of main risks (gender-based violence, sexual harassment) within and from the construction activities, as well as opportunities to promote gender equality • The Contractor to ensure workers sign the SH CoC provisions, and ensure continuous enforcement and monitoring.				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Increased GBV	• Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project e.g. effective and on-going community engagement and consultation, particularly with women and girls; • Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation • Sensitization of workers and the community on GBV and the various forms. • Having workers sign and comply with the code of conduct. • All workers to sign a Code of Conduct for commitment to avoiding SGBV • Heavy penalties to be enforced for workers found to have been the perpetrators in any form of GBV.	Moderate	Responsibility Contractor(s) Supervision team	• Availability of trained materials, photographs and attendance sheet • Signed CoC Monitoring Frequency Daily	KES 200,00O

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Sexual Exploitation and Abuse (SEA)	• Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMMP.	Moderate	Responsibility Contractor(s) Supervision team	• Availability of a SEA action plan • No of complaints received in regard to SEA Monitoring Frequency Daily	Cost catered under GBV

Table 8-4: Operation Phase Environmental and Social Management Plan

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
Risk of theft of the solar panels	• This shall require constant inspection by the Baricho Water Works officials • Conduct public sensitization programs on importance of not interfering with the installed facilities. • Engaging local CBOs, youth groups, women groups in management of the facilities to foster a sense of ownership and responsibility • Installation of adequate Solar security lighting • Proper barricading and having qualified security personnel.	CWWDA (Baricho Water Works)	• Number of vandalism and theft cases reported • Number of security guards deployed	To be established at operation phase
Operation Health and Safety Risks	• Formulate and enforce stand operation and maintenance procedures (SOPs) including for cleaning and provide requisite PPE to the cleaners and operations and maintenance staff • Display hygiene posters to create awareness on good hygiene practices	CWWDA (Baricho Water Works)	• Record of trainings done • Availability of PPEs • Awareness signages	

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
	• Ensure all works and storage areas are tidy, all material deliveries shall be planned to minimize accumulated materials. • Fire extinguishers should be located at identified fire points around the site. The extinguishers shall be appropriate to the nature of the potential fire. • First aid kit with adhesive bandages, antibiotic ointment, antiseptic wipes, aspirin, non-latex gloves, scissors, thermometer, etc. shall be made available. • Undertake workers training and awareness on the occupation safety and health risks and the SOPs • Provision of adequate and stable ladders			
Solar Waste Generation	• Contract a National Environmental Management Authority (NEMA) licensed waste handler and relevant experience for the handling, recycling, and disposal of solar waste material	CWWDA (Baricho Water Works)	• Visible waste on site • Availability of licensed waste handler • Waste tracking records	

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
	• Establish a specific waste management plan for managing electronic waste (e-waste) from solar panels and associated components, as these materials can contain heavy metals and other hazardous substances that may leak into the environment • Provide training for all project personnel on environmentally sound waste disposal and handling practices to ensure compliance with environmental standards and regulations. • Where possible, use biodegradable chemicals for any required maintenance or cleaning to reduce potential environmental impacts. • Have spill kits for collection of cleaning materials to prevent or minimize spills into the soils • Panel Reuse and Repurposing- Reuse functioning but less efficient panels for off-grid or low-power applications. Repurpose old panels for use in non-critical systems.		• Availability of waste management plan • Training records • Spill kits	

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
	• Using longer-lasting and more efficient solar panel			
Avi Fauna Impacts	• Insulate and properly sheath all overhead cables and connectors. • Regular cleaning of the solar panels • Use shielded, downward-facing, low-intensity lighting to avoid attracting nocturnal birds. • Minimize lighting at non-critical areas of the site.	CWWDA (Baricho Water Works)	• Cleaning records • Visible birds affected by the panels	

Table 8-5: Decommissioning Phase Environmental and Social Management and Monitoring Plan

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
Loss of jobs and income	• Notify the employees in advance on the project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007;	Contractor	▪ Record of notification made to employees about job losses	To be established at Decommissioning phase
Solid Waste generation	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling. All solid waste will be collected at a central location designated by the Contractor, using clearly labelled and color-coded containers within the site and campsite. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector by NEMA	Contractor	• Availability of a valid Permit/License for the waste handler • Waste collection records	

Associated Impacts	Management Actions	Responsibilities	Monitoring Indicator	Budget
	as per the Waste Handler regulation 2006.			
Occupation health and Safety	• Provide the correct PPE for the workers when conducting the demolition activities; • Conduct training on health and safety procedures to the workers prior to commencement of demolition; • Proper plans should be made prior to demolition to contain the raw sewage and other waste water that poses as health risk to human beings and the environment, to prevent the workers and surrounding communities from getting into contact with it.	Contractor	• Availability of appropriate PPEs for all workers • Training records on occupational health and safety	

8.7 Climate Change Vulnerability Assessment, Relevant Adaptation and Mitigation Actions

The Baricho Water Works is in Kilifi County**,** which experiences high temperatures (21–34°C), high evaporation (1,800–2,200 mm/yr), and bimodal rainfall with variability. Energy demand for pumping is 5,212 kW**,** with monthly electricity costs of Kshs 60 million. Heavy reliance on grid power makes the system vulnerable to rising fossil fuel prices and climate-induced grid instabilities (storms, floods). The Sabaki River catchment and Baricho Aquifer face risks from droughts and floods, which can lower recharge rates, increase sedimentation, and affect pumping reliability.

