Republic of Kenya
Coast Water Works Development Agency

IMPROVEMENT OF DRINKING WATER AND SANITATION SYSTEMS IN MOMBASA: MWACHE CKE 1103

Preliminary Design, Tender Documents, Safeguards (ESIA and RAP) Reports and Construction Supervision of Mwache Water Treatment Plant

Contract No : CWSB/AFD/MWCE/C/4/2017

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) PROJECT REPORT (ESIA)
ADDENDUM (1) TO THE MWACHE DAM ESIA LICENCE NO NEMA/EIA/PSL/5204

JANUARY 2025

ARTELIA

MIBP CONSULTING ENGINEERS

JANUARY 2025 / 877 3335

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REPUBLIC OF KENYA - COAST WATER WORKS DEVELOPMENT AGENCY

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ABREVIATIONS AND ACRONYMS

AFD	Agence Francaise de Développement
ASALs	Arid and Semi-Arid Lands
AoI	Area of Influence
BoD	Biological Oxygen Demand
CWWDA	Coast Water Works Development Agency
C-ESMP -	Construction – Environment and Social management Plan
CoC	Code of Conduct
CHSMP	Construction Health and Safety Management Plan
DMP	Dust Management Plan
ESAAP	Environment and Social Audit Action Plan
EHS	Environment Health and Safety
EA	Environmental Assessment
EIA	Environment Impact Assessment
EMCA	Environment Management & Coordination Act
ESMP	Environment and Social Management Plan
IFC	International Finance Cooperation
ILO	International Labour Organization
KFS	Kenya Forest Service
H&S	Health and Safety
NEMA	National Environmental Management Authority
NOx	Nitrogen Oxides
Sox	Sulphur Oxides
SGR	Standard Gauge Railway
SML	South Mainland
OSHA	Occupational Health & Safety Act
PDR	Preliminary Design Report
Pm	Particulate Matter
PPE	Personal Protective Equipment
MOWASSCO	Mombasa Water and Sanitation Services Company
NMP	North Mainland
TMP	Traffic Management Plan
VOC	Volatile Organic Compounds
WML	West Mainland
WTP	Water Treatment Plant
WBG	World Bank Group
WRA	Water Resources Authority
WMP	Waste Management Plan

EXECUTIVE SUMMARY

E.1 BACKGROUND & OBJECTIVES

The Mwache Dam Water Supply Project entails:

- An 84m RCC dam on the Mwache river, crest length 526.1m
- A Raw Water Pumping Station, Raw Water Pumping Main, Water Treatment Plant (WTP) with a clear water tank and associated facilities within the vicinity of the Dam with a proposed production capacity of 186,000 m^3/d
- Four Terminal Reservoirs; one for each of the target supply areas (North Main Land, West Main Land, South Main Land and Island); namely
  - Nguu Tatu terminal reservoir, proposed within the existing Nguu Tatu Reservoir Site, serving the North Mainland
  - Changamwe Reservoir, proposed at the existing Changamwe Reservoir Site, serving Mombasa Island
  - Dongo Kundu Reservoir, proposed to be constructed within Dongo Kundu area in Mtongwe, serving the South Mainland
  - West Mainland reservoir, proposed to be located at a100 masl site within the West Mainland, to serve the West Mainland area
- A system of Treated Water Transmission Pipelines, transmitting treated water from the Mwache WTP to the proposed Reservoirs

The MWS&I has secured funds from the Word Bank (WB) and from the Agence Francaise de Développement (AFD), for financing implementation of the various components of the Mwache Dam Water Supply Project. The WB will finance the Dam and possibly the Nguu Tatu, Changamwe and WML reservoirs and their corresponding transmission pipelines. The AFD will finance the WTP & associated facilities, the Dongo Kundu reservoir, the trunk transmission pipeline (common to all the reservoirs) and the pipeline to Dongo Kundu.

The present design and supervision contract consists of the following components: raw water pumping station, raw water pumping main, the water treatment plant and the clear water tank.

E.2 ENVIRONMENT LICENSE VARIATION

The Ministry of Water and Sanitation and Irrigation through the Kenya Water Security and Climate Resilience Project (KWSCRP) (2016) commissioned an Environmental and Social Impact Assessment (ESIA) of the Dam and the Lower Check dam. Further an Environmental Impact Assessment License (NEMA/EIA/PSL/5204) was obtained from the National Environment Management Authority (NEMA) on 18th September 2018 with a validly of 24 months from date of issuance.

This Report presents an Addendum to the ESIA prepared for Mwache Dam and Lower Check Dam. The addendum seeks to include the proposed Water Treatment Plant (WTP) and associated works including Raw Water Pumping Station and the Raw Water Pumping main.

The Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 2003 provides for variation of Environmental Impact Assessment Licenses to include additional scope of works or to renew expired Licenses. Clause 25. (1) provides that where a proponent wishes to vary the terms and conditions on which an Environmental Impact Assessment License has been issued, the holder of the License has to apply for a Variation in Form 9 set out in the First Schedule of the EIA Regulations 2003.

Therefore, this addendum will be used to apply for variation of Mwache Dam Environment License **NEMA/EIA/PSL/5204** to include **additional** scope of the WTP and extend license validity for an additional 24 months.

E.3 PROJECT DESCRIPTION

Table E.1 below presents the design capacity of the Project components as outlined in the Preliminary Design Report (Artelia/MIBP Nov. 2021):

Table E.1: Capacity of Project component

PROJECT COMPONENT			UNIT	CAPACITY
WTP	Design Year	Output production	m^3/day	186,000
	2035	Production losses (backwashing requirements): 5%	m^3/day	9,300
		Input supply capacity	m^3/day	195,300
Storage Tank	**2035**	Storage capacity	m^3	15,000
Raw Water Intake		Design Capacity (excluding the component for irrigation and environmental flows)	m^3/d	195,300
Pumping Stations		Design Capacity	m^3/hr	8,900

E.4 LEGAL AND POLICY REGULATORY INSTRUMENTS

The project is listed under the Second Schedule of the EMCA 1999 cap 387 Legal Notice 31 and 32 of 30th April 2019of which require that an EIA be carried out to identify the environmental impacts, their significance and mitigation measures be proposed. Also, World Bank OP 4.01 on Environmental Assessment requires that such projects be subjected to an environmental impact assessment.

Further, Environmental and Social Risk Management Policy for AFD-funded Operations was also reviewed. The policy provides that any development operation may involve potentially adverse risks, particularly in terms of environmental and social impacts. Consequently, AFD's financing is conditional upon the implementation by the client of continuous and systematic environmental and social assessment procedures to (i) assess the environmental and social impacts of operations, (ii) propose appropriate measures to avoid the negative impacts or, when they are unavoidable, reduce or offset them in an appropriate manner, (iii) monitor the application of such measures during the implementation phase of the operation, and (iv) conduct an ex post evaluation of the effectiveness of the proposed measures.

At ESIA stage detailed analysis of the applicable Acts of parliament was discussed, under this addendum the focus was on statutes discussed on **Table E.2 on Page 3.**

Table E.2: Applicable Policy, Standards and Legal Statutes

STATUTE	REGULATIONS / RULES/ STANDARD/POLICY	Relevance
Environment Management and Coordination Act (EMCA) 1999 Cap 387	• Legal Notice No 101: The Environmental (Impact Assessment and Audit) Regulations, 2003. • Legal Notice No. 19: Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009. • Legal Notice no 120: Water Quality Regulations, 2006. • Legal Notice no 121: Waste Management Regulation 2006 • The Environmental (Impact Assessment and Audit) Regulations, 2003 • Environmental Management and Coordination (Water Quality) Regulations, 2006 • (Waste Management Regulations, 2006 • Noise and Excessive Vibration Pollution (Control) Regulations, 2009 • The Environmental Management and Coordination (Air Quality Regulations 2014) • National Water Quality Standards	The proposed WTP Project including associated works is classified under Medium-risk project in the Second Schedule of EMCA 1999 and thus requires an ESIA. By conducting this ESIA, the project therefore complies with the Act. The Act provides regulations that are discussed in detail in this report
Water Act 2016	• Water Resources Management Rules of 2007	The proposed WTP Project is envisaged to abstract and provide reliable water to residents of Kwale and Mombasa Counties in line with the provisions of this Act.
Occupational Health and Safety Act (OSHA) 2007	Fire Risk Reduction Rules, 2007 Medical Examination Rules, 2005 Safety and Health Committee Rules of 2004 First-Aid Rules, 1977	OSHA is enforced by the directorate of occupational safety and health services (DOSHS). Further, the project contractor will be expected to register the site as a work place with DOSHS and also engaged the directorate in handling work related accidents.
World Bank Environment and Social Standards (ESS)	• (ESS1) Assessment and Management of Environmental and Social Risks and Impacts • (ESS2) Labor and Working Conditions • (ESS3) Resource Efficiency Pollution prevention and Management • (ESS4) Community Health and Safety • (ESS5) Land Acquisition, Restrictions on land Use and Involuntary Resettlement • (ESS6) Biodiversity Conservation and Sustainable Management of Living Natural Resources • (ESS7) Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities • (ESS8) Cultural Heritage • (ESS10) Stakeholder Engagement and Information Disclosure	As provided by the Environmental and Social Framework (ESF), The Environmental and Social Standards (ESSs), are designed to avoid, minimize, reduce or mitigate the adverse environmental and social risks and impacts of projects, the frameworks are discussed in detail in this report under chapter 4
AFD Safeguards Policy	Environmental and Social Risk Management Policy for AFD-funded Operations	The policy provides that any development operation may involve potentially adverse risks, particularly in terms of environmental and social impacts.

E.5 ASSESSMENT PROJECT CONSTRUCTION IMPACTS RELATED TO WTP COMPONENTS

Impact Significance

The assessment characterized magnitude of impact and sensitivity of receptors. A summary of significance of each impact was designated using the matrix given in **Table E-3**.

Table E-3: Impact Significance

		SENSITIVITY OF THE RECEPTOR		
Magnitude of Impact		Low	Medium	High
	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all receptors, and all impacts to these receptors, as the receptor-specific considerations are factored into the assignment of magnitude and sensitivity of the receptor. A summary of impact significance discussed in this report is presented in **Table E-4.**

Table E-4: Impact Significance Assessment

ENVIRONMENTAL / SOCIAL RECEPTOR	PHASE	IMPACT TYPE	SEVERITY RATING	
			BEFORE MITIGATION	AFTER MITIGATION
Impact on Water Resources and storm water infrastructure along the water pipeline alignment	Construction	Direct	Minor	Negligible
Impacts on Soil Resources along the water pipeline alignment	Operation	Direct	Moderate	Minor
Impact on Air Quality on human along the water pipeline alignment	Construction	Direct	Moderate	Negligible
Noise and Vibration Impacts along the water pipeline alignment	Construction	Direct	Minor	Negligible
Impacts on Flora and Vegetation Cover	Construction	Direct	Minor	Negligible
Community Health and Safety	Construction	Direct	Moderate	Minor
Workers Health and Safety	Construction	Direct	Moderate	Minor
Resettlement Impacts	Construction	Direct	Moderate	Minor

A summary of Environment and Social Impacts discussed in this report is provided in **Table E.5** below.

Table E.5: Environment and Social Impacts and Mitigation at Project Construction Phase

RISK	MITIGATION
Impacts on Water Resource	● All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate Waste Management Plan (WMP). ● No hydrocarbon-contaminated water may be discharged to the environment. ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which will include among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Impacts on Soil Resource	● Vegetation clearing and topsoil disturbance will be minimized. ● Contour temporary and permanent access roads / laydown areas so as to minimize surface water runoff and erosion. ● Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means. ● Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. ● Wherever possible construction work will take place during the dry season. ● Topsoil shall be evenly spread across the cleared areas when reinstated. ● Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). ● Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. ● Spread mulch generated from indigenous cleared vegetation across exposed soils after construction ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Impacts on Air Quality	**As general measures for all locations:** ● Develop a Dust Management Plan (DMP); ● Record all dust and air quality complaints, identify cause(s), take appropriate measures; ● Liaise with local communities to forewarn of potentially dusty activities; ● Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter ● Undertake inspections to ensure compliance with the Dust Management Plan; ● Plan potentially dusty activities so that these are located as far from receptors as feasible; ● Erect solid screens if feasible around stockpiles and concrete batching; ● Avoid run off of mud and water and maintain drains in a clean state; ● Remove dusty materials from site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; ● Impose speed limits on haul routes and in construction compounds to reduce dust generation; ● Minimize drop heights when loading stockpiles or transferring materials; and ● Avoid waste or vegetation burning. **For traffic on unpaved roads:** ● Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and ● On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity. **For excavations and levelling** ● Revegetate exposed areas as soon as feasible; ● Revegetate or cover stockpiles if feasible;

RISK	MITIGATION
	● Expose the minimum area required for the works, and undertake exposure on a staged basis to minimize dust blow.
Noise and Vibrations Impacts	● Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable; ● Where practicable noisy equipment will be orientated to face away from the nearest Human settlement and other receptors; ● Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only; ● Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable; ● Where practicable, stationary equipment will be located in an acoustically treated enclosure; ● For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals; ● Throttle settings will be reduced and equipment and plant turned off, when not being used; ● Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.
Impacts on vegetation cover	● Avoidance of impacts should be prioritized. However, if not possible then compensatory planting of trees that will be cut by the contractor during works will be undertaken. ● Vegetation shall only be within the Water Treatment Plant (WTP) only if the vegetation and will interfere with Project construction and/or present a hazard. ● Areas to be cleared shall be agreed and demarcated before the start of the clearing operations to minimize exposure. ● The use of existing cleared or disturbed areas for the Contractor's office, stockpiling of materials etc. shall be encouraged. ● Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible. ● Rehabilitation of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants
Community Health Safety and Security Impacts	● Contractor will develop and monitor the implementation of a Community Health and Safety Management Plan (CHSMP) ● Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. ● Contractor will extend the Worker Code of Conduct to include guidelines on worker – community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the induction process. ● Contractor will provide primary health care and first aid at construction office sites for workers to avoid pressure on local healthcare infrastructures. ● Contractor will implement a Community Grievance Mechanism. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
Worker Health and Safety and Workers Management impacts	● Contractor will develop a Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime, holidays etc. contractor will require its subcontractors to put in place policies in line with national legislation and applicable international legislation and contractor Code of Conduct and Policies. ● Contractor will establish contractual clauses (signed code of conduct) to be embedded in the contracts of the workers and sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights. ● Contractor will prohibit the use of alcohol or drugs, which could adversely affect the ability

RISK	MITIGATION
	of the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment. ● Contractor and sub- contractors will assess the H&S risks related with the tasks to be performed during the construction phase. ● Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting pre-employment medical assessments include a safer working environment, reduction in workplace injuries, minimized downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. The assessment will be done manner to ensure fairness and non-discrimination, is in line with the Employment Act, and the Persons with Disabilities Act ● Contractor will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. ● Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implement sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. The audits will be done by an independent entity approved by the proponent. ● Contractor will develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors. ● Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. ● Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. ● Contractor will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations such as lack of use of PPE. ● Contractor will ensure that IFC/World Bank Health and Safety guidelines regarding the construction and management of worker accommodation and the provisions of medical facilities at worker accommodation are followed. ● Contractor will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations. ● Contractor will develop a Waste Management Plan for the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.
Sexual Exploitation Abuse and Harassment (SEAH)	● Ensure clear human resources policy against sexual harassment that is aligned with national law ● Integrate provisions related to sexual harassment in the employee COC ● Ensure appointed human resources personnel to manage reports of sexual harassment according to policy ● The Contractor shall require his employees, sub-contractors, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse ● The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: - effective and on-going community engagement and consultation, particularly with women and girls; - Review of specific project components that are known to heighten GBV risk at the community level, e.g., compensation schemes; employment schemes for women; etc.

RISK	MITIGATION
	● the contractor shall develop specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment; etc. ● The contractor will ensure adequate referral mechanisms for Project Workers are in place and if a case of GBV is at the community level appropriate action/advice will be taken.
	● Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). ● The SEA action plan will include how the project will ensure necessary steps are in place for: - Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level Information Education and Communication (IEC) materials; - Response to SEA: including survivor-cantered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ● Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.
HIV/AIDs	● Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS and sexual health and rights through staff training, awareness campaigns, multimedia and workshops or during community Barazas. ● Use existing clinics to provide Voluntary Counselling Centres (VCT) services to construction crew ● Ensure safety of women and girls in provision of VCT services.

E.6 CUMMULATIVE IMPACTS ASSESSMENT

Definition

The assessment of cumulative impacts is a long-established requirement for any comprehensive ESIA. For the purposes of this Proposed Project, the IFC Performance Standards and IFC Good Practice Note: Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets have been used as a primary reference source. IFC PS12 defines cumulative impacts as:

"…impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted".

The impacts of the Proposed Project thus need to be considered in conjunction with the potential impacts from other future developments or activities that are existing, planned or reasonably defined, and are located within a geographical scope where potential environmental and social interactions could act together with the Proposed Project to create a more or less significant overall impact.

The concept of Valued Environmental and Social Components (VECs)

The Cumulative Impact Assessment Good Practice Handbook was issued by the IFC in August 2013. This Handbook supplements the IFC PS1 and its Guidance Note, providing further guidance on the practical assessment of cumulative impacts, recognizing some of the uncertainties and constraints faced by private sector proponents. It also introduces the concept of Valued Environmental and Social Components (VECs), which are environmental and social attributes that are considered to be important in assessing risk and can include:

- Physical features;
- Wildlife populations;
- Environmental processes;
- Ecosystem conditions (e.g. biodiversity);
- Social conditions (e.g. health, economics); or
- Cultural aspects.

Existing, Planned or Reasonably Defined Developments

A number of sources were reviewed to establish whether there is existing, planned or reasonably defined developments that are located within a geographical scope where potential environmental and social interactions could act together with the Proposed Project to create a more or less significant overall impact.

- Mwache Multi-Purpose Dam Project
- Mombasa Southern Bypass Highway Project
- the special economic zone development project at dongo kundu
- 800mw Liquefied Natural Gas (LNG) Power Plant at Dongo Kundu
- Storm Water Drainage System that will cover Mvita, Changamwe, Jomvu, Kisauni, Nyali and Likoni Sub Counties
- North Mainland Transmission Line Project

Evaluation of Cumulative Effects on VECs

Evaluation of cumulative effects takes into consideration the potential impacts that could be generated by the Project and adds those generated by identified past, existing and future projects. This evaluation will be realized through the analysis of the various projects' effects on each of the VECs.

Table E.6: Assessment of VECs and Cumulative Impacts Implication

#	VECs	Impacts	Consideration
1	Water Resources	• Transport of exposed or disturbed soils towards water courses during rain events • Accidental spills and leaks from machinery and vehicle operations or associated with inadequate management of hazardous products and wastes • Contamination risk through excavation site exposing groundwater • Groundwater extraction for construction and operation requirements	Some cumulative effect may be anticipated. However, with the application of the standard and specific mitigation measures presented in this chapter, the overall residual cumulative impact should remain moderate to minor.
2	Soils	Affecting soil stability in steep areas during land clearing, soil movements which could generate or accentuate existing erosion.	With the application of the standard measures presented in this section overall cumulative effect would be no greater than moderate.
3	Terrestrial Habitat	• Loss of non-critical terrestrial habitat through development of the project within the existing right-of way and implementation of temporary construction facilities and new borrow pits; • Potential spread of invasive species and alteration of local conditions that will alter vegetation composition;	Cumulative effect is anticipated. However, considering the existing level of degradation of terrestrial habitat, the overall residual cumulative impact should be minor.
4	Terrestrial Fauna	Habitat degradation or modification through construction work. With the mitigation measures, the magnitude of the residual impacts was identified as minor.	Cumulative effect is anticipated. However, considering the existing level of degradation of terrestrial habitat, the overall residual cumulative impact should be minor.
5	Community Relations and Social Justice	Past, present and future projects may contribute to perpetuating women economic dependency, increase gender-based violence, heighten the number of single mothers, increase the prevalence of HIV/AIDS and STIs, and cause or exacerbate land use and compensation disputes. In addition, they may trigger community tensions and conflict.	The application of mitigation measures outlined in this section 8.4.3 should ensure that most residual cumulative impacts on gender, and community relations remain of moderate magnitude.

E.7 STATUTORY REQUIREMENTS PRE-COMMISSIONING OF THE WTP

A summary of the statutory requirements that Coast Water Works Development Agency (CWWDA) will confirm priori to pre-commissioning of Project Components are listed in **Table E.7** below.

Table E.7: Statutory Requirements Prior to Pre-commissioning of the Project Components

ACTIVITY	REQUIREMENT	CONFORMITY MEASURE
Registration of the Water Treatment Plant as a Workplace with DOSHS	OSHA 2007 requires that any workplace with more than 7 employees should be registered as a workplace	*Register the Proposed Mwache Water Treatment Plant as Workplace with DOSHS*
Duties Of Occupiers (Legal Requirements)	• Risk Assessment • Safety and Health Audit • Fire Safety Audit • Initial Environment Audit	*Undertake Risk Assessment, Safety and Health Audit and Fire Safety Audit for Mwache Water Treatment Plant.*
Management of Polices required at the Water Works	Policies Required: • Safety & Health Policy • Fire Safety Policy • Environment Policy	*Prepare Safety & Health Policy, Fire Safety Policy and Environment Policy Mwache Water Treatment Plant.*
Water Works Personnel Trainings Required	Training required: • Statutory: Fire marshal training	*Establish of Health and Safety Committee for Mwache Water Treatment Plant and train them on;* • *Statutory Fire marshal training* • *Statutory First Aid Training* • *Statutory Safety and Health Committee training on Occupational Health and Safety (OSH)* • *Regular provision of personnel at the T/Works with Appropriate (PPEs)*
	Training required: • Statutory: First Aid Training	
	Training required: • Statutory: Safety and Health Committee	

E.8: ESMP DURING OPERATION OF THE WTP

A summary of statutory Environment and Social Impacts and Mitigation at Project Operation Phase is given in **Table E.8** below.

Table E.8: Environment and Social Impacts and Mitigation at Project Operation Phase

ACTIVITY FIELDS	REQUIREMENT	RELEVANT ACT (CLAUSES)
Approval, Authorization and Permits	CWWDA should apply and renew water Abstraction permit for Mwache Water Treatment Plant from WRA, activities under in are listed under the Sixth Schedule of the Rules.	Water Rules 2007: Part II - Approval, Authorization and Permits
Control of Pollution and Water Quality Requirements	**Management of Reagents** For Mwache Water Treatment Plant, the design provides well ventilated and proper lighting chemical storage house. Further, personnel handling the reagents will be provided with appropriate PPEs such as gloves, nose masks and googles to protect them from the chemical. Also, procurement of reagent will be done in batches with enough doses to eliminate the risk of some of the reagent expiring therefore requiring disposal. **Management of Sludge** The design provides for sludge drying beds, the beds provided allow for sludge dewatering and allow for easy handling and evacuation, options prided include, Disposal to a sanitary landfill or collected by entities manufacturing fertilizers.	Water Rules 2007: Part V Water Quality Monitoring and Effluent Discharge
Water Use Charges	A master meter has been installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA)	PART VIII – Water Use Charges
Conservation of Riparian	The Water Rules 2007, Part (ix) on Conservation of Riparian and Catchment Areas regulation 120. (1) provides that for the purposes of conserving the catchments and riparian areas, the authority may by order or state as a condition on an authorization or permit, require a person to prepare and conform to a Soil and Water Conservation Plan (SWCP). In compliance with this regulation, a forestation program in liaison with Kenya Forest Services (KFS) will be initiated within the WTP and dam peripheries. Plant Operator will upscale this initiative after commissioning of the Plant.	PART IX - Conservation of Riparian and Catchment Areas

E.7 CONCLUSION

A summary of ESIA Addendum conclusion is presented below.

- The Ministry of Water and Sanitation and Irrigation through the Kenya Water Security and Climate Resilience Project (KWSCRP) (2016) commissioned an Environmental and Social Impact Assessment (ESIA) of Mwache Dam and the Lower Check dam.
- Further an Environment License (NEMA/EIA/PSL/5204) was obtained on 18th September 2018 with a validly of 24 months from date of issuance.
- CWWDA has secured funds from AFD towards the cost of constructing Proposed Mwache Water Treatment Plant (WTP) designed to have an output of 186,000 m^3/d. The Environment License NEMA/EIA/PSL/5204 secured for Mwache Dam did not include the proposed Mwache WTP and associated components.
- CWWDA has therefore instructed us to prepare and Addendum to the ESIA that was done for proposed Mwache Dam and further apply for variation of Environment License to include the WTP and associated Components.
- The addendum discusses the environment and social impacts related to the proposed Water Treatment Plant (WTP) and associated components.
- Therefore, this addendum will be used to apply for variation of Mwache Dam Environment License NEMA/EIA/PSL/5204 to include additional scope of the WTP and extend license validity for an additional 24 months.
- The proposed Water Treatment Plant (WTP) is located within Kasemeni Location of Kinango Sub-County in Kwale County. The site is located within Land already acquired under Mwache Dam at GPS Coordinates -3.970346^0 and 39.508029^0. The Land has been acquired under ongoing Mwache Dam Resettlement Program undertaken by National Lands Commission (NLC) on behalf of Project Management Unit (PMU) of the Kenya Water Security and Climate Resilient Project (KWSCRP)
- This implies that Land Acquisition as an impact will not be triggered by proposed Water Treatment Plant (WTP)
- Through government resettlement program under Mache Dam Project, all Project Affected Persons (PAPs) have been relocated from the site, this implies that no direct socio economic negative impacts will be triggered to community as a result of construction of the WTP. However, indirect and cumulative impacts to villages outside the WTP site will be triggered as discussed in Chapter 5 of this addendum, such villages include; Mwatate, Mataa, Gandini, Mwavumbo, Fulugani and Mazeras
- The addendum has discussed WTP construction impacts on Physical Resources and Receptors including, impacts on water resources, Impacts on Soil Resources, Impacts on Air Quality, Impacts related to noise and excessive vibrations. Further the addendum has discussed impacts on biological resources including fauna and Flora and finally discussed impacts on health and safety to workers and community members including; SEA/SH, GBV and spread of communicable diseases such as HIV and Covid 19.
- At operation phase the addendum has discussed pre-commissioning statutory requirements to be complied with by CWWDA including; Approval, Authorization and Permits by WRA, need for Control of Pollution and Water Quality Requirements, Water Use Charges and Conservation of Riparian, Registration of the Water Treatment Plant site as a Workplace with DOSHS, Duties Of Occupiers (Legal Requirements), Management of Polices required at the Water Works and Water Works Personnel Trainings Required
- Finally, operation impacts and mitigation measures have been discussed in relation to Management of Backwash Water, Reagents and Sludge from the WTP, management of and domestic sewerage, Erosion Control at Washouts, fencing of the WTP, maintaining Aesthetic and Hygiene and commissioning Afforestation Program.

E.8 PROVISIONS

The ESIA addendum makes below listed provisions.

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment provides a budget of **Kenya Shillings Six Million, Nine Hundred and Fifty Thousand (Kshs 6,950,000.00** for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporate the Environment, Social provisions discussed under Chapter 8 (Environment and Social Impact Assessment and Mitigation Measures).
- The Project Contract Document should include provisions for the Contractor to prepare and implement the Construction Environmental and Social Management Plan (C-EMSP). Annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/AIDS Prevention Strategy. The contractors will be required to engage services of a qualified Environment, Health and Safety Officer and a Social Safeguards Officer at the time of Project implementation.
- At Project implementation stage, the contractor will prepare periodic Environmental and Social Implementation Reports to be approved by the supervising engineer. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an occupational Health and Safety approach, the Contractor will undertake the following; OSH risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment.
- At Project completion stage, within the Defects Liability Period, Coast Water Works Development Agency (CCWDA) will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Project implementation stage.

MAIN REPORT

1. INTRODUCTION

1.1. GENERAL

Mombasa is the second largest city in Kenya, after Nairobi, which is the Capital City of Kenya. Based on the 2019 Population Census, Mombasa had a population of 1,208,000 people. The city acts as a major gateway to the Country and the larger Eastern African region, hosting a major port and an International Airport. Mombasa is also a major tourist hub, key to the coastal tourism industry.

The Mwache Dam Water Supply Project entails the following components:

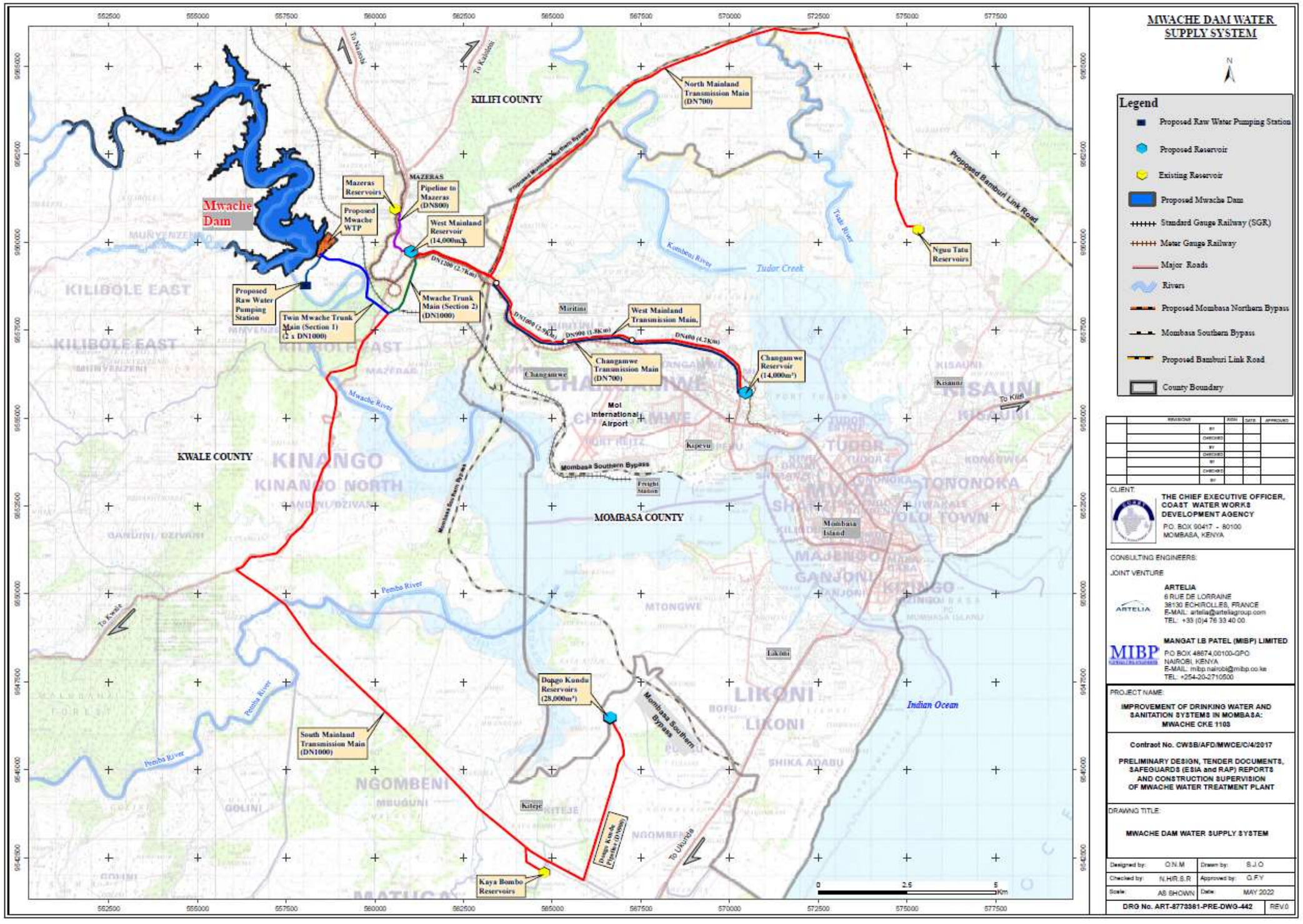
- An 84m RCC dam on the Mwache river, crest length 526.1m
- A Raw Water Pumping Station, Raw Water Pumping Main, Water Treatment Plant (WTP) with a clear water tank and associated facilities within the vicinity of the Dam with a proposed production capacity of 186,000 m^3/d
- Four Terminal Reservoirs; one for each of the target supply areas (NML, WML, SML and Island); namely
    - Nguu Tatu terminal reservoir, proposed within the existing Nguu Tatu Reservoir Site, serving the North Mainland
    - Changamwe Reservoir, proposed at the existing Changamwe Reservoir Site, serving Mombasa Island
    - Dongo Kundu Reservoir, proposed to be constructed within Dongo Kundu area in Mtongwe, serving the South Mainland
    - West Mainland reservoir, proposed to be located at a100 masl site within the West Mainland, to serve the West Mainland area

- A system of Treated Water Transmission Pipelines, transmitting treated water from the Mwache WTP to the proposed Reservoirs, including Trunk Main, Transmission Main to Dongo Kundu Reservoir in South Mainland, Transmission to Nguu Tatu Reservoirs in the North mainland and Transmission Main to the West Mainland service area and Changamwe Reservoirs.
- Sanitation for SML
- Capacity building for Mombasa Water Supply and Sanitation Company (MOWASSCO)

A Location Plan of the proposed components of the Mwache Dam Water Supply System is shown in **Figure 1-1 on Page 2.**

CWWDA and MWS&I have secured funds from the Word Bank (WB) and from the Agence Francaise de Développement (AFD), for financing implementation of the various component of the Mwache Dam Water Supply Project. The WB component will finance the Dam and possibly part of the Trunk Main, West Mainland Reservoir as well as Nguu Tatu and Changamwe transmission pipelines and their corresponding reservoirs. The AFD component will finance the WTP & associated facilities, a section of the trunk main up to the Dongo Kundu Pipeline Offtake, the transmission pipeline to Dongo Lundu and the Dongo Kundu reservoir. A Schematic Diagram showing the proposed project components of the Mwache Dam Water Supply System and their respective financing agencies is given in **Figure 1-2 on Page 3.**

Figure 1-1: A Location Plan of the Proposed Components of the Mwache Dam Water Supply System



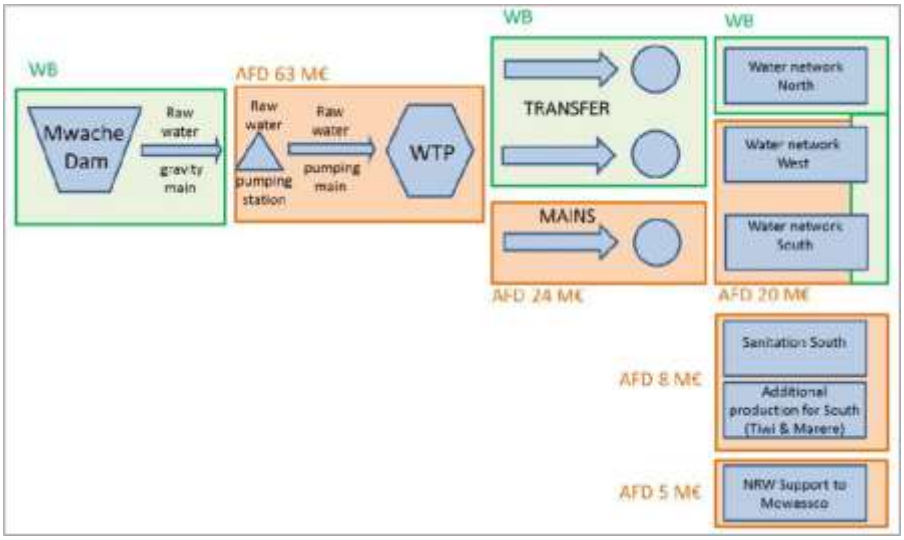


***Figure 1-2:** Components of the Mwache Dam Project and respective Financing Agencies*

Source: AFD Mission Aide-Memoire, June 2021

Although the construction of part of the trunk main and the North Mainland and West Mainland Water Transmission Pipelines and their corresponding reservoirs is likely to be financed by the WB, their Design and Construction Supervision is included in the Mwache Transmission Lines Consultancy Contract funded by the AFD.

The overall Mwache Dam Project as planned by Coast Water Works Development Agency (CWWDA) also includes a Water Distribution component, to be financed by both the WB and the AFD. This component will ensure that water produced under the Mwache Dam Project will reach the end consumers within Mombasa County and partially in Kwale County.

The Dam Construction Contract was signed on 14th August 2019 between the Ministry of Water and Sanitation and Irrigation (MWSI) Kenya Water Security and Climate Resilience Project (KWSCRP) and the successful bidder. Pre-construction activities are in progress. The RAP implementation is ongoing, at advanced stages. Preparations to commence construction works are ongoing.

1.2. ENVIRONMENT LICENSE VARIATION

The Ministry of Water and Sanitation and Irrigation through the Kenya Water Security and Climate Resilience Project (KWSCRP) (2016) commissioned an Environmental and Social Impact Assessment (ESIA) of the Dam and the Lower Check dam, and an **Environmental Impact Assessment License (NEMA/EIA/PSL/5204)** was issued by NEMA **on 18th September 2018** with a validly of 24 months from date of issuance.

This Report presents an Addendum to the ESIA prepared for Mwache Dam and Lower Check Dam. The addendum seeks to include the proposed Mwache Water Treatment Plant (WTP) and associated Components.

The Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 2003 provides for variation of Environmental Impact Assessment Licenses to include additional scope of works or to renew expired Licenses. Clause 25. (1) Provides that where a proponent wishes to vary the terms and conditions on which an Environmental Impact Assessment License has been issued, the holder of the License has to apply for a Variation in Form 9 set out in the First Schedule of the EIA Regulations 2003. Therefore, this addendum will be used to apply for variation of Mwache Dam Environment License **NEMA/EIA/PSL/5204** to include additional scope of the WTP and extend license validity for an additional 24 months.