The proposed project at Baricho Water Works is a proposed hybrid system that will use solar power during the day and grid-power during the night based on the water demand and pumping schedule

8.7.1 Climate Change Vulnerability Assessment

Climate change is change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Climate change vulnerability refers to the susceptibility of a system to harm from climate change and its inability to cope with those impacts. The climate change vulnerability assessment would determine the project's vulnerability to climate change impacts by considering the following factors;

- Exposure - The direct stresses of climate change. Stresses that may affect the proposed project include increased temperatures, drought and floods. The project area does experience high temperatures and the nearby River Sabaki has high chances of flooding as noted in the previous years and that affected the system.
- Sensitivity - How the proposed project reacts to climate change stresses. The proposed site selected is a suitable site that would prevent the system from been affected by stresses and risks such as flooding. The operations may however be affected in case of drought affecting the amount of water been pumped to the community.
- Adaptability capacity - the ability to cope with climate change. The facilities been constructed are of high and durable conditions and are able to withstand the stresses in the region.

8.7.2 Relevant Adaptation Actions

Climate change adaptation is increasing the ability to cope with climate change and climate change stressors. The following are ways the proposed project has developed adaptations measures:

a) Engineering / Infrastructure Adaptation

- Design already includes elevated panel structures (1.5–3.5m) on C25 reinforced concrete foundations for strong support of the system
- Use of galvanized steel supports (corrosion-resistant) ensures durability against coastal humidity.

b) Resource Efficiency & Diversification

- Hybridization (use of solar + grid system) ensures during cloudy or low-radiation days the facility can still be in operation.
- Battery storage ensures management of extreme climate variability. This is through reducing Carbon Footprint**.** By using more of stored solar energy and less from fossil-fuel-powered grids, this helps to lower the carbon emissions and contribute to a cleaner energy future.

8.7.3 Relevant Mitigation Actions against Climate Change

The relevant mitigation measures adopted in the proposed project includes:

a) Emission Reduction and economic resilience

- The 8.34 MW solar hybrid system is a renewable source of energy and will contribute in the minimization/ reduction of annual GHG emissions such as CO_2.
- By adopting the solar powered system, the plant will reduce the high cost of production hence enhancing economic resilience.

b) Energy Efficiency

- Proper sizing of PV panels and inverters ensures maximum energy yield efficiency**.**
- The design proposes to use 6mm^2 Busbar cables and low voltage metal armoured cables for efficient and safe power distribution.

c) Sustainable Construction & Operation

- Use of locally sourced labor and materials reduces transport-related emissions.

8.8 Grievance Redress Mechanism

The steps in grievance resolution mechanism includes:

1. Steps in dealing with grievances

- Complaint received in writing from affected person
- Recording of grievance in standard form
- Reconnaissance site visit with the complainant.

- Submission of detailed complaint to Resident Engineer for resolution by negotiation.
- Submission of detailed complaint to the Grievance Committee for resolution by mediation.
- Submission of complaint to CWWDA for resolution.

2. Composition of grievance committee

No	Designation	Organization	Position
1.	EHS officer	CWWDA	Chair
2.	Resident Engineer	Consultant	Committee Secretary
3.	EHS officer	Consultant	Committee Assistant Secretary
4.	Site Administrator	Contractor	Member
5.	EHS officer	Contractor	Member
6.	Chief	Community Representative	Member

3. Communication

There is need for clear communication channels to facilitate effective complaint expression. Stakeholders need to feel secure in doing so. Employees who voluntarily limit access to these means of communication will be sanctioned. Communication methods may include but not limited to:

- Worker representative,
- Harassment procedure,
- Community representatives,
- Poster, Boards, brochures.
- Verbal Worker committees,
- Meetings and assemblies,
- Suggestion box,
- Logbooks

4. Communication Means

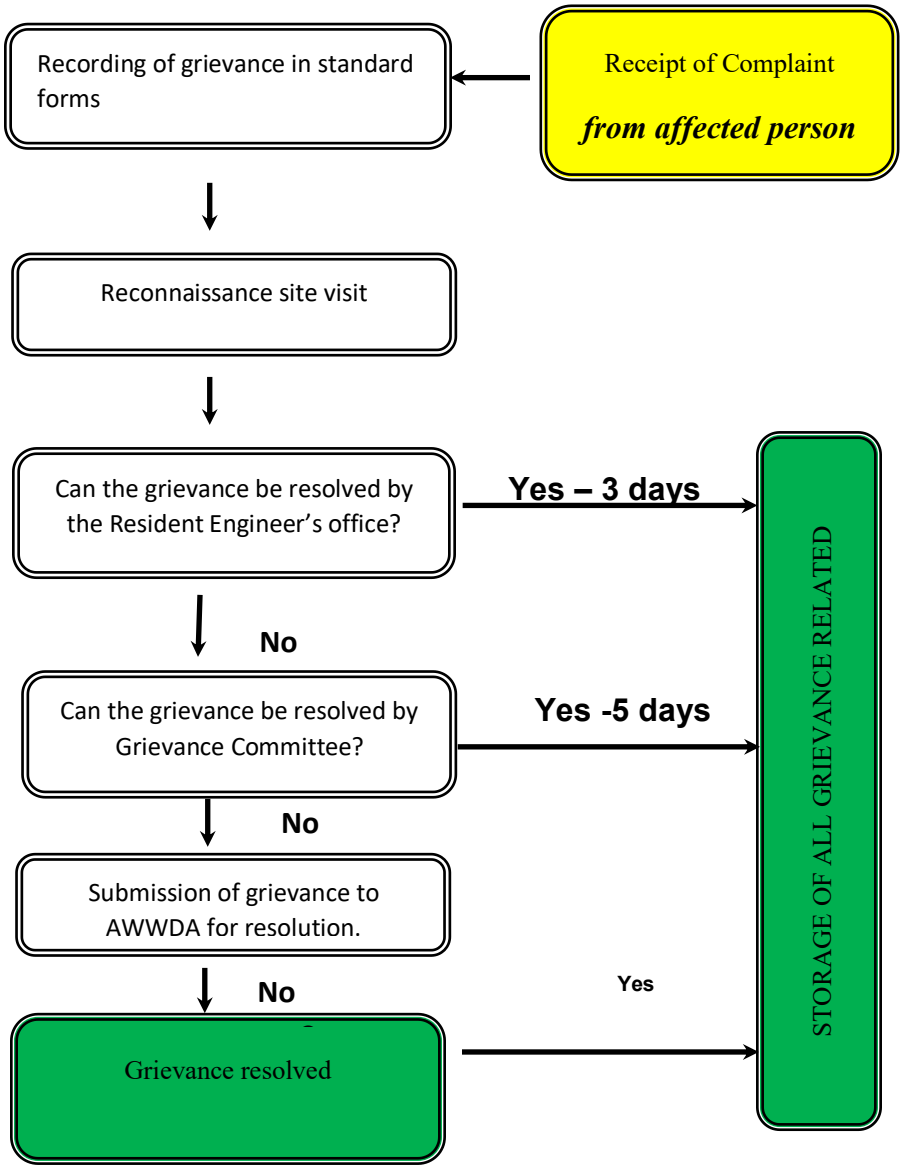
The communication means that can be used in raising grievances is through

- Email,
- Complaint form,
- Web-site,
- Phone call,
- Letter,
- Meetings minutes

- Complaint to Grievance Committee

The grievance redress mechanisms methods and means of communications should leave room for anonymity. This will ensure the identity of whistle-blowers is protected.

GRIEVANCE RESOLUTION PROCEDURE



CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

9.1 Recommendation

The Consultant recommends the following:

- All the recommendations/ mitigations mentioned in the assessment should be financed, and incorporated in the construction and supervision contracts, technical specifications and the Bill of Quantities.
- The Project team should ensure continuous stakeholder engagement throughout all project phases. The cost should be included in the Bill of Quantities (BOQ).
- The Contractor will be required to prepare a Construction Environment & Social Management Plan (CESMP) which shall be approved by the proponent before the beginning of works.
- The proponent should set up a proper and applicable Grievance Redress Mechanism (GRM) for the project to deal with grievances and issues on the project.
- Periodic environmental and social monitoring is required by the project Proponent and supervision team to ensure that mitigation measures have been implemented to prevent or avert any negative impacts of the project.
- At project implementation stage, the Contractor to report monthly ESHS compliance to the project management team comprising of the Project Proponent and Supervision Consultant.
- On completion, CWWDA to commission an independent Consultant to undertake an Environment, Social, Health and Safety Audit as required by and Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019. The audit will identify nonconformities which the Contractor together with CWWDA will address through the defect liability period of the project. This audit will also form the basis of annual project self-audits by CWWDA.
- The proponent to Contract licensed waste handler for the disposal of generated solar waste during the operation phase.