2. PROJECT DESCRIPTION

2.1 WATER DEMAND AND CAPACITY OF THE WTP

2.1.1 Water Demand

Analysis and updating of the projected water demand for Mombasa city has been carried out under the "Mwache Water Transmission Pipelines and Terminal Reservoirs" contract and presented in the Design Criteria report under that contract. The summary of the results of this update are presented here below:

Table 2.1: Adopted Water Demand and the Proposed Re-Allocation of Water Supply for Mombasa City

	UNIT	SUPPLY AREA				TOTAL
		WEST MAINLAND	MOMBASA ISLAND	SOUTH MAINLAND	NORTH MAINLAND	
Updated demand, Year 2035	**m^3/day**	**82,675**	**38,974**	**67,921**	**127,965**	**317,535**
Source of Water		Mwache Dam/ Mzima Springs	Mwache Dam	Mwache Dam	Mwache Dam/ Baricho Wellfields	
Terminal Reservoir		West ML Tank / Mazeras Tanks	Changamwe Tanks	Dongo Kundu Tank	Nguu Tatu Tanks	
Supply from Mwache Requirements	m^3/day	31,176	38,974	67,921	43,929	182,000
Supply from Mwache Design basis	**m^3/day**	**31,200**	**39,000**	**67,900**	**43,900**	**182,000**
Supply from Mzima	m^3/day	51,499	-	-	-	51,499
Supply from Baricho	m^3/day	-	-	-	84,036	84,036
Total Daily Supply	**m^3/day**	**82,675**	**38,974**	**67,921**	**127,965**	**317,535**

**Note: Proposed Water Supply component to the South Coast (Kwale County) from the Mwache Dam (4,000 m^3/d according to Kwale Water Supply Master Plan, EGIS, 2018) has been excluded from the above table.*

2.1.2 Capacity of Project Components

The Table below present the design capacity of the different project component under the Mwache WTP:

Table 2.2: Capacity of Project Component

PROJECT COMPONENT			UNIT	CAPACITY
WTP	Design Year	Output production	m^3/day	186,000
	2035	Production losses (backwashing requirements): 5%	m^3/day	9,300
		Input supply capacity	m^3/day	195,300
Storage Tank	**2035**	Storage capacity	m^3	15,000
Raw Water Intake		Design Capacity (excluding the component for irrigation and environmental flows)	m^3/d	195,300
Pumping Stations		Design Capacity	m^3/hr	8,900

2.2 RAW WATER PUMPING STATION (RWPS)

The RWPS will be located along Mwache river, downstream of the proposed Mwache Dam (approx. 0.5Km) as illustrated in **Figure 2-1** below.

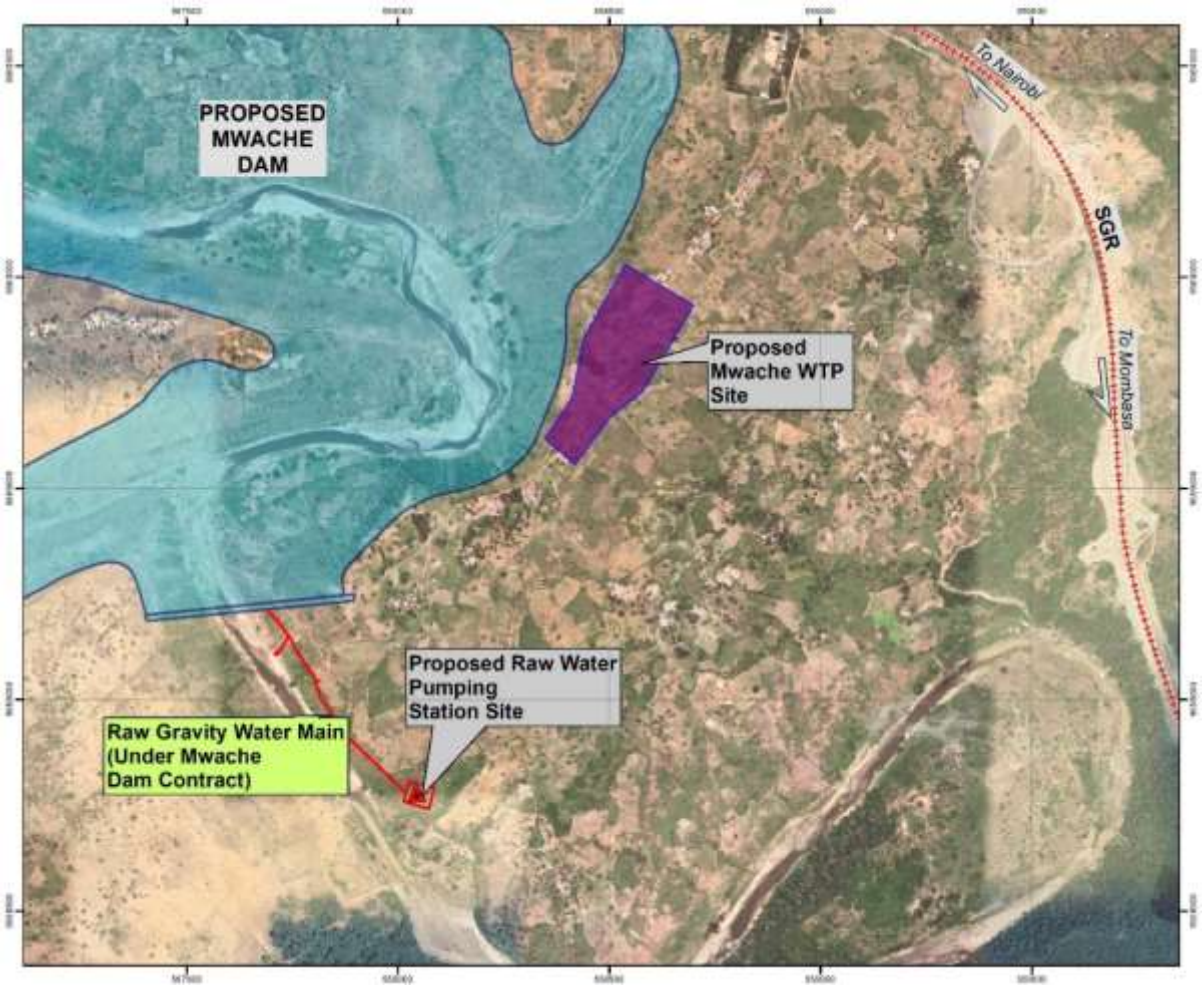


Figure 2-1: Location of Proposed Site for Raw Water Pumping Station

The scope of works for the Mwache WTP Contract commences at the pumping station inlet. The Dam Contractor shall construct the raw water gravity main from the Dam to the boundary of the site of the Raw Water Pumping Station (RWPS) and shall install a blank flange at the pipeline end.

The proposed arrangement for the raw water abstraction, pumping system to Mwache WTP including the limitation of scope for each of the adjoining Contracts is illustrated in the **Figure 2-2**.

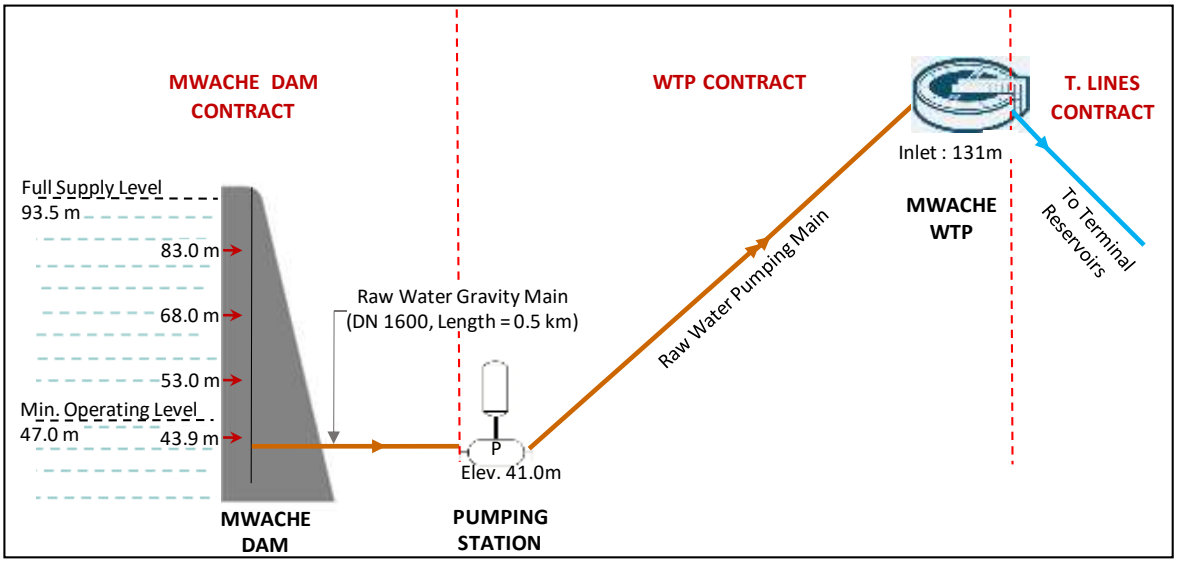


Figure 2-2: Mwache Dam Raw Water Abstraction and Pumping System

The design of the RWPS shall be finalised by the Contractor. Based on Preliminary designs prepared in the current consultancy assignment, the RWPS design parameters are summarized as follows:

Discharge: The design capacity is 8900 m^3/h. To meet the variable raw water needs of the WTP, the RWPS must also be able to supply 25%, 50% and 75% of the full capacity.

Total Dynamic Head (TDH): Varies:

- From the minimum TDH (frequent): 44 m
- To the maximum TDH (exceptional): 90 m

Number of Pumps: Six (6) pumps each of 2,225 m^3/h, the maximum discharge of 8,900 m^3/h being provided by four pumps and the minimum discharge of 2,225 m^3/h by one pump.

Type of Pumps: Single Stage - Axially Horizontal Split Case - Double Suction Pumps with a double Volute Casing.

Pump operation: To use variable speed drives

Pumping set efficiency:

- Pump: 80% minimum
- Motor: IE3 class

Footprint requirements: 100m wide by 120m length

Other facilities to be provided:

- Transformer Area
- Plant Manager Office
- Operators' office
- Kitchenette
- Store
- Car parking area
- Washroom facilities & changing rooms
- Guard house

2.3 RAW WATER PUMPING MAIN (RWPM)

The raw water pumping main route will majorly be along an access road which will be constructed by the Dam Contractor. The distance from the RWPS to the WTP is short (approximately 1.7Km) and there is nothing strategic in the selection of the pipeline alignment. The final alignment will be determined by the Contractor. The tentative alignment of the Raw Water Pipeline is given in **Figure 2-3.**

Hydraulic design of the RWPM shall be finalised by the Contractor. Based on Preliminary designs prepared in the current consultancy assignment, the RWPM design parameters are summarized as follows:

- Discharge - 2.50 m^3/s
- Number of Pipelines - two (twin) – 2 x 1100 mm
- Pipe material - Steel or Ductile Iron
- Design Equation - Colebrook-White
- Roughness coefficient - 0.5 mm
- Max. Velocity - 1.5m/s

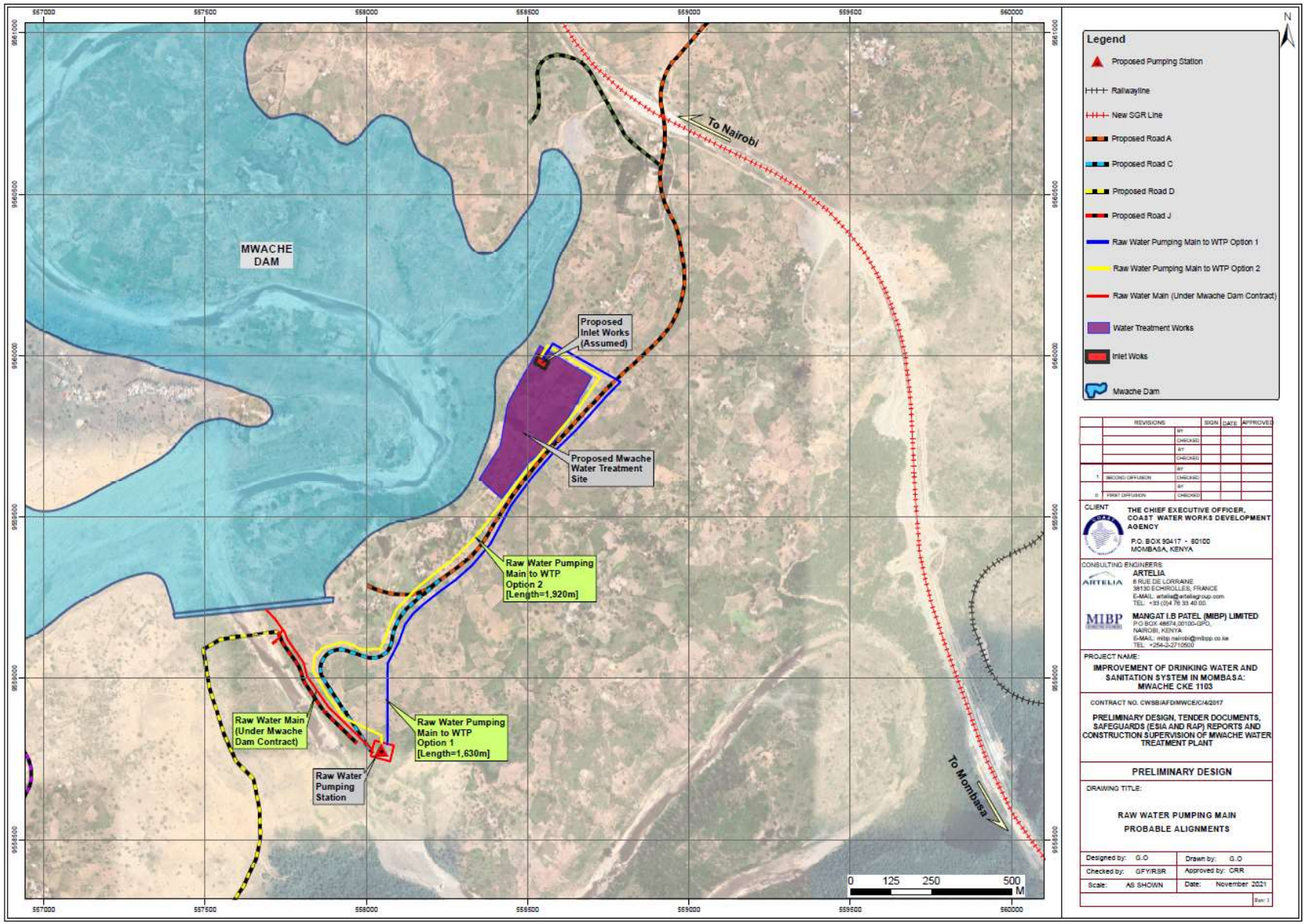


Figure 2-3: Proposed Alignment of Raw Water Pumping Main

2.4 WATER TREATMENT PLANT

2.4.1 Design Data

Capacity design of the WTP is as follows:

- Outlet capacity (total production): 186,000 m^3/day
- Inlet capacity (Raw water inflow): 195,000 m^3/day

As a safe design, water production will be designed on 22 hours of operation which is an equivalent of an hourly flow of raw water of 8,877 m^3/h **rounded to 8,900 m^3/h.**

The plant will be designed with 4 treatment lines. Each line will thus have a capacity of 2,225 m^3/h.

The table below summarizes the raw water quality and treated water quality inputs for WTP design:

Table 2.3: Final Proposed Water Quality Design Input Values

PARAMETER	UNIT	PROPOSED RAW WATER QUALITY VALUES	PROPOSED TREATED WATER QUALITY VALUES
Colour	True Color Units	10	**≤15**
Taste and odour		-	**Acceptable to users**
Suspended matter		15	**Nil**
Oil & Grease	mg/L	7	**-**
Physico-chemical limits			
Turbidity	NTU	30 average 100 peak	**0,5**
Conductivity	µS/cm	1500	**1500**
Total Dissolved Solids (TDS)	mg/l	750	**<500**
Total Suspended Solids	mg/l	35	**-**
Hardness as $CaCO_3$	mg/l	400	**500**
Salinity	mg/l	600	**-**
Dissolved oxygen	mg/l	6	**-**
Aluminium (Al)	mg/l	-	**0,1**
Chloride (Cl)	mg/l	250	**250**
Copper (Cu)	mg/l	-	**0,1**
Iron (Fe)	mg/l	1,5	**0,3**
Manganese (Mn)	mg/l	0,05	**<.0.05**
Sodium (Na)	mg/l	-	**200**
Sulphate (SO_4)	mg/l	40	**<250**
Zinc (Zn)	mg/l	-	**5**
pH		6,5 – 8,4	**6,5 – 8,5**
Magnesium (Mg)	mg/l	50	**100**
Chlorine	mg/l	0	**0,2 – 0,5**
Calcium (Ca)	mg/l	90	**250**
Ammonia (N)	mg/l	1	**0,5**
Phosphate (P)	mg/l	0,11	**-**
Fluoride (F)	mg/l	-	**1,5**
Arsenic (As)	mg/l	-	**0,01**

PARAMETER	UNIT	PROPOSED RAW WATER QUALITY VALUES	PROPOSED TREATED WATER QUALITY VALUES
Cadmium (Cd)	mg/l	-	**0,003**
Lead (Pb)	mg/l	-	**0,01**
Mercury (Total Hg)	mg/l	-	**0,001**
Selenium (Se)	mg/l	-	**0,01**
Chromium (Cr)	mg/l	-	**0,05**
Cyanide (CN)	mg/l	-	**0,01**
Phenolic substances	mg/l	-	**0,002**
Barium (Ba)	mg/l	-	**1,3**
Nitrates (NO_3)	mg/l	2	**10**
Limits for organic constituents			
Organic Matter by KMnO4	mg/l	15	**-**
Chl-a	mg/l	650	**-**
Benzene	µg/l	-	**10**
Chlorophenols	µg/l	-	**10**
Polynuclear aromatic hydrocarbons	µg/l	-	**0,01**
Trihalomethanes Chloroform	µg/l	-	**300**
Limits for radioactive materials			
Gross alpha activity	Bq/l	-	**0,1**
Gross beta activity	Bq/l	-	**1**
Microbiological limits			
Total Viable counts at 37°C	MPN/ml	2000	**100**
Coliform	MPN/250 ml	1000	**Nil**
E.Coli	MPN/250 ml	1000	**Nil**
Staphylococcus aureus	MPN/250 ml		**Nil**
Sulphite reducing anaerobes	MPN/50 ml		**Nil**
Pseudomonas aeruginosa fluorescence	MPN/250 ml		**Nil**
Streptococuus faecalis	MPN/250 ml		**Nil**
Shigella	MPN/250 ml		**Nil**
Salmonella	MPN/250 ml		**Nil**