9.2 Conclusion

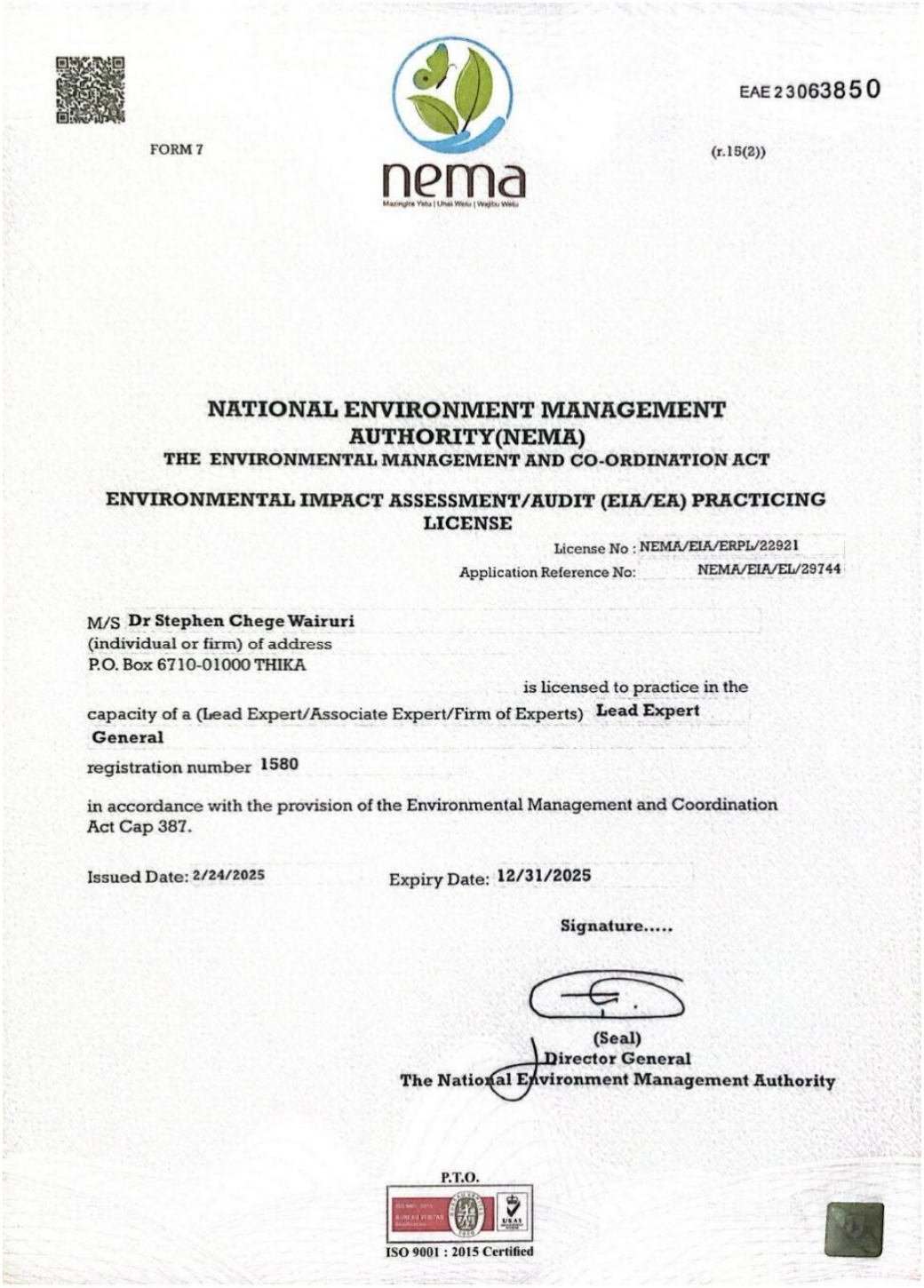
The proposed project is environmentally, legally, and socially acceptable. The proposed project as noted from the assessment is likely to generate both positive and negative impacts within the project area. It is worth noting the potential significant environmental impacts can be adequately mitigated by the proposed measures, and it is the responsibility of the Proponent and all other Project Implementation Unit to ensure the measures are implemented and strict compliance during project implementation. An ESMMP has been prepared, and it includes: the impacts, the mitigation plan; the monitoring and enforcement requirements; and the responsible persons/organizations. The ESMMP been a dynamic document will form as a guide in the enforcement of the proposed mitigation measures and developing mitigation measures for emerging issues in the project areas.

The project will also be implemented on land belonging to CWWDA at Baricho Water Works and there will be no Project Affected Persons hence no need for (A) RAP. A combined solar plant to generate the combined power of 4.366MW would require a land size equivalent to 10 acres at a single site while the clustered solar plants will require 1 – 3 acres per site which will be possible at Baricho water works.

It is based on the above, that it is recommended that the project be issued with the necessary clearance and licensing for the proponent to commence the project implementation.

ANNEXES

Annex 1: Lead Expert License



EAE 23063850

FORM 7 (r.15(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/22921

Application Reference No: NEMA/EIA/EL/29744

M/S **Dr Stephen Chege Wairuri**
(individual or firm) of address
P.O. Box 6710-01000 THIKA

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
General
registration number **1580**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: 2/24/2025 Expiry Date: 12/31/2025

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Annex 2: Public participation minutes

CONSULTANCY SERVICES FOR FEASIBILITY STUDY, PREPARATION OF PRELIMINARY DESIGNS, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE AND TRANSMISSION PIPELINES TO KILIFI AND GANDA TANKS (PHASE II)

CONTRACT No.: KE-CWSB-102977-CS-QCBS

Assignment Name	Consultancy Services For Feasibility Study, Preparation Of Preliminary Designs, Detailed Designs, Safeguards Documents And Tender Documents And Construction Supervision Of Second Baricho – Kakuyuni Water Pipeline And Transmission Pipelines To Kilifi And Ganda Tanks (Phase II)
	Environmental And Social Impact Assessment Comprehensive Project Report For The Proposed Baricho Plant Solarization Project
Contract No:	CONTRACT No.: KE-CWSB-102977-CS-QCB
Subject:	Minutes of Public participation Meeting Held at LangoBaya
Date and Time:	August 14, 2025
Venue:	Assistant Chief's Office

Agenda for the Meeting

S/NO	Agenda
1.	Introductions
2.	Purpose of the Meeting
3.	Brief on the Project Team, Its Mandate And Jurisdiction.
4.	Scope of works
5.	Impacts of the Project
6.	Comments and Responses
7.	Filing of Questionnaires
8.	Any Other Business
9.	Meeting Adjournment

MEMBERS PRESENT

(ATTENDANCE SHEETS ATTACHED)

MINUTE No.	ITEM DESCRIPTION	ACTION BY
Min 1-1	**INTRODUCTION** The Assistant Chief called the meeting to order at 10:20 A.m. with a word of prayer from one of the members. This was followed by brief-introductions by all participants present.	**All**
Min 1-2	**PURPOSE OF THE MEETING** The Consultant informed the participants that holding public participation meetings is a legal requirement in accordance with Environmental Management and Coordination (Amendment) Act, 2015 and the Kenyan Constitution 2010 before commencement of development projects. The participants were informed that the project was at the planning stage hence their contributions would be incorporated during finalization of project designs. Further, they were informed that all their views would be captured and documented in the ESIA report that would be prepared for submission to NEMA for consideration before issuing of license for the project. The Consultant informed the participants that the Client would then submit all final documentation to the Bank for approval before project implementations.	**All to note**
Min 1-3	**BRIEF ON THE PROJECT TEAM, ITS MANDATE AND JURISDICTION.** **The Client- Coast Water Works Development Agency (CWWDA)** CWWDA is one of the Development Agencies under the Ministry of Water, Sanitation and Irrigation. CWWDA is responsible for the development of water and sanitation infrastructure in the counties of Mombasa, Kilifi, Lamu, Kwale, Taita Taveta, and Tana River Counties After implementation of the projects**,** Coast Water Works Development Agency will operate and maintain the facilities under its Bulk Water Unit. **Consultant –Sari Consulting Joint Venture with SGAPI and Gath Consulting Engineers**	**All to note**

MINUTE No.	ITEM DESCRIPTION	ACTION BY
	Coast Water Works Development Agency (CWWDA) has appointed Sari Consulting Joint Venture with SGAPI and Gath Consulting Engineers to provide Consultancy services for the assignment from designs to construction supervision. **Contractor** After approval of the relevant documentations and financing from the World Bank, a Contractor will be selected to undertake the construction works.	
Min 1-4	**SCOPE OF WORKS** The proposed works for solarization of Baricho Water Works are summarized as follows; • Supply and installation of 6,717No. 650W Solar PV Modules to generate at least 4.366MW of Power from the respective solar plants • Supply and installation of battery storage system for the respective pumps • Supply and installation of the accompanying MPPT inverter system for each set of the pumps • Supply and Installation of the respective PV Disconnect Switch • Supply and Installation of Electrical cables and sundries • Construction of 1.5m – 3.5m of galvanized steel support structure on Class C25 concrete foundation. This will also include supply and mounting of the solar panels using solar cell brackets as detailed in the book of drawings • Installation of inverter cage • Construction of Civil works – Fencing of the solar power plant sites, related road works, and drainage works and equipment/control rooms.	**All to note**
Min 1-5	**IMPACTS OF THE PROJECT** The Consultant highlighted that the project is likely to have both positive and negative impacts as highlighted below: **Benefits of the project** The Consultant also highlighted the project benefits shall include but not limited to:	**All to note**

MINUTE No.	ITEM DESCRIPTION	ACTION BY
	• Creation of employment opportunities • Creation of a market for construction materials • The project will result in economic growth in the area through the use of locally available materials • Earning of income from the project will result in improved standards of living and creation of wealth • Reduced power bills for the Baricho Water Works • Minimal uninterrupted water supply within the region • Trainings and continuous awareness will ensure transfer of knowledge and skills to the workers and community members **Negative Impacts of the Project** The Consultant also highlighted the project negative impacts shall include but not limited to: • Air pollution through generation of dust and fumes • Solid Waste Generation • Noise pollution • Labour influx • Grievances • Damage to existing infrastructures The Consultant informed the community members that mitigation measures will be put in place to prevent/minimize the negative impacts highlighted above.	
Min 1-6	**<u>COMMENTS AND RESPONSES</u>** **Comment** The community enquired whether the project team had already been given the go ahead to commence the project **Response** The Consultant informed the community that the project was currently at the design and planning phase. In addition Environmental and Social Impact Assessment (ESIA) was ongoing. The community were also informed the public meeting was been held to obtain views and concerns from the community that will help improve the final designs of the proposed project	**Community** **Consultant**

MINUTE No.	ITEM DESCRIPTION	ACTION BY
	Comment The community enquired about the project cost **Response.** The Consultant informed the meeting the estimated project cost would be around KES 500 million. The final cost will be determined after finalization of the designs and project documentations. **Comment** The Community highlighted the project would result in both positive and negative impacts. They enquired whether the key stakeholders and experts had been involved to provide their input especially regarding the negative impacts likely to be encountered. **Response** The Consultant stated that the key stakeholders had been involved among them been the County Government environmental department, the administration (DCC), Baricho Water Works and Water Service Providers. Continuous engagement will continue throughout the project implementation **Comment** The community enquired about the criteria and persons who will be employed on site. **Response** The Consultant informed the community that first priority during labour recruitment for both skilled and non-skilled will be given to the local communities. They were informed the Contractor will be allowed to also source some of the labour outside especially the skilled however ensuring majority of the workers are from the local community. **Comment** The community enquired regarding the payment of workers **Response** The Consultant informed the members present that the amount the workers will be paid will be an agreement between the workers and the Contractor. They were further	**Community** **Consultant/Client** **Community** **Consultant** **Community** **Consultant** **Community** **Consultant**