2.4.2 Water Treatment Line

Figure 2-4 below summarizes the recommended waterline for Mwache WTP Project

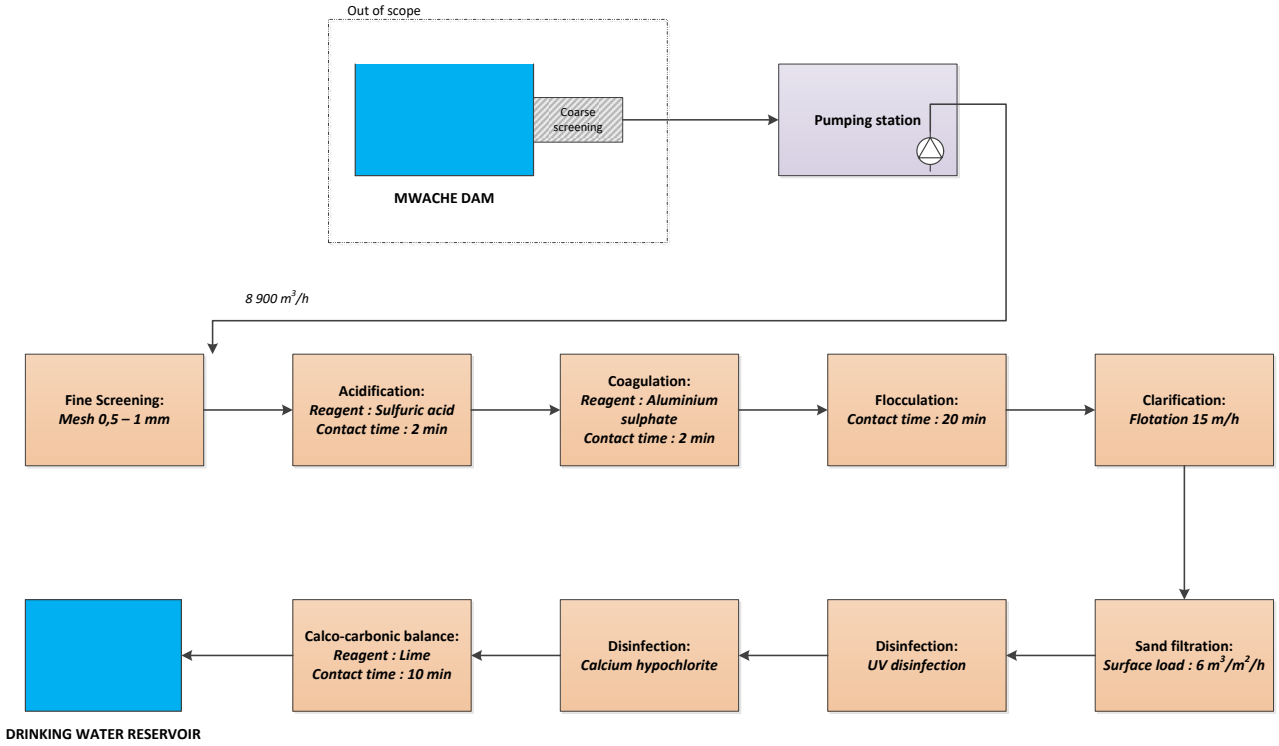


Figure 2-4: Water Treatment Line

The proposed water treatment process is briefly discussed as follows:

Table 2.4: Selected Water Treatment Process Units

PROCESS UNIT	*FUNCTION*
Pumping station	to raise water from Dam to WTP
Fine screening	to remove small particles before clarification
Acidification with sulfuric acid	to adjust pH prior to clarification in order to improve its efficiency
Chlorine (shock chlorination)	Only for intermittent use
Flocculation with polymer	Coagulant aid: Gather solidly between the particles that can be eliminated by the clarifier
Flotation	Eliminate by flotation flocs formed by the flocculation and produce a clarified water whose turbidity is lower to 5 NTU
Rapid Sand Filtration	It will reduce the residual turbidity below 0.5 NTU.
UV disinfection	Elimination of the pathogen germs and cysts (Giardia and cryptosporidium)
Calco-carbonic balance - Soda	Correct the pH of water distributed. Slightly over the saturation pH it provides a protective layer on networks and facilities
Final chlorination:	The residual chlorine content in the treated water will keep a permanent disinfecting agent in the distribution network.

2.4.3 Sludge Line

Figure 2-5 below summarizes the proposed sludge line for Mwache WTP .

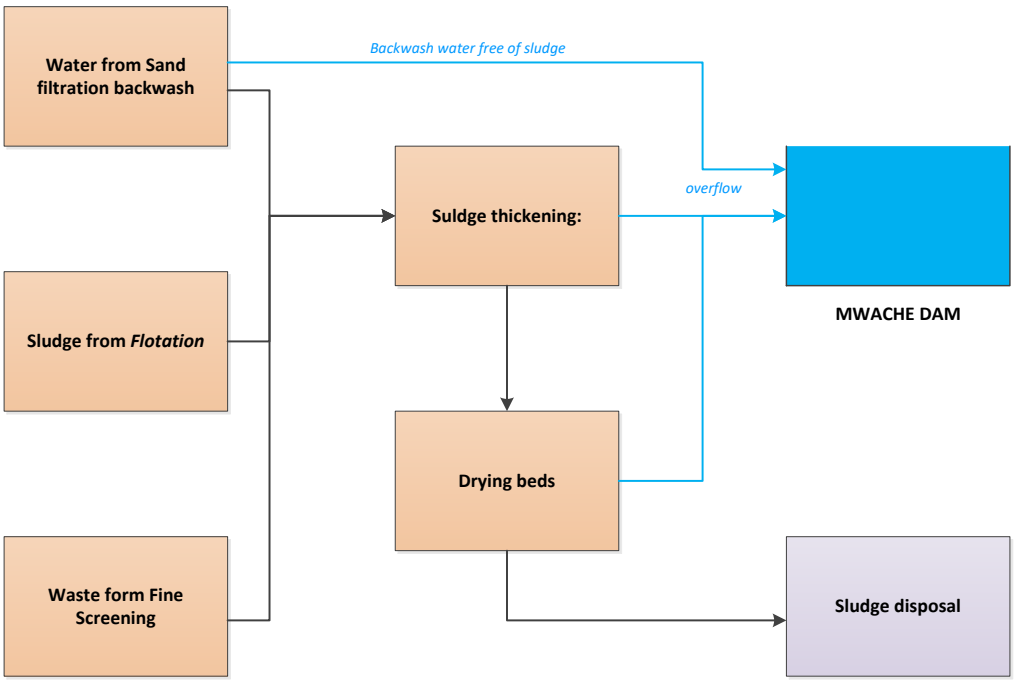


Figure 2-5: Sludge Treatment Line

2.4.4 Water Discharge

Artelia/MIBP recommends designing the discharge for return into the Mwache Dam for by-pass and treated backwash water. This discharge pipe should then allow for the total Water Treatment plant design flow: 195,000 m^3/d and 8 900 m^3/h.

2.4.5 Preliminary Layout of the Water Treatment Plant

The final layout of the Mwache WTP will be finalised by the Contractor in compliance with the Employer's requirements. The tentative general and site layout plans are given in **Figure 2-6** and **Figure 2-7**.

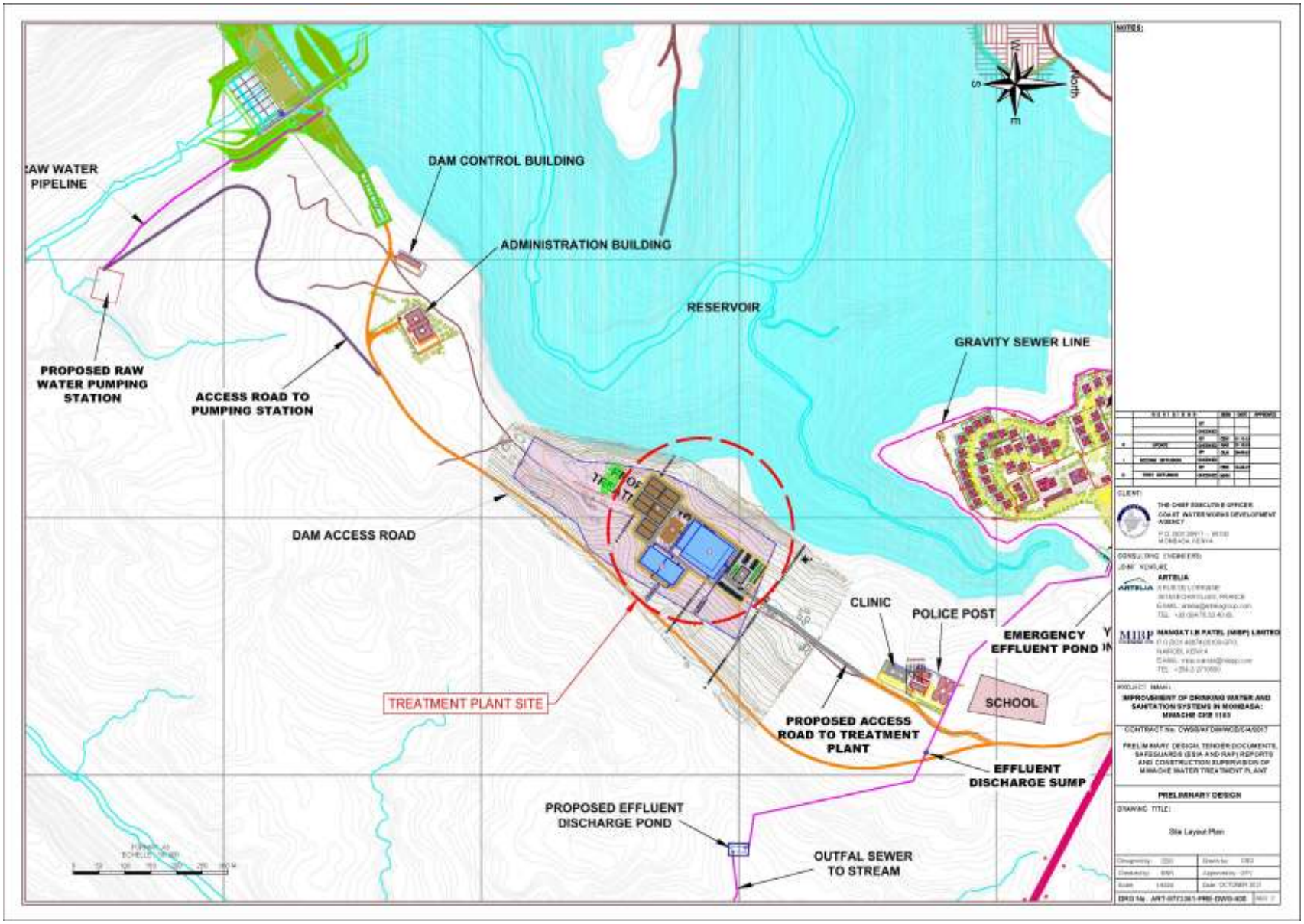


Figure 2-6: General Layout Plan for Mwache WTP

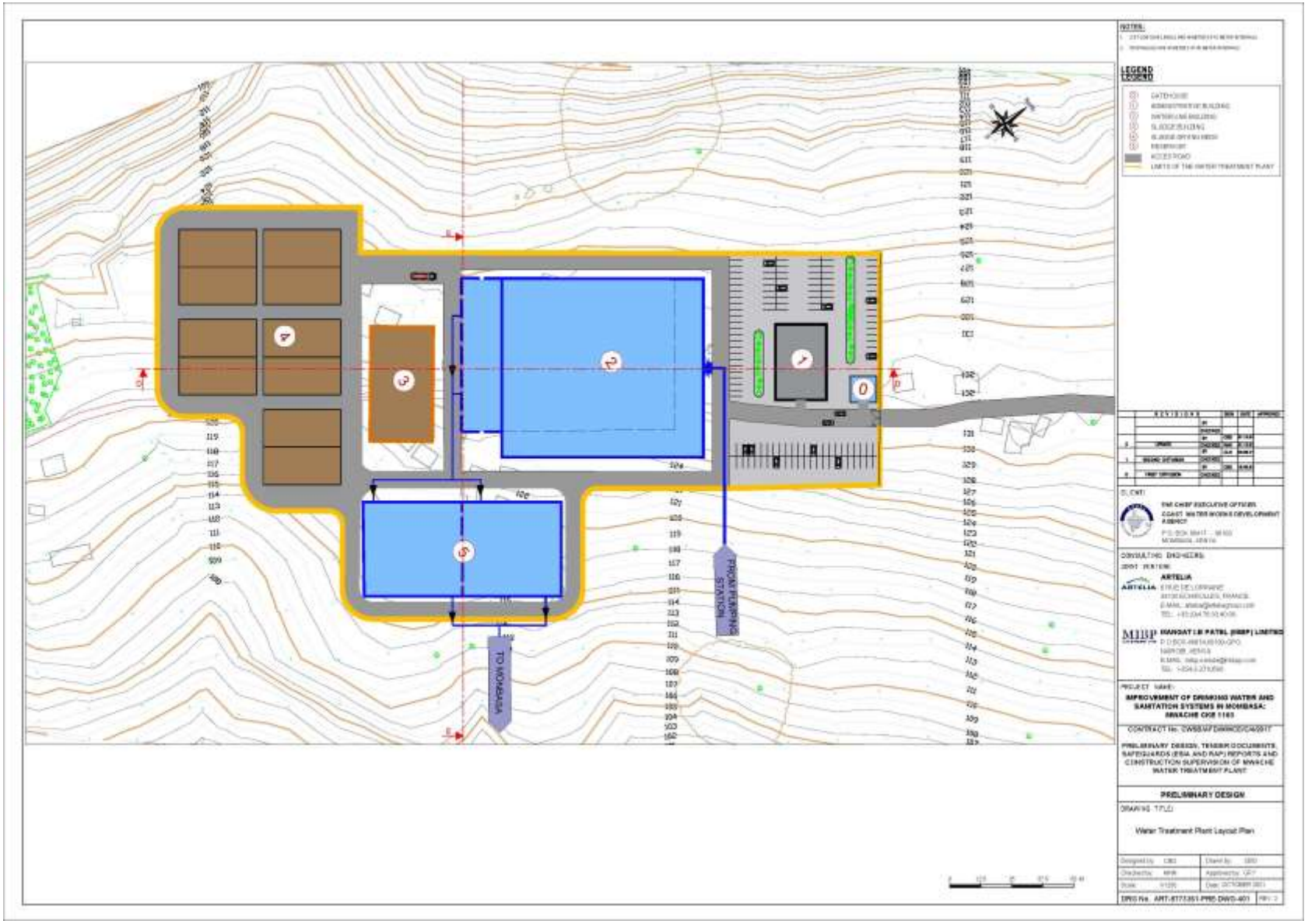


Figure 2-7: Water Treatment Plant Site Layout Plan

2.5 PROJECT ALTERNATIVES

An ESIA should identify and assesses alternatives to the proposed project. Only the best alternative should be selected based on less negative impacts and cost-benefit analysis. An important alternative to be analysed is the "no project" alterative. This is a very important analysis because it helps the proponents measure the impacts from the project against those which would have taken place without the project.
Mwache WTP will abstracts raw water from the proposed Mwache Dam, which is currently under implementation as a separate Contract, for treatment and subsequent transmission to the targeted service areas in Mombasa and Kwale Counties. Therefore, the proposed Dam, WTP and Transmission mains are interdependent and form the Mwache Dam Water Supply Scheme.

2.5.1 No Project Alternative

The 'No Project Alternative' alternative in respect to the proposed project implies that the status quo is maintained i.e. the Mwache Dam Water Supply Scheme/Project is not implemented.

Without the Project, the environmental situation will neither improve, nor can it necessarily deteriorate. Development of the project on the other hand will ensure that an additional 186 million litres of potable water is supplied daily to the residents of Mombasa and Kwale Counties.

Accepting the no-project option will however mean that the targeted populations will continue to suffer from inadequate and unreliable water supply. This also means that the local communities will potentially miss out on development opportunities that the Project could bring including access to water and economic opportunities through project construction and operation including employment and small business opportunities.

From an environmental and socio-economic perspective, the 'No Project Alternative' is not a suitable alternative for the affected community and Kenya as a whole.

2.5.2 Site Location Alternative

The main design constraint in location a suitable site for the proposed Mwache WTP is the elevation of the clear water tank.

A review of the elevations for the target supply areas and corresponding terminal reservoir inlet levels as well as the optimum transmission pipeline routes ascertained that a minimum level of 115 masl is required for the most economical pipeline lengths and diameters for gravity transmission. A clear water tank minimum outlet level of 115 masl is also required for gravity flow to the New West Mainland Reservoir.

The adjusted location of the clear water tank with the outlet level of 115m has a significant advantage on hydraulics, pipeline size and length, notwithstanding the fact that the site is within the dam operation area which reduces the risk of delayed commencement due to delay in acquisition of the WTP site and duplication of cost for acquiring an alternative site.

The revised site will also utilize the available head in the dam, hence optimization of pumping costs".

Two probable sites were identified for the WTP as follows:

- **Upper site**: locate the clear water tank and the water treatment works on the Upper site which is marked in red (refer to figure 12). The raw water will be pumped directly to water treatment plant and the treated water will be gravitated and stored in the clear water tank.

- **Lower site:** locate the water treatment plant on the lower site which is marked in green (refer to figure 13), and the clear water tank on the Red site (Upper site). The raw water will be pumped to the water treatment plant and then the treated water will be pumped to the clear water tank on the Red site. The main disadvantage of this solution is the installation of 2 pumping stations (double pumping).

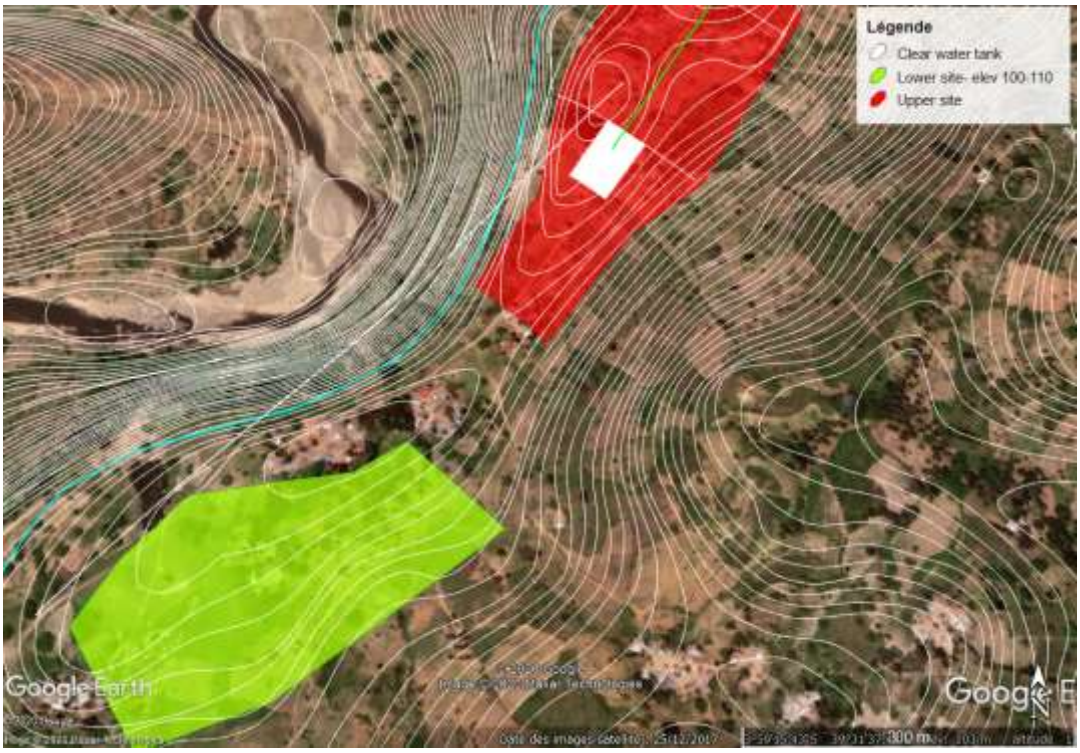


Figure 2-8: Alternative Location for Mwache Water Treatment Plant

The upper site (marked in red) is narrower and relatively on a steep terrain compared to the lower site (marked in green). The upper site is adequate for the proposed WTP units and was therefore adopted.