MINUTE No.	ITEM DESCRIPTION	ACTION BY
	informed the Consultant will only supervise and ensure the Contractor adheres to the minimum wage requirement as highlighted in the labour laws. **Comment** The community wanted to know the duration of the project construction. **Response** The Consultant informed them the project has been estimated to take 4 months. **Comment** The community enquired whether there was any CSR for the proposed project since they did not benefit from the previous project. Some of the CSR activities they requested included: ❖ A public watering point free access to the community at the Assistant Chief's office ❖ Restoration of dilapidated Mondola tank within LangoBaya ❖ Rehabilitation and construction of an ablution block and social hall at the Assistant Chief's Place and LangoBaya **Response** The Consultant informed the community that it was not compulsory for CSR activities to be included in the project components. The Consultant however informed the community that the suggestions have been recorded and will be presented to CWWDA for consideration and approval. **Comment** The community enquired whether the project will affect private land. They further requested for a walk through at the proposed site for confirmation **Response** The Consultant informed them the project will be implemented on land belonging to CWWDA at Baricho Water Works. They were informed the site was identified	**Community** **Consultant** **Community** **Consultant** **Community** **Consultant**

MINUTE No.	ITEM DESCRIPTION	ACTION BY
	with the assistance of the Officer In Charge at Baricho water works. The community were later taken to the proposed site after the meeting and confirmed it was indeed within the land owned by CWWDA.	
Min 1-7	**ADMINISTERING OF QUESTIONNAIRES** The community were taken through and guided in responding the questions in the questionnaire issued. They were informed their opinions will be incorporated in the design and ESIA reports.	**All to note**
Min 1-8	**ANY OTHER BUSINESS** • The Chief thanked the attendees for taking their time to attend the meeting and assured them that during the Project implementation they will be involved in every step of the project implementation. • The community was requested to support the proposed project as it will benefit all members of the community and improve their living standards. • Mkondoni Community Water Supply Project highlighted they experience challenges with their water infrastructures. They requested for assistance in the provision of water pipes to enable them to supply water within the community. • The community requested for lesser charges in their water bills especially in areas within LangoBaya • The community requested for another public participation meeting and the presence of CWWDA will be required • The community requested for feedback on which of the CSR will be approved	**All to note**
Min 1-9	**MEETING ADJOURNMENT** There been no other matters of discussions, the meeting was adjourned with a word of prayer at 12:30 p.m.	**All to note**

MINUTES SIGNED AND AGREED UPON BY:

MINUTES SIGNED AND AGREED UPON BY:

CONFIRMATION OF MINUTES

FOR CHIEF/ASSISTANT CHIEF

Name: STEPHEN K. MONZA.

Designation: SNR. ASSISTANT CHIEF

Date: 30/9/2025

Sign:

ASST. CHIEF
SUB-LOCATION
P. O. Box 1, MAUNU

FOR CONSULTANT - SARI CONSULTING JOINT VENTURE WITH SGAPI AND GATH CONSULTING ENGINEERS

Name: Sarah Karanja

Designation: ESHS

Date: 24.09.2025

Sign:

Attendance Sheets

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SARI CONSULTING LTD | SGAPI | gath CONSULTING ENGINEERS

WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

CONSULTANCY SERVICES FOR PREPARATION OF PRELIMINARY DESIGNS, FEASIBILITY STUDY, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE PROJECT – PROPOSED HYBRID SOLARIZATION AT BARICHO WATER WORKS

LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement **DATE:** August 14, 2025

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
1.	Joseph Kalama	-	Community member		✓	NO	0728909748	[signature]
2.	WILLIAM S. BAYA	CBO	C/person		✓	NO	0726162172	[signature]
3.	Peter Kinyanjui	SARI / SGAPI / GATH	Engineer		✓	No	0722103085	[signature]
4.	Sarah Komingia	SARI/SGAPI/ GATH	ESHS	✓		NO	0703122837	[signature]
5.	Julia Wango	SARI / SGAPI / GATH		✓		Yes	0707 [illegible]	[signature]
6.	STEPHEN K. MENZA	INTERIOR	ASST. CHIEF		✓	NO	0724635562	[signature]
7.	Boniface Kogi	SARI / SGAPI / GATH	Engineer		✓	NO	0725942224	[signature]
8.								

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WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

CONSULTANCY SERVICES FOR PREPARATION OF PRELIMINARY DESIGNS, FEASIBILITY STUDY, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE PROJECT – PROPOSED HYBRID SOLARIZATION AT BARICHO WATER WORKS

LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement **DATE:** August 14, 2025

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
1.	Clinton Khero				✓	NO	0798908899	[signature]
2.	Ezekiel Tumaini				✓	NO	0728376561	[signature]
3.	Bensluson Konde Tuwa	member CBO LB			✓	NO	0728463491	[signature]
4.	Isaac Chaka	member CBO LB	I.T		✓	NO	0726967596	[signature]
5.	JUMA CHANGAWA				✓	NO	0769606488	[signature]
6.	ANDERSON KITHI THOYA				✓	NO	0700494195	[signature]
7.	ANDERSON KALAMA				✓	NO	0797740408	[signature]
8.	Kahindi Randu M	member			✓	NO	0792667224	[signature]

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
9.	Kadzo Kadenge			✓		No		
10.	Herron Raraka				✓	No	0712415007	
11.	CHARLES KOMBE YERI				✓	No	0727141371	
12.	SIDI BAYA CHARO			✓		NO		SB.
13.	DAMA CHARO KARISA			✓		No	0700221528	
14.	SERA KADENGE CHENGO			✓		NO	0708598690	
15.	LOVE KAHONZI DICKSON			✓		NO	0116433998	
16.	James DICKSON				✓	No	0743231740	
17.	Sharlet Bahati		Wife	✓		NO	0795562844	
18.	Dhahabu Mnyazi		Business owner	✓		NO	0746122554	
19.	Sidi Kahindi		farmer	✓		NO		
20.	BETTY CHAKA		Farmer	✓		NO	0725003878	
	J.K. Mose		farmer Boda	✓		NO NO	0100716813 0757962512	

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
21.	SINARA RANDU			✓		NO	0713631603	
22.	JOHN THOTA				✓	NO	0746816459	
23.	JUMWA GARAMA		Farmer	✓		No	0706064953	
24.	Florene Kadzo		Farmer	✓		NO	0714046539	
25.	Kahindi Kazungu				✓	No	0791032691	
26.	Katana Kalama				✓	No	0716650850	
27.	Hamisi Kahindi				✓	No	0715449801	
28.	DENIS KAZUNGU				✓	NO	0714497890	
29.	CHANGAWA KARISA				✓	NO	0799669310	
30.	Michael Kadzungu		Idle		✓	No	0106147026	
31.	CHRIS BARAKA		Farmer		✓	NO	0710268632	
32.	AMOS DANIEL		Farmer		✓	NO	0741940707	

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NAME	Designation	M	F	Disability	Phone No	Sign.
1. Justine Kazungu	Business owner	✓		NO	0798332497	
2. Garama Kansa	Business Owner	✓		NO		
3. Anderson	Shungu	✓		NO		
4 MOSES IHORISO		✓				
5 OMAR BAYA		✓				
6 Thomas Japhet		✓				
7 Edison Kambi	Cyber man	✓		N	0702596028	
8 John Yaa		✓		No	070520745	
9 FRANCIS K BAYA	Farmer	✓		No	0743128251	
10 Mwalimu Kenga	Farmer	✓		No	0113973308	
11. Jumwa Kenyeri	Farmer		✓	No		
12 Katana Ngumbao	Cyber man	✓		Yes	0115083849	
13. Grace Kitsao			✓	No	0790876609	
Lilian kadzo	Farmer		✓	NO	0718761187	

WATER AND SANITATION DEVELOPMENT PROJECT (WSDP)

CONSULTANCY SERVICES FOR PREPARATION OF PRELIMINARY DESIGNS, FEASIBILITY STUDY, DETAILED DESIGNS, SAFEGUARDS DOCUMENTS AND TENDER DOCUMENTS AND CONSTRUCTION SUPERVISION OF SECOND BARICHO – KAKUYUNI WATER PIPELINE PROJECT – PROPOSED HYBRID SOLARIZATION AT BARICHO WATER WORKS

LIST OF ATTENDANCE – Public and Key Stakeholders' Engagement **DATE:** August 14 , 2025

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
1.	Franklin Kaingu		BusinessPerson		✓		0711527146	
2.	Dama George Kitonga		farmer.	✓				
3.	Esther Gona Kaloma		farmer	✓			0720827806	
4.	HADIJA MBITHA THETHE		Farmer	✓			0706600097	
5.	JOHNSON NZARO KAINGU		Teacher		✓		0728545980	
6.	Samuel Baya	Mkondoni c. water project	Eng.		✓		0712211594	
7.	LENA SUSAN WANJIRU		Bussnes Person	✓			0748119714	
8.	GLADYS T. IHA	AGR.	Agricultural officer	✓		NO	0728847432	

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No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
9.	Mkaze		farmer	✓		NO	.	[signature]
10.	John Munene		famer		✓	No	0702011491	[signature]
11.	Daniel Ponda		Famer		✓	No	0705331267	[signature]
12.	Marry Kazungu		Famer	✓		No	0701106077	[signature]
13.	Caliste		farmer	✓		NO	—	
14.	MBITHE DOUGLAS		FARMER	✓		No	0705310978	[signature]
15.	Seling		farmer	✓		NO	—	[signature]
16.	MAUREEN SIDI MAPINGA		Farmer	✓		NO	0798502253	[signature]
17.	Lucy Sidi Charo		Farmer	✓		NO	0745541789	[signature]
18.	EUSTINA MASIKA MICHAEL		Farmer	✓		NO	0741169128	[signature]
19.	KANZE JEFA		Farmer	✓		NO	—	[signature]
20.	EUNICE JUMWA KAHINDI		Farmer	✓		NO	0707223151	[signature]

No.	Name	Organization	Designation	Gender F	Gender M	Persons Living With Disability (Yes/No)	Phone No	Signature
21.	Jonathan		Business owner		✓	NO	0725321818	[signature]
22.	Samuel Garama		Pastor		✓		0729343400	[signature]
23.	Rodgers J. Mwambire		Pastor		✓		0727920151	[signature]
24.	JOSEPHINE KANZE			✓		NO	0727437302	[signature]
25.	JOSEPHINE KAHINDI			✓		NO	0711544791	[signature]
26.	Alex Changawa		Farmer		✓	—	0723282224	[signature]
27.	Furaha Gladys		House wife	✓		NO	0746813876	[signature]
28.	EMMANUEL THUVA		farmer		✓	NO	0705192677	[signature]
29.	Dennis Thoya				✓	No	0791417196	[signature]
30.	NASIBU JAPHET				✓	No	0115423553	[signature]
31.	Adam Kahindi		)		✓	No	0795353051	[signature]
32.	KADII MORRIS		farmer	✓		NO	0712018439	[signature]

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Annex 3: Sample questionnaire

ESIA QUESTIONNAIRE - KEY STAKEHOLDERS

Coast Water Works Development Agency (CWWDA) has received funding from the World Bank and the Government of Kenya under the Water and Sanitation Development Project (WSDP) to undertake the Second Baricho-Kakuyuni Pipeline Project. As part of the project, designs, tender and safeguards documentations of a Hybrid Solar-Powered Pumping System at Baricho Water Works are being undertaken.