2.5.3 Proposed Development Alternative

Under the proposed Mwache WTP project alternative, the proponent would be issued with a variation to the Mwache Dam and Lower Check Dam NEMA license to include the additional scope of the WTP and associated components. In issuing this variation to the license, NEMA would approve the proponent's propose Project, providing all environmental conditions to be complied with during construction, operation and decommissioning phases.

2.6 COST ESTIMATES

2.6.1 Capital Expenditure (CAPEX)

Capital cost estimates for the water treatment plant and associated components are summarized in the **Table 2.5** below.

Table 2.5: CAPEX Summary

COMPONENTS	DETAILED DESCRIPTION	ESTIMATES 2021 (EURO)
	Raw water pumping station	7 660 000 €
	Raw water pumping main	3 014 000 €
	Water Treatment Plant	43 280 200 €
	Treated water main & clear water tank	4 185 100 €
	Provisional sums	9 517 185 €
	TOTAL in Euro	**67 656 485 €**
	TOTAL in Kshs (Exchange Rate of Kshs 135)	**KES 9,133,625,475**

2.6.2 Operational Expenditure (OPEX)

Table 2.6 below summarizes the estimated operational costs for the water treatment plant and associated components.

Table 2.6: OPEX Summary

ITEMS	ANNUAL OPERATING COST KSHS/YEAR	ANNUAL OPERATING COST €/YEAR
Energy	424 798 025 KES	3 293 008 €
Chemicals	325 646 336 KES	2 524 390 €
Sludge disposal	3 224 993 KES	25 000 €
Staff	26 220 000 KES	235 814 €
Maintenance	58 660 728 KES	454 734 €
Renewal	166 735 798 KES	1 292 526 €
TOTAL	**1 005 285 880 KES**	**7 825 472 €**

2.7 SUMMARY OF SCOPE OF WORK – EMPLOYER'S REQUIREMENTS

The scope of works under the WTP Contract includes but not limited to the following :

- Design and additional studies
- Execution of additional studies (geophysical investigations, soil studies, assessment of structures, plans defined by the ESIA, water analyses, etc.) that Contractor considers necessary
- Additional topographical survey
- Geotechnical survey
- Preparation of a design report of the installations answering the program fixed by the Employer's Requirements.
- Documents forming the application for building permit (English language), including the architect's drawings and layouts, and in particular the landscaping aspects, so that the Employer has only to file this application to the concerned authorities.
- The preparation of guide drawings, working design drawings for the civil engineering structures, reinforced concrete drawings and calculation notes, drawings and calculation notes for the roads and utilities networks, drawings and diagrams of equipment, erection and dismantling drawings, in compliance with the detailed design accepted by the Employer.
- Implementation: Works to be carried out by the Contractor include but are not limited to the following:
  - Adopting mitigating measures provided in the ESIA and ESMP. In addition, if need be, these documents (ESIA and ESMP) should be updated and/or preparation of renewal plan.
  - Preparation and adopting different management plans, such as: Site Specific Waste Management Plan, Site Specific Dust Management Plan, Site Specific Surface Water Management Plan, Site Specific Excavated Material Management Plan, Site Specific Biodiversity Management Plan, Site Specific Traffic Management Plan, Site Specific Health and Safety Management Plan, Community Health and Safety Plan
  - Installation of the site and preparatory works, connection to telecoms, water, electricity and other networks.
  - Implementation of civil works in accordance with the accepted detailed design, including in particular:
    - preliminary drillings and investigations for the existing facilities and networks, if necessary,
    - earthworks and final backfilling, drainage (including removal and storage of materials and earth),
    - special foundations, if necessary
    - All shell construction (concrete, reinforced concrete, masonry, framework, roofing, sealing, cladding, etc.),
    - all finishing and fitting works for the plant,
    - fences, roads and utilities networks,
    - demolition of existing structures to be removed, if any, including pipes and the reuse or removal and dumping of the corresponding materials in locations authorized by local legislation, and levelling of the land thus freed,
    - Connection of the new installations with existing structures (pipes).
  - Implementation of the treatment process in conformity with process flow diagram including:
    - Pumping station
    - Fine screening
    - Acidification tank
    - Clarification tanks
    - Sand filtration

  - Disinfection
  - Reservoirs
  - Associated pipes and connections
  - And all other treatment required to achieve performances specifications
- Implementation of the "electricity and electromechanical and hydromechanical equipment" section in conformity with the performances specifications and technical specifications, including the supply, testing and transportation on site of all necessary materials and equipment and their implementation or erection and adjustment, namely:
  - hydraulic, mechanical and electrical treatment equipment, including driving equipment and control, monitoring, measurement, protection and safety devices
  - Miscellaneous equipment required for the proper operation and maintenance of the installations, (lighting, heating, telephone, etc.),
  - the remote surveillance system, if any
- The commissioning of the installation and performance of the tests defined in the Employer's requirements.
- The provision of maintenance and operating manuals and as-built drawings of the structures and networks including cadastral measuring/planning drawings in UTM coordinate systems to deliver them to National Agency of Public Registry for registration.
- All other necessary works required to complete the construction of the Water Treatment Plant (WTP).
- Training in Environment Health and Safety (EHS) and operation and maintenance of the WTP

■ Operation and Maintenance
- The CWWDA shall be in charge of the operation of the new treatment plant for 2 years with a possibility of 1 year extension and thereafter hand over operation and maintenance of the WTP to MOWASCO

3. BASELINE INFORMATION FOR WTP SITE

3.1 LOCATION AND LAND OWNERSHIP

The proposed Water Treatment Plant (WTP) is located within Kasemeni Location of Kinango Sub-County in Kwale County. The site is located within Land acquired under Mwache Dam at GPS Coordinates -3.970346^0 and 39.508029^0 as indicated in **Figure 3-1.**

Land ownership of the proposed site for WTP has been acquired by the government under the ongoing land acquisition by National Lands Commission (NLC) on behalf of Ministry of Water and Sanitation. This implies that Land Acquisition as an impact will not be triggered. Also, through government resettlement program under Mache Dam Project, all Project Affected Persons (PAPs) have been relocated from the site, this implies that no direct socio-economic negative impacts of displacement will be triggered to community as a result of construction of the WTP. However, indirect and cumulative impacts to villages outside the WTP site will be triggered as discussed in **Chapter 5** of this addendum, such villages include; Mwatate, Mataa, Gandini, Mwavumbo, Fulugani and Mazeras.

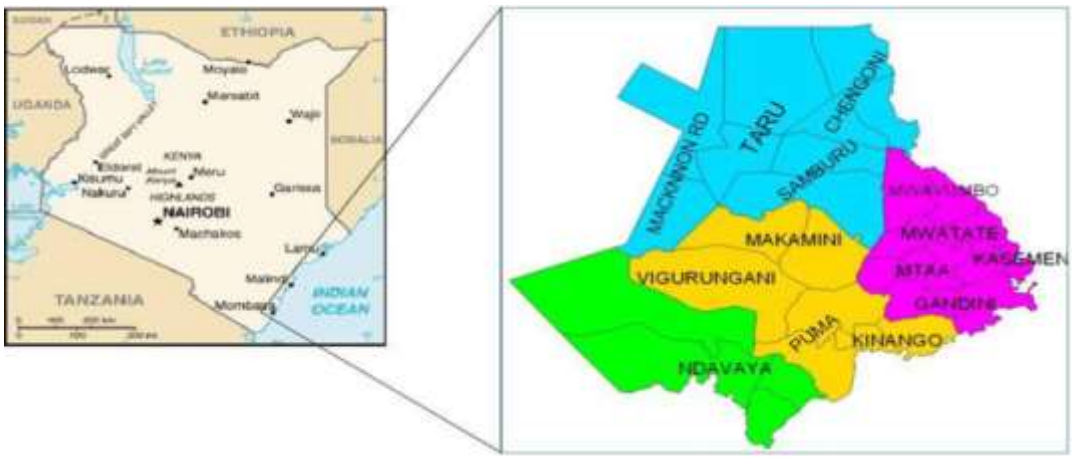
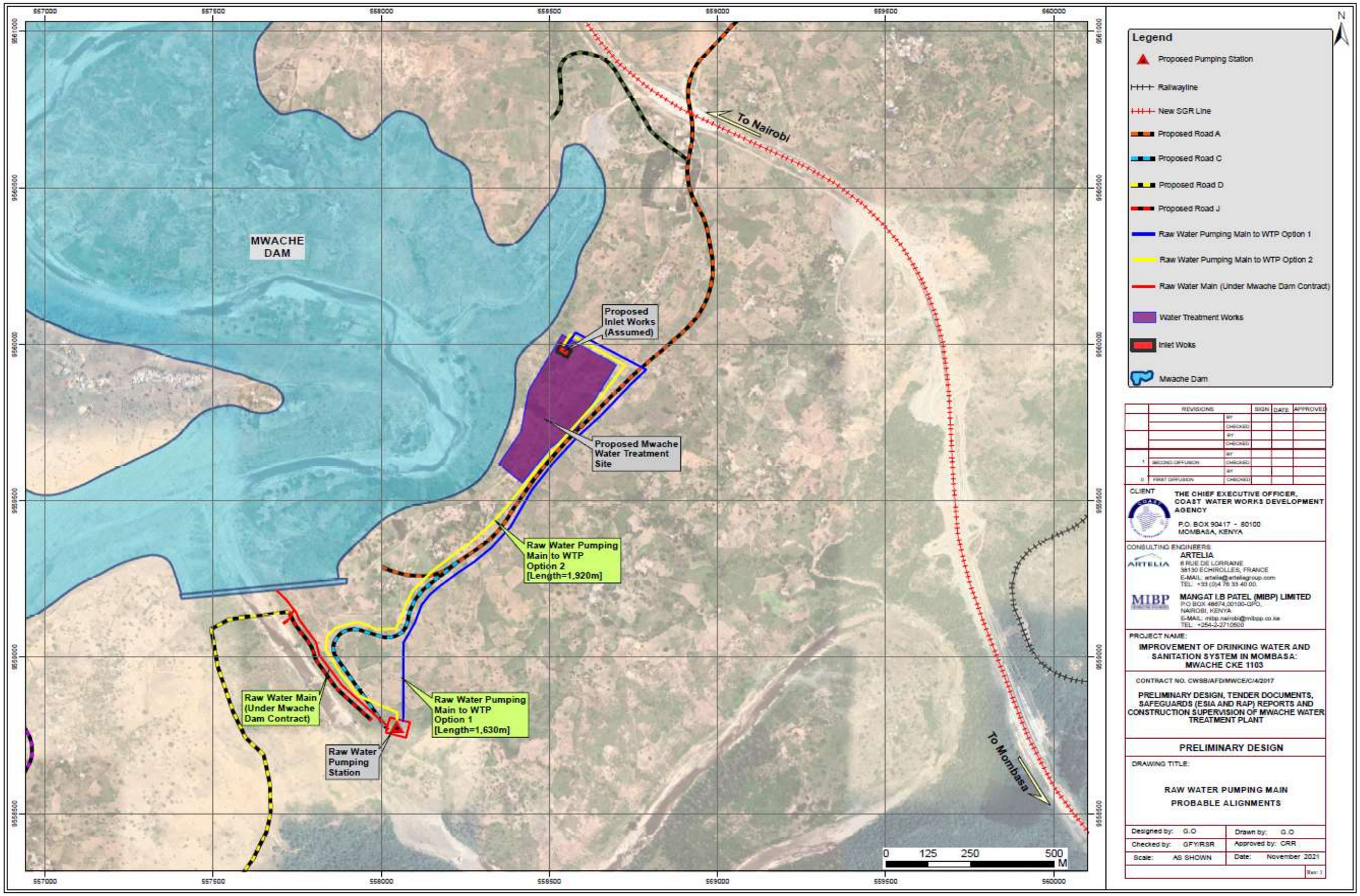


Figure 3-1: Map of Kinango Sub County (Project is sited in Kasemeni Ward)

Photograph illustrating an overview of proposed site for the Water Treatment Plant (WTP)

Figure 3-2: Layout Plan of proposed Raw Water Pumping Main Alignment Options and WTP Location



3.2 CLIMATIC CONDITIONS

The annual minimum temperatures in the area (Kasemeni Location) range between 22.5˚C and 24.5˚C while the maximum temperatures vary between 27˚C and 32˚C along the coastal belt. The Location is generally hot and humid all the year round, with a relative humidity of about 60% along the coastal belt due to the high evaporation rate and availability of surface water.

The precipitation is highest in the months of April and May while no or little precipitation occurs from December to March. Annual Average precipitation is about 900mm against an average1,860mm evapo-transpiration in the region, with 75% Dependable Annual rainfall equivalent to 610 mm. Evaporation rates recorded at the Moi International Airport in Mombasa provide the appropriate parameter to describe evaporation variation in the project area. The results indicate that the mean daily evaporation rates vary from 3.5 mm in July to 6.3 mm in February. The Relative humidity data shows the Coastal nature of climate. Relative humidity varies between 70% - 75% from January to March and 65% – 67% from April to December.

3.3 DRAINAGE AND HYDROLOGY

The drainage of Kasemeni within Kinango Sub County of Kwale County where the WTP is located is influenced by the ocean, which determines the easterly surface slope. While there are no permanent rivers and streams, the main river is the Mwache River which collects surface runoff discharging from numerous drains from the immediate catchment and watershed resulting into soil erosion that has left notable gullies, especially on steep sloppy areas. Additionally, apart from some sections of the larger riverbeds that tend to retain water after floods, there are no possibilities of flooding around the project areas. This implies a well-drained area in both surface as well as the largely porous geological formations.

Mwache River is the main water body (though it is seasonal by nature) in the project area with its source in the Taita hills. The main tributaries (also seasonal) discharging into the river include Bome river from the south immediately downstream of the proposed dam axis lines and Mnyenzeni river also from the southwest immediately upstream of the dam axis. There are also numerous dry surface drains into Mwache River that seemingly flows with water only during rainy seasons. The general water quality could be summarized as indicated in **Table 3.1**.

Table 3.1: Water Quality Parameters

PARAMETER	DESCRIPTION
pH	Water generally neutral in river and the creek (6.0 –9.0)
Colour	Surface water is highly coloured compared to ground water (<25mgPt/l)
Electrical Conductivity	Ground water and creek brackish (<2,000mg/l)
Turbidity	Surface water is highly turbid compared to ground water (<5NTU)
Dissolved Oxygen	Surface water and ground water is fresh (>5mg/l)
Total Dissolved Solids	Ground water and creek saline. Mwache pools are fresh (<1,500mg/l)
Suspended Solids	High suspended matter clear due to settlements) <30mg/l

Photograph Illustrating Dry River Bed for a Tributary of Mwache River near the Proposed Site of WTP

3.4 GEOLOGY AND SOILS

The soils type at the Water Treatment Plant (WTP) is sandy clayey gravel at depths of 2 – 2.5m deep. The soil types have a strong correlation with the geology and topography of the region and differ widely in depth, texture, physical and chemical properties with variations running parallel to the coastal line due to sedimentation process. The significance of this geological and soil characteristics is the porosity associated with the sedimentary type of soils. Infiltration to the groundwater aquifers of polluting substances from the ground surface is also highly likely. Kasemeni Locations falls within the Cainozoic rocks that occur on the coastal strip of land bordering Indian Ocean and include stratigraphic units belonging to Pliocene, Pleistocene and Recent periods. These are composed of sands, dune sands, raised coral reef, crags, red wind-blown sands and raised alluvial deposits.

Photograph Illustrating Nature of Soils near the Proposed Site of WTP

3.5 TOPOGRAPHY

The topography of Kasemeni Location gently rises from Mombasa Island near Indian Ocean coast of Kenya and from EL 0.0m (mean sea level), rising steadily towards Kinango Sub County. The topography of the area is generally characterized by a hilly terrain, with steep slopes along and across the alignment, with numerous seasonal water courses including streams and gulleys, and a seasonal river. At the specific site for the WTP, the topography is given in the range of 131m a.s.l.

3.6 BIODIVERSITY

Flora

Flora of the Water Treatment Plant (WTP) Site is influenced by the Mwache Forest which is adjacent to the site. However, specific site exhibits Arid and Semi-Arid (ASAL) characteristics. In terms of Agro-ecological zone classification, the site is located within Agro Ecological Zones (AEZ) three. Vegetation cover observed include various species of *acacia Sp. Acacia ssp, Diospyros ssp, Cynometra-Manilkara type and Euphorbia bushland,* other exotic trees include *Tamarind tree, Neem tree, Flame Tree.*

Within the valleys in the either side of the Water Treatment Plant (WTP) ridge riverine plants observed are; reeds, grasses / sedges among others which form part of Mwache Creek Mangroove Vegetation. Specific Mangroove sp include *Rhizophora mucronata, Avicennia marina, Ceriops tagal, Lumnitzera racemosa, Bruguiera gymnorrhiza, Sonneratia alba, Xylocarpus granatum, Xylocarpus moluccensis and Heritiera littoralis. R. mucronata, C. tagal and A. marina* are the dominant species within forest.

The following plant species are domesticated and grown within the Kasemeni Location; *Maize (green), Maize, Cow peas, Cassava, Sisal, Water melon, Banana, Sukuma wiki (Kalas), Tomato, Groundnut, Coconut, Cashew nut. (others in local languages Mwawa, Mwanga, Mkanju (Cashew nuts), Mporojo, Kikwata, Mkone, Mnyubu, Mkilifi (neem tree), Mbuyu (Boabab), Mfune, Mchonge Mahana and Mkwakwa* among others).

However, it is important to note that at the WTP site Project Affected Persons (PAPs) have been resettled by Government and land vested into Kenyan Government. Therefore, socio economic Impacts to the PAPs in relation to loss of agricultural Land has been fully addressed by the government through compensation

Photograph Illustrating Vegetation Cover at the Proposed Site of WTP

Fauna

Avian population recorded in Mwache forest and adjoining ecosystem like Shimba hills, etc. can be listed as; Southern Banded Snake-eagle *Circaetus fasciolatus* (Near Threatened); Brown-headed Parrot *Poicephalus cryptoxanthus* (least concern), Fischer's Turaco *Tauraco fischeri* (Near Threatened), African Green-tinkerbird *Pogoniulus simplex* (Least Concern), Mombasa *Woodpecker Campethera mombassica* (Least Concern), Chestnut-fronted Helmet-shrike *Prionops scopifrons* (Least Concern), Black-bellied Glossy-starling *Lamprotornis corruscus* (Least Concern), Spotted Ground-thrush *Zoothera guttata* (Endangered),Plain-backed Sunbird *Anthreptes reichenowi* (Near Threatened) Sokoke Pipit *Anthus sokokensis* (Endangered).

An inventory of fish species within Mwache River and seasonal streams along the Water transmission line show that there are 4 common fish species in the main river trunk, 5 prawn species and 1 crab species. These species are distributed in various ecological habitats that include brackish water, riverine and tributaries. The main commercial species are the prawn species. Other species are *tilapia, catfish and barbus*. The proposed Mwache Dam Reservoir will help establish a vibrant fishery because water temperature ranges are conducive from a minimum of 25^0 C in the morning to a maximum of 35^0 C at 3.00 p.m.

Mangroves, intertidal mudflats and shallow brackish water creeks are well known feeding and nursery areas not only for fish but also for crustaceans (crabs and prawns) on which many fish species in the coastal area are found. Occasional catches are realized from Rabbit fish (Tafi), Redfin robber (English), Nkwakwa (Pokomo), Milkfish (English), scavengers (Tangu), Mullets (Mkizi), Sardines (Simu), Snappers (Pali). Artisanal fishers use crafts consisting of Dug out (Mtumbwi), Foot fishers, Pointed crafts (Mashua) and Hori with gears such as gillnets, seine nets, hand lines, beach seines, traps and fences. Trawling also takes place in the deep areas (> 5 m) also targeting prawns. The main prawn species targeted are *Penaeus indicus, Metapeneaus monoceros, P. semisulcatus, P. monodon* and *P. japonicas*. Images of Redfin robber (English), Nkwakwa (Pokomo), Milkfish (English) found within Mwache creek is presented in the photos below**.**

However, it is important to note that works at the WTP will not directly interact with such identified fauna, this is because the site is bare and does not provide habitat for such listed species. The works also will not involve extensive excavation that might cause significant sedimentation in Mwache Stream nor require extensive clearance of vegetation cover. Hence impacts to fauna and flora is assessed as minor.

3.7 RECEPTORS WITHIN PROJECT AREA

The assessment identified relevant social baseline receptors that might be exposed to degradation risks associated with the construction of the proposed water line. The receptors are indicated in **Table 3.2**.

Table 3.2: Environmental Receptors

NAME	LOCATION	GPS CORDINATE
Mwache (Bonje) Creek	Gandini	0558734, 9555844
Mwache Forest	Kasemeni	‘0560398, 9558200

4. POLICY AND LEGAL FRAMEWORK

At ESIA Stage detailed analysis of the policy, legal and institutional framework governing environmental issues in Kenya for development Projects was discussed with specific focus on Construction of Mwache Dam. This addendum therefore provides additional statutes that are applicable to Water Treatment Plant with specific focus on impacts that might be triggered during WTP operations. Further, Environmental and Social Risk Management Policy for AFD-funded Operations is also discussed.

4.1 POLICY AND LEGAL PROVISIONS

4.1.1 Kenya Constitution 2010

Kenyan Constitution 2010 in the preamble recognizes the role of environment in sustaining Kenya's heritage for the benefit of future generations. The relevant section of the constitution to the WTP is Chapter 5 that discusses Land and Environment. Part 2 of the chapter defines environment and natural resources, obligations in respect of the environment, enforcement of environmental rights, agreements relating to natural resources and legislation relating to the environment. Section 69 explains each and every citizen's obligations in respect of the environment in subsection (1) it states the following. The State shall:

- ✓ *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.*
- ✓ *Encourage public participation in the management, protection and conservation of the environment.*
- ✓ *Establish systems of environmental impact assessment, environmental audit and monitoring of the environment.*
- ✓ *Eliminate processes and activities that are likely to endanger the environment.*
- ✓ *Utilize the environment and natural resources for the benefit of the people of Kenya.*

Part 'iv' is of relevance to these Addendum.

Subsection (2) states:

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.

4.1.2 Environment Management and Coordination Act 1999 Cap 386

The Act of parliament that provided 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 constitution, Part II of EMCA confers to every person the right to a clean and healthy environment and to its judicial enforcement. The Constitution and EMCA therefore obligate Mwache Water Treatment Plant (WTP) to operate 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 operations of Mwache Water Treatment Plant. In line with EMCA of 1999 and EIA/EA regulations guidelines, NEMA issued a License for the construction of Mwache dam (NEMA/EIA/PSL/5204).

Applicable EMCA regulations are listed below;

- ✓ *Legal Notice No 101: The Environmental (Impact Assessment and Audit) Regulations, 2003.*
- ✓ *Legal Notice No. 19: Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009.*
- ✓ *Legal Notice no 120: Water Quality Regulations, 2006.*
- ✓ *Legal Notice no 121: Waste Management Regulation 2006.*

Table 4.1 below analyses provision of the above listed EMCA regulations applicable to the Mwache WTP.

Table 4.1: EMCA Regulations Applicable to the Mwache Water Treatment Plant (WTP)

NO	REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
1	Legal Notice No. 101: The Environmental (Impact Assessment and Audit) Regulations, 2003	The regulation provides a framework under which environment audit for the Water Works is prepared. Part V of the Regulations outlines requirements for undertaking an environmental audit, projects that should undertake an audit (Regulation 31), procedures for environmental auditing (Regulation 35) details of an environmental audit (Regulation 36) and issuance of improvement orders (Regulation 37).	Coast Water Works Development Agency (CWWDA) is therefore mandated by law to undertake an environmental audit for Mwache Treatment Plant (WTP) after Commissioning and submit the reports to NEMA of its operations as stipulated in these Regulations
2	Legal Notice No. 19: Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	The regulation provides that wetland resources shall be utilized in a sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services; and Environmental Impact Assessment and Environmental Audits as required under the Act shall be mandatory for all activities likely to have an adverse impact on the wetland.	in compliance with this regulation, a forestation program has been recommended within the WTP area to be financed under the Project. This initiative will be aimed at conserving Mwache River as provided by the regulation. Also, a Master Meter will be installed at the raw water inlet chamber to measure the water abstraction volume required for calculation of payment for water services to Water Resources Authority (WRA)
3	Legal Notice No 120 Water Quality Regulations, 2006	Regulation 9 of these regulations provides for water quality monitoring. It states that the "Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to the regulations". The operator, CWWDA shall pay annual statutory fees that will be used to by Water resources Authority (WRA) to undertake water quality monitoring activities along the Mwache River	The regulation provides that the operator shall not carry out any activity near rivers, streams and lakes without an EIA license in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003; Abstract water from rivers, lakes and streams without a valid license from the Water Resource Authority in accordance with the Water Act, 2016. CWWDA and WRA will be consulted during the statutory ESIA review by NEMA prior to approval of any ESIAs for projects within Mwache River

NO	REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
4	Legal Notice No 121 Waste Management Regulation 2006	Regulation 4 (1) states that "no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle". Regulation 4 (2) further states that "a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations".	In compliance with this regulation, Mwache Water Treatment Plant has included sludge drying beds for both disinfection of sludge by use of UV before disposal, the sludge shall be disposed in a designated landfill or purchased by fertilizer manufacturing entities
5	Noise and Excessive Vibration Pollution (Control) Regulations, 2009	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 by vehicles. The regulations provides for a maximum of 60 dBA during the day and 35 dBA during the night for a construction site.	Provisions of the regulations apply during preparation of this addendum.
6	The Environmental Management and Coordination (Air Quality Regulations 2014)	These regulations provide a framework for management of plant and equipment emissions of hydrocarbons on site. The regulations require that all plant and equipment on site should be well serviced to manufacturers specifications to avoid air pollution, the regulation also require monitoring of baseline air quality within construction site and implementation of correction action where the standards are not complied to.	Water spray will be used at all times when working in dry areas to avoid risks associated with dust menace. Particulate matter (PM_{10}), equipment's will be operated as provided by manufacturers specification to eliminate cases of Oxides (SOx), Nitrogen Oxides (NOx)) and Volatile Organic Compounds (VOC).
7	Fire Risk Reduction Rules, 2007	The rules require electrical equipment be installed in accordance with the respective hazardous area classification system, flammable materials are stored in appropriately designed receptacles, electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections, installation and maintenance of firefighting systems in workplaces, fire drills at least once a year, assembly points be marked, undertake annual fire safety audits etc.	The contractor will be required to store all flammable materials and liquids safely to avoid risk of fire.
8	Medical Examination Rules, 2005	It requires workers on site to undergo regular medical examination to identify the symptoms of hazardous exposures on the body, especially those who handle food or food products. This is with a sole purpose of monitoring exposure for remedial action.	The contractor will institute and implement regular medical examinations for its staff at the facility. These will include COVID 19 temperature checkup and drug abuse (at least alcohol on daily basis).
9	Safety and Health Committee Rules of 2004	These rules require the proponent and contractor (once they employ a more than twenty persons) to establish a committee to address the health, safety and welfare of workers. The Proponent and by extension the contractor, are required to provide space for meetings for the committee, training of the S&H Committee, appoint a S&H management representative, as well as allowing all staff to attend these meetings with no risk of loss of earnings, opportunities for promotion or advancement. They should also make legislation on occupational safety and health available to the Committee.	The contractor will develop a clearly defined safety and health policy, bring it to the notice of all employees at the workplace. They are also required to implement and review the policy when need arises. If construction workers exceed 20, the contractor will facilitate the formation of a S&H Committee and its operations.

NO	REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
10	First-Aid Rules, 1977	Rule 7 of First-Aid Rules, 1977 require that (No person shall be placed in charge of a first aid unless he has received adequate training and holds a certificate of competence	The contractor will conduct first aiders' training for the first time and a refresher training Bi- annually.

4.1.3 Water Act 2016 and Applicable Water Rules of 2007

At operation stage for Mwache Water works, applicable legal and policy statutes will be guided by the Water Resources Management Rules of 2007 of the Water Act 2016 as detailed in **Table 4.2** below.

Table 4.2: Water Resources Management Rules Applicable to the Mwache Water Treatment Plant (WTP)

NO	REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
1	Approval, Authorization and Permits	Coast Water Works Development Agency (CWWDA) will apply and renew water Abstraction permit for Mwache Treatment Works from Water Resources Authority WRA, activities under the Project are listed under the Six Schedule of the Water Rules 2007. Water Rules 2007: Part II - Approval, Authorization and Permits	The regulations provides that no water works approval, authorization and permit shall be issued or renewed for the purposes of supplying water for domestic, public, commercial or industrial use within the limits of supply of a water service provider without the applicant having received consent of the licensed water service provider for the area.
2	Control of Pollution and Water Quality Requirements	Regulation 81 provides that no person shall discharge or apply any poisonous, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into any water resource unless the discharge of such poisonous, toxic, noxious or obstructing matter, radioactive waste or pollutant is treated to permissible standards as authorized by the Authority	Mwache Treatment Works Preliminary Design Report (PDR) has provided for construction of Sludge drying beds to handle sludge disposal. Further the addendum that ALUM used for coagulation will be procured in enough stocks therefore no wastage and expiry will not be anticipated. Water Rules 2007: Part V Water Quality Monitoring and Effluent Discharge discussed in detail under section 5.5.4 and 5.5.5
3	Easement and Compliance with the Environmental Management and Coordination Act	Entry upon land section 11 of the water rules provide that Every applicant for authority to enter upon land belonging to other persons for survey or investigative purposes of water resource management or development under section 89 of the Act, shall submit to the Authority the application on the prescribed form - Form WRMA 017 set out in the Twelfth Schedule.	CWWDA will apply for the easement permit from WRA during construction of 1.6km raw water section of the Pipeline and also abstraction from Mwache River. At operations stage MOWSSACO will regularly inspect the water pipeline corridor for encroachment and maintain the perimeter fence around the WTP including the dam.
4	Water Use Charges	PART VIII - Water Use Charges 104.(1) Any person in possession of a valid permit or who is required to have a valid permit for water use, shall be required to pay to the Authority water use charges on the basis of the water abstracted, diverted, obstructed or used including energy derived from a water resource at the appropriate rate as set out in the First Schedule	A master meter will be installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA)

NO	REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
5	Conservation of Riparian	PART IX - Conservation of Riparian and Catchment Areas 120.(1) For the purposes of conserving the catchments and riparian areas, the Authority may by order or state as a condition on an Authorization or Permit, require a person to prepare and conform to a Soil and Water Conservation Plan.	in compliance with this regulation, a forestation program has been recommended within the WTP area to be financed under the Project. This initiative will be aimed at conserving Mwache River as provided by the regulation.

4.1.4 Occupational Health and Safety Act (OSHA) 2007

At operation stage of the Water works, applicable legal and policy statutes will be guided by the Occupational Health and Safety Act (OSHA 2007) and subsequent regulations. Also the Public Health Act (Cap.242) will apply as detailed in **Table 4.3** below.

Table 4.3: Provisions of OSHA Act 2007 (Applicable at Operation Stage)

ACTIVITY FIELDS	REQUIREMENT	RELEVANT ACT (CLAUSES)
Duties Of Occupiers (Legal Requirements)	Risk Assessment Safety and Health Audit Fire Safety Audit Initial Environment Audit	Section 6 (3) of OSHA 2007 *Every occupier shall carry out appropriate risk assessments in relation to the safety and health of persons employed…* Section 11 of OSHA 2007; *The occupier of a workplace shall cause thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a safety and health advisor* Section 36 of Fire risk Reduction Rules; 2007 *(1) Every occupier shall cause a fire safety audit of the work place to* *be taken at least once every*
Management of Polices required at the Water Works	Policies Required: • Safety & Health Policy • Fire Safety Policy • Environment Policy	Section 7(1) (b) of OSHA 2007 It is the duty of occupier to bring the statement and any revision of the policy to the notice of all of his employees. Section 7(2) of OSHA 2007 giving implementation obligations
Water Works Personnel Trainings Required	Training required: • Statutory: Fire marshal training Training required: • Statutory: First Aid Training Training required: • Statutory: Safety and Health Committee	Rule 22 of Fire risk reduction rules,2007 *(A firefighting team should be formed and provided fire safety training to enable them effectively discharge their functions)* Rule 7 of First-Aid Rules, 1977 *(No person shall be placed in charge of a first aid unless he has received adequate training and holds a certificate of competence which shall be valid for a period of one year.)* Section 9 (2) b, of OSHA 2007 *The occupier shall be responsible for the training of the members of safety and health committees and safety and health representatives* *Section 12 (1) & (2) of Safety & Health Committee rules,*

ACTIVITY FIELDS	REQUIREMENT	RELEVANT ACT (CLAUSES)
		2004. (All Committee members are to undertake prescribed course).
Occupational Health Programmes within the Water Works	Statutory Medical Examinations. • Pre-employment • Periodical • Post-employment	Section 21(1) and 21(5), Section 122 of OSHA, 2007 *notification of accident and entering the details in the general register*
	Provision of First Aid Kit – the Water Works was well equipped with First Aid Kits	Section 95 of OSHA 2007 *provision of a first aid box or cupboard of a prescribed standard*
	Documents required: • General register • Accident notification forms	Section 21(1) and 21(5), Section 122 of OSHA, 2007 *notification of accident and entering the details in the general register*
	Examinations required: All plants, lifting equipment and machinery (as per OSHA 2007) that will be used during construction	Part VII of OSHA 2007 *As the case may apply*
Water Works Operations Safety	Required: Risk assessment Inspection of ladders / scaffoldings	The Factories and other places of Work Act, (Building and Works of engineering construction rules, 1984) Requirement for inspection of ladders/scaffoldings
Permits To Work (PTW)	Permit to Works are required for non-routine hazardous work.	***Section 96(1) & (2) of OSHA, 2007*** *(Employers to issue permits to work to employees likely to be exposed to hazardous work processes. PTW sets out work to be done, hazards involved & precautions to be taken)*
Fire Safety at the Water Works	Requirements: • Fire drill • firefighting equipment • Fire escapes	**Rule 22 of Fire risk reduction rules,2007** *A firefighting team should ensure that fire drills and regular workplace inspections are conducted for purposes of identifying fire risks and recommending remedial measures.* Section 78-82 of OSHA 2007
Emergency Response Plan	Required: • Injury emergency response; • Non entry rescue mission to persons in confined space; • Fire emergency response; • Accidental spill management;	Section 82(1)-(4) of OSHA 2007 *Designing of evacuation procedures for emergency, including accident and fire*
Ergonomics at the Workplace	Requirement: Ergonomic survey	Section 76 of OSHA 2007 *(4)An employer shall not require or permit any of his employees to engage in the manual handling or transportation of a load which by reason of its weight is likely to cause the employee to suffer bodily injury.*
Contractors And Suppliers	Duties of an occupier of place of work to persons other than his employees.	Section 18(01and (2) of OSHA 2007 *Responsibility of a person by virtue of contract*
Personal Protective Equipment	Requirements: • Head, body eye, ear, respiratory tract, hand and foot protection as needed. • Protection from fall from height	Section 101 & 102 of OSHA 2007 *Every employer shall provide and maintain for the use of employees in any workplace where employees are employed in any process involving exposure to wet or to any injurious or offensive substance, adequate, effective and suitable protective clothing and appliances, including, where necessary, suitable gloves, footwear, goggles and head coverings.*

4.1.6 Sustainable Waste Management Act 2022

An Act of Parliament to establish the legal and institutional framework for the sustainable management of waste; ensure the realization of the constitutional provision on the right to a clean and healthy environment and for connected purposes. The objective of the Act among others is to promote sustainable waste management; (b) improve the health of all Kenyans by ensuring a clean and healthy environment. The project at implementation stage will be aligned to provisions of existing CESMPs for of the Mwache Dam that addresses management and disposal of wastes from site such as the Solid and Liquid Wastes Management Plan

4.1.7 The Climate Change Act Revised in 2023

An Act of Parliament to provide for a regulatory framework for enhanced response to climate change; to provide for mechanism and measures to achieve low carbon climate development, and for connected purpose. The objective and purpose of the Act among others is to mainstream climate change responses into development planning, (a) decision 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. The project objective is to provide clean water to residents of Kwale and Mombasa Counties, clean water is significant drivers towards implementation of adaptation measures related to combating climate change

4.1.8 Physical Land Use and Planning Act 2019

Section 29 of the Act empowers the local Authorities (now county governments) to reserve and maintain all land planned for open spaces, parks, urban forests and green belts as well as land assigned for public social amenities. The project will provide clean water to Kwale and Mombasa Towns ultimately addressing the current water challenges

4.1.9 National Water Quality Standards

The PDR report provides that the WTP will conform to provisions of national regulatory drinking water quality standards and WHO water quality guidelines, whichever is stringent. Regular monitoring to determine compliance will be done by CWWDA and corrective/ mitigation measures applied where necessary. The standards are provided in **Table 4.4** below.