CWWDA has contracted the Consortium of SARI Consulting LTD in Joint venture with SGAPI Srl and Gath Consulting Engineers (Consultant) to undertake the preparation of designs, safeguard documents (ESIA&RAP), tender documentation and construction supervision for the project.

The proposed interventions include solarization to generate the required combined power of at least 8,345,000W (8.345MW) and appropriate/equivalent solar assembly and accessories. The solarization will be clustered into 5 solar plants located within the Baricho water works to power the respective set of pumps as outlined below;

1. Solar Plant 1 – Malindi pumps (1.604MW)
2. Solar Plant 2 – Mombasa pumps (4.032MW)
3. Solar Plant 3 – Borehole pumps in Pumping Station No. 4 (P4) i.e. Boreholes 1A, 5, 2A and 3A (0.721MW)
4. Solar Plant 4 – Borehole pumps in Pumping Station No. 5 (P5) i.e. Boreholes 4A, 6A, 6B, 7 & 8 (1.436MW)
5. Solar Plant 5 – Borehole pumps in Pumping Station No. 6 (P6) i.e. Boreholes 9, 10 & 11. (0.553MW)

This Questionnaire is intended to ensure there is adequate Consultations & Public Participation (CPP) before implementation of the said project. It is proposed this questionnaire is filled and signed by members of the surrounding community and institutions in the area of the said project, as required by the National Environment Management Authority, NEMA and Bank. You have been selected to participate in this exercise and we would highly appreciate your assistance for responding to all questions in this questionnaire adequately and appropriately as possible. Please fill in the following questionnaire giving in your comments where necessary.

Your response will be treated with confidentiality and will only be used for the purpose of this project.

Respondents' Details

Name:	B AYA SILAS KAITINDI.
Institution:	COAST WATER WORKS DEVELOPMENT AGENCY
Position:	OFFICER IN CHARGE, BARICHO WATER WORKS
Department:	BULK WATER SUPPLY UNIT AND MANAGEMENT

1. What is your proximity to the project area?

Distance	Tick appropriately
Less than 50m	✓
50-100m	
100-200	
More than 200	

2. Are you aware of the proposed interventions in this area for the proposed Solar-Powered System (Hybrid) at Baricho Water Works?

Yes ☑ No ☐

3. Are there any other viable options to this project?

Yes ☐ No ☑

Name them and give reasons.

4. In what way do you think this project will affect the following:

• Normal land use	Positive effects: ① Can convert idle, unused land into productive use. ② Roof top solar reduces pressure on agricultural land.
	Negative: ① Requires clearing vegetation, which can alter local ecosystems and reduce biodiversity ② Restricts future alternative land use

• historical or cultural heritage	Positive: ① If sited carefully, it can help protect heritage sites by controlling access and reducing vandalism Negative: ① Construction may disturb buried artifacts
• hydro-geological (ground-water) or surface water resources	Positive: ① Solar reduces dependence on water-intensive power sources, lowering strain on groundwater and surface water. Negative: ① Altered drainage patterns may cause localized erosion
• General operations of the Baricho Water Works	Positive: ① Reduction on power Pumping bill. ② Solar produces stable power suitable for pumping units.

5. What are the expected POSITIVE environmental and social impacts?

① Reduced Greenhouse Gas Emissions – Cuts reliance on fossil fuels, reducing CO_2 and air pollution
② Noise & air Quality – Very low operational noise and no direct air pollution

6. What are the expected NEGATIVE environmental and social impacts?

① Land use change – Large solar projects may occupy forest land.
② Habitat loss and fragmentation - Clearing vegetation can disrupt ecosystems and wildlife.

7. What suggestions would you make to mitigate any adverse environmental and social impacts?

- Planting and growing of trees in the area affected

8. State any cultural, environmental and social challenges in the project area.

① Temporary Disruptions – Noise dust, and inconvenience nearby residents during construction can

②

(1) Inequality issues:- Benefits may bypass local communities if jobs and power are exported.

9. Give any relevant observations, recommendations or comments on this project.

(1) Employ big percentage of the ~~com~~ unskilled and semi-skilled personnel from the locals during the proj construction.
(2) The project should grow many trees in the area

10. In your conclusion, do you welcome the project in the said area, and why?

Yes [✓] No [ ]

Signature .....

Date 18/08/2025

Annex 4: Chance Find Procedure

Chance find procedures are an integral part of the project ESMMP and works contracts. The following is proposed in this regard:

- If the Contractor discovers archaeological sites, historical sites, remains and objects during excavation or construction, the Contractor shall:
- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;
- Notify the supervisor, Project Environmental Officer and Resident Engineer who in turn will notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less).
- Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.
- Decisions on how to handle the find shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archaeological importance) conservation, preservation, restoration and salvage.
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.
- Construction work may resume only after permission is given from the responsible local authorities or the Ministry of State for National Heritage and Culture concerning safeguard of the heritage.

Annex 5: Social Screening Report