Table 4.4: National Drinking Water Quality Standards

PARAMETER	UNITS	GUIDELINE VALUE
Aluminum	mg/L	0.05 - 0.2
Chloride	mg/L	<250
Color	Hazen	<15
Copper	mg/L	<1.0
Corrosivity	-	Non – corrosive
Fluoride	mg/L	<2.0
Foaming Agents	mg/L	<0.5
Iron	mg/L	<0.3
Manganese	mg/L	<0.05
Odour	Odour threshold level	<3
Ph	Sorensen scale	6.5-8.5
Silver	mg/L	<0.10
Sulphate	mg/L	<250
Total Dissolved Solids	mg/L	<500
Zinc	mg/L	<5

PARAMETER	UNITS	GUIDELINE VALUE
Sodium	mg/L	<200
Chlorine	mg/L	0.2+ -0.5
Magnesium	mg/L	<100
Ammonia	mg/L	<0.5
Mercury	mg/L	<0.001
Nitrate	mg/L	<10
Fluoride	mg/L	<1.5
Arsenic	mg/L	<0.05
Cadmium	mg/L	<0.05

Source-NEMA

Table 4.5: Microbiological Limits for Drinking Water

TYPE OF MICROBES	PRESENT/ABSENT
Total viable counts at 37^0C per ml, Max	100% Present
Coliforms in 250 ml	Absent
E. Coli in 250 ml	Absent
Staphylococcus aureus in 250 ml	Absent
Sulphite reducing anaerobes in 50 ml	Absent
Pseudomonas aeruginosa Fluorescence in 250 ml	Absent
Steptococuus faecalis	Absent
Shingella in 250 ml	Absent
Salmonella in 250 ml	Absent

Source-NEMA

4.1 ENVIRONMENT AND SOCIAL STANDARDS (ESS) OF THE WORLD BANK

At the time of preparation of the Mwache Dam ESIA in 2016 the World Bank's Operational Policies (OP) were in effect. The Environmental and Social Framework (ESF) and the Environmental and Social Standards (ESS) had not been published. Therefore, under this addendum a review of Environmental and Social Standards (ESS) of the World Bank is presented in **Table 4.6 below**.

Table 4.6: World Bank Environment and Social Standards

STANDARD	PROVISION	RELEVANCE TO THE PROJECT
(ESS1) Assessment and Management of Environmental and Social Risks and Impacts	(ESS1) Assessment and management of environmental and social risks and impacts which provides for (i) Environment Assessment (ii) Development of Environmental and Social Commitment Plan (ESCP), (iii) Project monitoring and reporting (iv) Stakeholder engagement and information disclosure. The main focus of the standard is to promote environmental and social sustainability in the Program design; avoid, minimize, or mitigate adverse impacts, and promote informed decision-making relating to the Program's environmental and social impacts;	An addendum to the Environmental and Social Impact Assessment prepared for the Mwache Dam is required, the Addendum details Environment and Social Risks Associated with the proposed Water Treatment Plant.
(ESS2) Labor and Working Conditions	ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. The standard objectives include among others; To promote safety and health at work,	The addendum discusses Project Social Impacts, appropriate provisions have been provided to mitigate impacts related to

STANDARD	PROVISION	RELEVANCE TO THE PROJECT
	To promote the fair treatment, non-discrimination and equal opportunity of project workers, To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with the (ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate among others	Workers and management of labour
(ESS3) Resource Efficiency Pollution prevention and Management	ESS3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. The policy objective among other include; to promote the sustainable use of resources, including energy, water and raw materials and; To avoid or minimize adverse impacts on human Health and the environment by avoiding or minimizing pollution from project activities among others.	The addendum discusses possible impacts to Biophysical resources ranging from Water, Soil and Air and Biological resources including Fauna and Flora.
(ESS4) Community Health and Safety	ESS4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to project activities. The policy objectives among others include; to anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances and to promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure.	Appropriate provisions have been provided to mitigate impacts related to Community Health and Safety
(ESS6) Biodiversity Conservation and Sustainable Management of Living Natural Resources	ESS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. The policy recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. The policy objectives include among others include; to protect and conserve biodiversity and habitats and to apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity	The addendum discusses possible impacts to Biophysical resources ranging from Water, Soil and Air and Biological resources including Fauna and Flora.
(ESS8) Cultural Heritage	ESS8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. The policy objectives include; to protect cultural heritage from the adverse impacts of Project activities and support its preservation; to address cultural heritage as an integral aspect of sustainable	Chance find procedures to be adopted in the event such resources are encountered during Project construction phase.

STANDARD	PROVISION	RELEVANCE TO THE PROJECT
	development; to promote meaningful consultation with stakeholders regarding cultural heritage; to promote the equitable sharing of benefits from the use of cultural heritage.	
(ESS10) Stakeholder Engagement and Information Disclosure	This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.	Appropriate stakeholder consultations were done during preparation of the ESIA report and during ESIA review stage by NEMA

4.2 ENVIRONMENTAL AND SOCIAL RISK MANAGEMENT POLICY FOR AFD-FUNDED OPERATIONS

The policy provides that any development operation may involve potentially adverse risks, particularly in terms of environmental and social impacts.

Consequently, AFD's financing is conditional upon the implementation by the client of continuous and systematic environmental and social assessment procedures to (i) assess the environmental and social impacts of operations, (ii) propose appropriate measures to avoid the negative impacts or, when they are unavoidable, reduce or offset them in an appropriate manner, (iii) monitor the application of such measures during the implementation phase of the operation, and (iv) conduct an ex post evaluation of the effectiveness of the proposed measures.

The systematic environmental and social assessment of operations aims to ensure that they are environmentally and socially sustainable, contribute to integrating environmental and social considerations into the decision-making process of all the stakeholders, and provide a strong framework to manage financial and reputational risks run by AFD.

Further, the policy provides under AFD principles that the client is responsible for conducting the environmental and social assessment of its project. It mobilizes the expertise and environmental and social resources required at the various stages of the project implementation (feasibility, detailed design preparation, construction, operation, decommissioning) and contractually commits to respect the environmental and social performance targets agreed during the appraisal of the financing and set out in the financing agreement with AFD. The client monitors and documents the application of the environmental and social management measures during the implementation of the project activities. It also implements the preventive actions required to remove the potential causes of a failure and the remedial actions required when a failure is identified. It regularly informs AFD about this through periodic progress reports.

AFD assists the client in defining its environmental and social objectives and verifies their implementation throughout the project cycle. The addendum to the Environmental and social impact assessment (ESIA) prepared for Mwache Dam has been prepared to conform to this principle.

5. STAKEHOLDER CONSULTATION

5.1 STAKEHOLDER MAPPING AND IDENTIFICATION

A stakeholder identification, mapping and analysis exercise was carried out to determine all organizations and individuals who may be directly or indirectly (positively or negatively) affected by the proposed Mwache Water Treatment Plant Project. All identified stakeholders were consulted at the **ESIA stage for the South Mainland Water Transmission Pipeline and Addendum for the WTP**. The motive of consultations was to collect their views in relation to the Project

The identified stakeholders were grouped into two main categories depending on their various needs, interest, and potential influence to the project as follows:

Primary Stakeholders: These are stakeholders directly affected by the project such as the local community, local administration, institutions such as schools and health centers within locations along the pipeline alignment.

Secondary Stakeholders: These are stakeholders indirectly affected by the project but influence development through Project implementation. These include but not limited to: National and County Government, Government Parastatals among others.

An Inventory of the Stakeholder relevant to the Proposed Project is summarized in Table 5-1.

Table 5-1: Inventory of the Project Stakeholder

Stakeholder Category	Stakeholder Name
Primary Stakeholders	• Local community in, Kasemeni, Gandini, Mbuguni, Kaya Bombo and Dongo Kundu • Local administration, in, Kasemeni, Gandini, Mbuguni, Kaya Bombo and Dongo Kundu • Institutions such as schools and health centres, in, Kasemeni, Gandini, Mbuguni, Kaya Bombo and Dongo Kundu • Beach Management Units (BMU) and Community Forest Association (CFA) who include; Tsunza, Bonje and Mwache
Secondary Stakeholders	• GoK -Ministry of Water and Sanitation • Coast Water Works Development Agency (CWWDA) • Ministry of Environment and forestry • Water Resources Authority (WRA) • Mombasa and Kwale Water Companies • Kenye Forest Service (KFS) • National Environment Management Authority

5.2 STAKEHOLDER AND PUBLIC PARTICIPATION SCHEDULE

Kenya's Environmental Impact Assessment / Audit Regulations of 2003 require that in the process of Environmental Impact Assessment (EIA), the proponent shall, in consultation with the National Environment Management Authority (NEMA); seek the views of persons who may be affected by the Project. Stakeholder mapping was done by the help of local administration headed by area Deputy

County Commissioner who provided the list of key stakeholders to be included in the assessment, section being revised appropriately to reflect consultations with, Kenya Forest Services, Beach Management Unity and Community Forest Association and Local Administration. The schedule of stakeholder and public barazas within the Gandini and Mbuguni Locations, and Kiteje Sub Location is summarized **Table 5.2**.

Table 5-2: Schedule of Stakeholder Public Participation

Local Administration Meeting

MEETING	VENUE	DATE
Meeting with Kasemeni Sub County DCC	DCC office in Mazeras	20th October 2021
Meeting with Gandini Location Chief	Chiefs Office in Gandini	22nd October 2021
Meeting with Mbuguni Location Chief	Chiefs Office in Mbuguni	23rd October 2021
Meeting with Kiteje Sub Location Chief	Kiteje Sub Location Chief	24th October 2021

Kenya Forest Services Consultation

STAKEHOLDER	VENUE	DATE
Kenya Forest Services (KFS)	Kenya Forest Services (KFS) offices – Kwale Offices	24th October 2021

BMU / CFA Proposals to be Supported under the Project

#	BMU/ CFA	Proposals to be supported by the Project
1	Tsunza, Mwache and Bonje	• Tree planting and re- afforestation Programs • Stakeholder Sensitisation (Community) programs on conservation • Stakeholder Sensitisation programs (Kenya Ports Authority KPA) on conservation • Restoration Programs of Mangroves in Degraded areas • Beach Clean-up and Waste Management Programs • Bee Keeping Activities • Fish Ponds and fishing sites including; Kwasoa, Toneza, Maguzoni, Dongo Kundu, Chuyu, Ngare, Mkupe, Mbagani, Gutu, Mwinjala, Mshame, Mwekerwe Nyanje, Chiweni, Manzazani, Mwangowa, Mwishomo, Fungu ya Kati, Chilomoni, Hodi • Nursery Establishment within Kaya Chonyi, Kaya Mrera, Kaya Bombo, Kaya Mbuguni and Kaya Teleza

Stakeholder Workshop with Beach Management Units (BMU) and Community Forest Association (CFA)

BMU / CFA	VENUE	DATE
Tsunza BMU and CFA	Royal Star Resort Mazeras	14th June 2023
Mwache BMU and CFA	Royal Star Resort Mazeras	14th June 2023
Bonje BMU and CFA	Royal Star Resort Mazeras	14th June 2023

Public Meetings

LOCATION/ SUB LOCATION	VENUE	DATE	ATTENDEES
Gandini Location	Gandini Chiefs Camp office	21st October 2021	38 Male 29 females
Mbuguni Location	Mbuguni Chiefs Camp office	22nd October 2021	33 males 19 females
Kiteje Sub Location	Kiteje Sub Location Office	23rd October 2021	26 males 17 females

Tables 5.3 below presents summary of concerns raised by stakeholders during the consultations.

Table 5-3: Stakeholders Concerns and Responses

Kenya Forest Services (KFS)

STAKEHOLDER	RESOLUTIONS
Kenya Forest Services (KFS)	• CWWDA to formally apply for approval to lay the pipeline within Mwache Forest. Application to be addressed to the Chief Conservator of Forest (CCF) – Kwale County. • The application should clearly indicate the Scope of Works planned to be undertaken within the forest. • The application should include a clear Layout Plan and indicate the proposed pipeline route • The CCF will review the application and communicate the decision of KFS officially to CWWDA. • After approval is granted by KFS, CWWDA will undertake survey of the pipeline route. • After Survey works is completed, CWWDA will further apply through the CCF for approval or authority to commence pipeline construction. • This application will be reviewed and approval granted to CWWDA by KFS for construction works. This will be through a lease permit that will be renewed on an annual basis. • CWWDA will ensure that the proposed pipeline is restricted within existing track and the existing water pipeline easement, this approach will ensure that no tree is cleared along the easement. However, at the truncation, any trees that will be affected will be valued and cost included in the permit fees
Local Administration	• The office of Sub County Commissioner supports CWWDA initiative of expanding water distribution networks within Mombasa and Kwale Counties • The office of Sub County Commissioner is ready to assist CWWDA to mobilise any stakeholder consultations that might be required through project implementation stage • Local administration would ask to be involved in any stakeholder workshops that might be organized by CWWDA with regards to the Project • The DCC office advises consultations with Kenya Forest Services (KFS) given that the pipeline section traverses through Mwache forest.

Table 5.4: Stakeholders Concerns and Response in Gandini Location

SUGGESTION / QUESTION	RESPONSE
Mr. Katsudzi Dziro wanted to know how cases of disputed land will be handled.	The meeting was informed that the consultant will establish a grievance Redress Committee that will look into disputes locally. Residents were encouraged to use the GRC to solves disputes instead of court process that might be lengthy and expensive.
Underson Beja Wanted to be informed on how damages to private property outside the acquired project wayleave will be handled.	The meeting was informed that the wayleave will include extra working space. Any property that falls within the wayleave corridor will be compensated. In the event that the contractor damages property outside the wayleave, they will have to be reinstated on fresh compensation done by the contractor.
Harrison Chiwala wanted to be informed on when the project will commence.	The meeting was informed that funding for the project which include construction of Mwache dam and the transmission lines is available. The project will commence immediately after all the pre-requisite reports including ESIA report and NEMA licence has been issued and also a resettlement action plan has been prepared for the affected persons.
Mr. Mbodze wanted to know what will happen in the event that the pipeline alignment passes through graveyards.	Residents were informed that the contractor will try as much as possible to avoid graves, in areas where it is not possible to avoid, the community will be allowed to apply their cultural procedures of relocating graves. The project client will facilitate the process.
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that both unskilled labour and some skilled (if available) will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.

Table 5.5: Stakeholders Concerns and Response in Mbuguni Location

SUGGESTION / QUESTION	RESPONSE
Mr. Sale Ali wanted to know if the water will benefit residents of Mbuguni	The meeting was informed that the pipeline is a transmission line and not for household connection, however residents can request to be given water kiosks within shopping centres for them to access water easily.
Mr. Juma Omar wanted to know what will happen to those property owners who not be available during enumeration.	The meeting was informed that the consultant will be walking along the proposed pipeline route accompanied by village elders, details of those that will not be on the ground during enumeration will be captured and follow up done to ensure any missing information about them is captured.
Residents wanted to be informed on when the project will commence.	The meeting was informed that funding for the project which include construction of Mwache dam and the transmission line is available. The project will commence immediately after all the pre requisite reports including ESIA report and NEMA licence has been issued and also a resettlement action plan has been prepared for the affected persons.
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that both unskilled labour and some skilled (if available) will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.

Table 5.6: Stakeholders Concerns and Response in Kiteje Sub Location

SUGGESTION / QUESTION	RESPONSE
Mr. Kasim Chame wanted to know what will happen to residents who have bought parcels of land but the subdivision process is yet to be completed.	The meeting was informed that the National Lands Commission will follow up and authenticate the land documents to ensure compensation is done to the right owner.
Mr. Abdul Kongoninga wanted to know if during compensation there will be any discussion between property owner and the client about the rates.	The meeting was informed that compensation rates will be provided by a registered government value to ensure accuracy. During RAP report disclosure, residents will be given a chance to make adjustments if need be.
Harrison Chiwala wanted to be informed on when the project will commence.	The meeting was informed that funding for the project which include construction of Mwache dam and the transmission line is available. The project will commence immediately after all the pre requisite reports including ESIA report and NEMA licence has been issued and also a resettlement action plan has been prepared for the affected persons.
Mr. Jiti Abdalla wanted to know what will happen in the event that the pipeline alignment passes through graveyards.	Residents were informed that the contractor will try as much as possible to avoid graves, in areas where it is not possible to avoid, the community will be allowed to apply their cultural procedures of relocating graves. The project client will facilitate the process.
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that both unskilled labour and some skilled (if available) will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.
Hadija Omar wanted to be informed if residents will be given sufficient notice before construction commences and also if they will be required to be at their premises throughout during construction.	Residents were informed that adequate time will be given to land owners before project commences, asset owners will be given sufficient time to salvage whatever they want along the pipeline corridor She was also informed that once owners have agreed and allowed works to proceed, they will not be required to be physically present during implementation.

6. ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS POSED BY THE WATER TREATMENT PLANT (WTP)

6.1 INTRODUCTION

This section discusses assessment of Environment and Social Impacts associated with Construction and Operation of Water Treatment Plants of Similar Nature. These impacts were identified after review of (i) Background biophysical information, legal and regulatory issues associated with the prosed Mwache Dam Water Treatment Plant (WTP) (ii) field visit to proposed WTP site and (iii) Study of documents and Reports related to the Project, these included; Environment Impact Assessment Study Report (ESIA 2016), Environmental License Conditions (**NEMA/EIA/PSL/5204)**

6.2 CONSTRUCTION PHASE POSITIVE IMPACTS

Project positive impacts during construction phase are summarized below.

- **Employment Creation**: At construction stage workers will be deployed to help in construction and land preparation activities. This will include both skilled and unskilled personnel especially from the local population with approximately 200 direct and indirect jobs.
- **Income/Revenue to Government**: Income to government will be realized in terms of taxes generated during the acquisition of relevant statutory licenses. Materials to be used during construction will also be taxable (16% VAT). Through revenues generated, the government will be capable of financing its responsibility to her citizens.
- **Income to Other Businesses**: During implementation of the project, there will be need for transporters, suppliers of raw materials and other service providers, who will benefit from the proposed development.

6.3 OPERATION PHASE POSITIVE IMPACTS

Positive project impacts during operation phase are summarized below.

- Availability of water for domestic use, the project will ensure a reduction in the distance between the various households and the water collection points as compared to the long distances initially covered from the homesteads to water points.
- Reduction in poverty levels of many households, this will be as a result of the availability of reliable water for domestic use, households will therefore engage more time in other income streams.
- Employment opportunities will be created both to those working directly in the WTP under WTP Operator
- Improved public hygiene and sanitation and at home because of water availability.

An estimate of 626,200 people will directly benefit from this Project, and will be provided with improved water sources, sanitation facilities, improved hygiene and sanitation practice.

6.4 WATER TREATMENT PLANT CONSTRUCTION PHASE NEGATIVE IMPACTS

6.4.1 Impact On Physical Resources and Receptors

Water Resources

Impact

There will be indirect or direct interaction in the case of erosion of soils into seasonal streams that drain runoff from the WTP. Further, site activities such as excavations during trench excavation and levelling at reservoir sites could result to loosening of soils that could result to sedimentation and siltation of storm water drainage channels and eventually flowing into seasonal streams. There will be direct interaction from the abstraction of water from seasonal stream for construction activities (e.g., for dust control), equipment on site could result to oil and fuel leaks that could contaminate seasonal streams altering the chemical composition of the water bodies and affecting aquatic organisms in the seasonal streams. Impact evaluations is minor and discussed in **Table 6.1** below.

Table 6.1: Pre-Mitigation Impact Assessment

IMPACT	SILTATION AND POLLUTION OF SURFACE WATERS RESOURCES				
Nature of Impact	Negative	Positive	Neutral		
	Eroded soil and leaked oils and fuels entering surface water bodies (seasonal streams				
Type of Impact	Direct	Indirect	Induced		
	Impact is as a result of a direct interaction between Project activities and the environment along the footprint of the concrete dam				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The impact is expected to be short term, however in the case of serious erosion the impacts of siltation of surface water may be experienced long term (into the operational phase).				
Impact Extent	Local	Regional	International		
	The impact will be limited to the footprint of the concrete dam and immediate surrounds. The dilution of sediments in the river will render this impact negligible at the regional scale				
Impact scale	The impact is considered as small (local) scale. Limited at concrete dam Environs				
Frequency	Continuous				
Likelihood	Possible				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of the river along the proposed pipeline construction works to Siltation and pollution is considered to be medium to low.				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor.				

Mitigation

- Discharge of Grey water or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent rivers shall not be permitted
- Water containing pollutants such as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for planned removal from site and disposed into a sanitary landfill to be established on site.
- The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and streams without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances
- Earth stockpiles will be seeded as soon as possible, covered with geotextile mats or surrounded by a bund to minimise the risk of sediment-rich runoff

- Tools and plant will be cleaned in designated areas within the site where runoff can be isolated for treatment before discharge to the river
- Debris and other material will be prevented from entering watercourses; Construction sites (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants)
- Discharge into watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRA
- All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate Waste Management Plan (WMP)
- At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among others: Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.

Soil Resources

Potential Impacts

Soil excavation for construction of the proposed WTP will disrupt the soil cohesion and also may result in surplus soil due to installation of the gabions within the same excavated areas. If not properly restored or managed, such soils may erode and wash into nearby seasonal streams thereby increasing the sediment load as indicated in **Table 6.2** below.

Table 6.2: Mitigation Impact Assessment

IMPACT	SOIL EROSION DURING CONSTRUCTION				
Nature of Impact	Negative	Positive	Neutral		
	Loss of soil cohesion contributing to erosion.				
Type of Impact	Direct	Indirect	Induced		
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The impact is expected to be short term, however in the case of serious erosion the impacts may be experienced long term.				
Impact Extend	Local	Regional	International		
	The impact will be limited to the footprint of the project and immediate surrounds.				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Continuous				
Likelihood	Possible				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of seasonal streams and gullies to erosion is considered to be medium to low.				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor				

Mitigation

The following mitigation measures will be implemented to minimize the potential for soil erosion:

- Vegetation clearing and topsoil disturbance will be confined and minimized.
- Contour temporary and permanent access roads / laydown areas so as to minimize surface water runoff and erosion.
- Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means.
- Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated.
- Wherever possible construction work will take place during the dry season.
- Topsoil shall be evenly spread across the cleared areas when reinstated.
- Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures).
- Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile.
- Spread mulch generated from indigenous cleared vegetation across exposed soils after construction
- At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.

Air Quality Impacts

Baseline Information

The settlements adjacent to Mwache Dam have been compensated and relocated away from the Project area. Therefore, no settlement is anticipated to be impacted by air quality pollution associated with dust and particulate matter. However, construction workers during Project construction phase might be impacted if air quality impacts are not well mitigated. Indirect impact could be associated with dust and particulate matter caused by trucks driving on marram roads in the villages supplying construction materials to the WTP. The villages include among others; Mwatate, Mataa, Gandini, Mwavumbo, Fulugani and Mazeras. **Table 6-3 and 6-4** presents WHO Ambient Air Quality baseline undertaken during the ESIA for Mwache Roads as presented below.

Table 6-3:Results for Particulate matter (<2.5 microns)

Site Name	GPS Coordinates	*Particulate Matter ≤2.5 ($PM_{2.5}$)*			
		Sampling time	Concentration (µg/m³)	Guideline (µg/m³)[1]	Remarks
ML-1	Latitude: -3.96186745 Longitude: 39.48289318	60 mins	19	35	In Compliance
ML-2	Latitude: -3.97748435 Longitude: 39.47854239	60 mins	20	35	In Compliance
ML-3	Latitude: -3.95865844 Longitude: 39.49393485	60 mins	15	35	In Compliance
ML-4	Latitude: -3.95860424 Longitude: 39.49380871	60 mins	10	35	In Compliance
ML-5	Latitude: -3.945777 Longitude: 39.508078	60 mins	10	35	In Compliance
ML-6	Latitude: -3.987867 Longitude: 39.483962	60 mins	18	35	In Compliance
ML-7	Latitude: -3.99486266 Longitude: 39.52313375	60 mins	17	35	In Compliance
ML-8	Latitude: -3.966963 Longitude: 39.537213	60 mins	44	35	In Compliance
ML-9	Latitude: -3.99480577 Longitude: 39.48320963	60 mins	22	35	In Compliance
ML-10	Latitude: -4.00267161 Longitude: 39.50586095	60 mins	16	35	In Compliance

Table 6-4: Results for Particulate matter (<10 microns)

Site Name	GPS Coordinates	*Particulate Matter ≤10 (PM_{10})*[2]			
		Sampling time	Concentration (µg/m³)	Guideline (µg/m³)	Remarks
ML-1	Latitude: -3.96186745 Longitude: 39.48289318	60 mins	27	100	In Compliance
ML-2	Latitude: -3.97748435 Longitude: 39.47854239	60 mins	35	100	In Compliance
ML-3	Latitude: -3.95865844 Longitude: 39.49393485	60 mins	25	100	In Compliance
ML-4	Latitude: -3.95860424 Longitude: 39.49380871	60 mins	23	100	In Compliance
ML-5	Latitude: -3.945777 Longitude: 39.508078	60 mins	20	100	In Compliance
ML-6	Latitude: -3.987867 Longitude: 39.483962	60 mins	31	100	In Compliance
ML-7	Latitude: -3.99486266 Longitude: 39.52313375	60 mins	26	100	In Compliance
ML-8	Latitude: -3.966963 Longitude: 39.537213	60 mins	63	100	In Compliance
ML-9	Latitude: -3.99480577 Longitude: 39.48320963	60 mins	38	100	In Compliance
ML-10	Latitude: -4.00267161 Longitude: 39.50586095	60 mins	29	100	In Compliance

Gaseous parameters

Baseline air samples were collected during the ESIA Study field assessment for analysis of Sulphur Dioxide, Nitrogen Dioxide, Carbon Monoxide and Ozone. The results of the selected gaseous parameters are presented in **Table 6.5** below.

[1] Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS)
[2] EMCA 1999 Air Quality Regulation of 2014

Table 6-5: Results for Gaseous Parameters

Quarry Site	*NO_2*		*SO_2*		*CO*		*O_3*		*REMARKS*
	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (mg/m^3)	EMC AQR guide 2014 (mg/m^3)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	
ML-1	<0.01	0.5	0.011	0.191	0.07	10.0	0.015	0.12	In Compliance
ML-2	<0.01	0.5	0.018	0.191	0.09	10.0	0.019	0.12	In Compliance
ML-3	<0.01	0.5	<0.01	0.191	0.10	10.0	0.009	0.12	In Compliance
ML-4	<0.01	0.5	<0.01	0.191	0.08	10.0	0.005	0.12	In Compliance
ML-5	<0.01	0.5	<0.01	0.191	0.05	10.0	0.007	0.12	In Compliance
ML-6	<0.01	0.5	<0.01	0.191	0.07	10.0	0.005	0.12	In Compliance
ML-7	<0.01	0.5	<0.01	0.191	0.07	10.0	<0.001	0.12	In Compliance
ML-8	0.08	0.5	0.03	0.191	0.22	10.0	0.07	0.12	In Compliance
ML-9	<0.01	0.5	<0.01	0.191	0.09	10.0	0.003	0.12	In Compliance
ML-10	<0.01	0.5	<0.01	0.191	0.13	10.0	<0.001	0.12	In Compliance

Air quality survey was completed for short term exposure levels as the preferred time weighted averages in order to measure and quantify the air pollutant levels so as to determine the current existing conditions within the project area. Monitoring was done for three runs for each parameter except for ozone which was carried out for one hour continuously. Results of the gaseous concentrations and particulate parameters were compared with the Environmental Management Coordination (Air quality) regulations of 2014. The analyses show that:

- All Nitrogen Dioxide monitoring data recorded in the project sites were below the EMC (Air quality) regulations 2014 of 0.5 ppm. The maximum 1-hour NO2 concentration was observed to be 0.03 ppm at the station ML—8 situated near Mazeras high school. The minimum 1-hour NO2 concentration was observed to be less than detection levels (<0.001) at all the remaining nine stations.
- All Sulphur Dioxide monitoring data recorded in the project sites were below the EMC (Air quality) regulations 2014 of 0.191 ppm. The maximum 1-hour SO2 concentration was observed to be 0.03 ppm at the station ML—8 situated near Mazeras high school. The minimum 1-hour SO2 concentration was observed to be less than detection levels (<0.001) at seven of the ten stations.
- All Carbon Monoxide monitoring data recorded in the project sites were below the EMC (Air quality) regulations 2014 of 10.0 mg/m3. The maximum 1-hour CO concentration was observed to be 0.22 mg/m3 at the station ML—8 situated near Mazeras high school. The minimum 1-hour CO concentration was observed to be 0.07 mg/m3 at the station ML—1, ML—6 and ML—7. The maximum and minimum results are 100.00% within the acceptable limits.
- All Ozone monitoring data recorded in the project sites were below the EMC (Air quality) regulations 2014 of 0.12 ppm. The maximum 1-hour O3 concentration was observed to be 0.07 ppm at the station ML—8 situated near Mazeras high school. The minimum 1-hour O3 concentration was observed to be less than detection levels (<0.001) at ML-7 and ML-10.

Potential Impacts

Project activities that have potential to impact air quality would be associated with emissions of air pollutants from temporary power generators, construction equipment, and vehicles. Construction activities will also create dust. The following would be expected during construction. Emissions of oxides of nitrogen (NO_2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and Dust and particulate matter (as PM_{10}) created by construction-related vehicle traffic on unpaved roads. However, once the WTP is built and operational and the site is reinstated, no significant effects on air quality are anticipated.

Mitigation

- Develop and implement a Dust Management Plan (DMP) and Undertake inspections to ensure compliance with the Dust Management Plan;
- Record all dust and air quality complaints, identify cause(s), take appropriate corrective actions
- Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter
- Remove dusty materials from site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible;
- Impose speed limits on haul routes and in construction compounds to reduce dust generation;
- Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and
- Revegetate exposed areas as soon as feasible;
- Revegetate or cover stockpiles if feasible;
- Expose the minimum area required for the works, and undertake exposure on a staged basis to minimise dust blow.

Noise and Vibration

Standard

The World Bank Group General EHS Guidelines provide guidance on acceptable noise levels based on WHO standards and these are set out in **Table 6.6**.

Table 6.6: World Bank Group Noise Level Guidelines

	MAXIMUM ALLOWABLE AMBIENT NOISE LEVELS, LAEQ,1HR, DBA FREE FIELD	
	DAYTIME	NIGHT-TIME
	07:00 – 22:00	22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

National Environment Management Authority (NEMA) noise levels, (EMCA Noise and Excessive Vibration Pollution) (Control) Regulations of 2009) maximum permissible noise levels for construction sites (Measurement taken within the facility) are shown **Table 6.7**.

Table 6.7: NEMA Noise Level Guidelines

SITE	DAY	NIGHT
Health facilities, educational institutions, homes for disabled	60dBA	35dBA
Residential	60dBA	35dBA
Other areas	75dBA	65dBA

Baseline

The equipment and plant used during construction will generate noise during construction activities that might affect communities living and working near to the works. However, this impact will not be significant.

As provided by the ESIA report for Mwache Roads, determination of noise significance of results (diurnal Average Leq) was done using compliance against the EMC (Excessive noise and vibration regulations) 2009 to ensure compliance amongst other aspects. The results indicate that diurnal noise Leq averages were rated as insignificant having scored < 75 units based on parameters and score criteria given in **Table 6.8**. Thus, there is no threat to the sensitive receptors of the noise emissions. The proponent is burdened with the task of maintaining the noise levels and in scenarios of exceedance during construction activities, implementing appropriate mitigation measures.

Table 6-8: Results for Singular Noise Measurements

Measured Sound Pressure Level (Noise) (dBA)				EMC Noise Regulation 2009	Site Notes / Remarks
19TH – 20TH February 2022				Day time	
	L_{eq}	L_{max}	L_{min}	Leq	
ML -1	46.7	78.1	38.7	55	The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 20.7 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -2	47.5	78.9	40.8	55	The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 20.5 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -3	44.1	75.3	34.5	55	The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 21 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -4	49.7	77.2	39.5	55	The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 20.3 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -5	50.3	78.8	43.2	55	Measurements are taken to quantify the prevailing ambient levels of noise. The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 21.2 km/hr East wind. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze & noise from motorbikes were the likely sources of

Measured Sound Pressure Level (Noise) (dBA)				EMC Noise Regulation 2009	Site Notes / Remarks
19TH – 20TH February 2022				Day time	
	L_{eq}	L_{max}	L_{min}	Leq	
					noise emissions. Audible sounds from the nearby road were also recorded.
ML -6	54.7	81.5	42.6	55	Measurements are taken to quantify the prevailing ambient levels of noise. The prevailing weather was sunny at the time of the acoustic survey. Wind speed averaged about 18.5 km/hr East wind. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -7	47.3	80.0	30.6	55	Measurements are taken to quantify the prevailing ambient levels of noise. The prevailing weather was sunny and a little cloudy at the time of the acoustic survey. Wind speed averaged about 5.0 km/hr East wind. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze & motorbikes were the likely sources of noise emissions.
ML -8	58.8	81.9	40.0	55	The prevailing weather was sunny and hot at the time of the acoustic survey. Wind speed averaged about 18.0 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels exceeded the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, lorries, personal vehicles & motorbikes were the likely sources of noise emissions.
ML -9	43.9	78.1	38.5	55	Measurements are taken to quantify the prevailing ambient levels of noise. The prevailing weather was sunny at the time of the acoustic survey. Wind speed averaged about 21.0 km/hr East wind. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities related to the proposed project were ongoing during measurements. Wind breeze, personal vehicles & motorbikes were the likely sources of noise emissions.
ML - 10	48.6	78.3	39.5	55	The prevailing weather was sunny and dry at the time of the acoustic survey. Wind speed averaged about 20.3 km/hr East wind. Measurements are taken to quantify the prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities were ongoing at the time of measurements. Wind breeze & motorbikes were the likely sources of noise emissions.

Noise measurements was initiated to obtain and quantify the prevailing ambient levels of noise before commencement of any activity in the proposed project area. The obtained noise results were thereafter compared with the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance. The highest diurnal noise emissions recorded at the proposed survey stations was 58.8 dBA at ML-8 while the lowest diurnal noise emission recorded was 43.9 at ML-9. Diurnal noise equivalent levels (Leq) recorded at nine of the ten survey stations before commencement of any activity at sites complied with the EMC noise and vibrations regulations of 2009. Diurnal noise equivalent levels (Leq) recorded at one of the ten survey stations (ML-8) before commencement of any activity at sites marginally exceeds the EMC noise and vibrations regulations of 2009.

Table 6-9: Results for noise equivalents

Monitoring locations	Diurnal LA_{eq} results	Maximum noise level permitted (Leq) in dB (A) Day (0601-2000) hrs	Comments
ML-1	46.7	55	In Compliance
ML-2	47.5		In Compliance
ML-3	44.1		In Compliance
ML-4	49.7		In Compliance
ML-5	50.3		In Compliance
ML-6	54.7		In Compliance
ML-7	47.3		In Compliance
ML-8	58.8		Exceeds
ML-9	43.9		In Compliance
ML-10	48.6		In Compliance

Table 6-10: Determination of noise significance of results

MEASUREMENT SITE	ASPECT	CONDITION/A	IMPACT	QUANTITY A	OCCURRENCE	IMPACTS	DETECTION	CONTROL	LEGISLATION	TOTAL A*B*C*D	REMARKS SIG / INSIG
ML-1	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-2	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-3	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-4	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-5	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-6	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-7	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-8	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-9	NOISE	N/A	Hearing impairment	1	5	1	1	1	1	5	INSIG
ML-10	NOISE	N/A	Hearing impairment	1	5	1	1	1	10	50	INSIG

This baseline ambient noise measurement report documented the current noise levels and meteorological conditions for the proposed project shows that the quantity of diurnal noise measured and recorded from the survey locations ML-1, ML-2, ML-3, ML-4, ML-5, ML-6, ML-7, ML-9 and ML-10 complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq). However, the quantity of diurnal noise measured and recorded from the survey location ML-8 exceeded the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq).

The baseline results obtained at the monitoring locations shows that all the locations are noise insignificant areas hence there is no threat to the sensitive receptors around these areas. Ambient conditions existed at the time of the survey. The existing identifiable sources of noise emissions before commencement of the proposed projects included commercial vehicles, personal automobiles, tuk tuks vehicles and motorcycles accessing the residences through the respective marram feeder roads.

Vibration level monitoring

Monitoring of vibration intensities in the proposed project area involved inspection of the monitoring points and the implicated activities associated with the area; identification of ten perimeter points; verification / Calibration of the vibration meter before the measurements and; vibrations levels are established using a Vibration Meter spiked and attached into the ground to measure the ranges of acceleration, velocity, and displacement for a period of 15 minutes every one-hour interval. As each individual measurement were taken, the nature of the climate in the area was assessed and recorded. Observations made by the surveyor included the identification of those incidents which could have influenced the vibration level readings during that measurement period.

The tools and equipment used in this task were:

- Vibration Meter - AWA 5936
- GPS
- Digital camera

Vibration levels monitoring was conducted once before commencement of works on the 19th and 20th February 2022. The short-term vibration survey and data collection for velocity, displacement and acceleration levels were considered sufficient to understand background vibration conditions.

Data Validity and Acceptability of noise survey

All vibration survey data was taken through a data replications and quality assurance procedure to ensure that any anomalous readings or questionable data is not incorporated in the final results. Elements of this procedure account for: routine calibration and auditing of the analysers; zero correction of the baseline drift and noise and; statistical rendering of outliers. The locations for monitoring vibration levels are shown in **Table 6-11.** Vibration measurements are shown in **Table 6-12**.

Table 6-11: Measurement Locations

Site Name	GPS Coordinates	Test Parameters
ML-1	Latitude: -3.96186745 Longitude: 39.48289318	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-2	Latitude: -3.97748435 Longitude: 39.47854239	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-3	Latitude: -3.95865844 Longitude: 39.49393485	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-4	Latitude: -3.95860424 Longitude: 39.49380871	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)

Site Name	GPS Coordinates	Test Parameters
ML-5	Latitude: -3.945777 Longitude: 39.508078	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-6	Latitude: -3.987867 Longitude: 39.483962	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-7	Latitude: -3.99486266 Longitude: 39.52313375	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-8	Latitude: -3.966963 Longitude: 39.537213	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-9	Latitude: -3.99480577 Longitude: 39.48320963	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)
ML-10	Latitude: -4.00267161 Longitude: 39.50586095	Displacement (mm), Velocity (mm/s), Acceleration(m/s^2), Calculated minimum acceleration (m/s^2)

Several observations were made in the project area:

- The current source of vibration is mobility of motorbikes, private motor vehicles and few commercial vehicles along the respective nearby access marram roads.
- The maximum displacement value recorded was 0.0094 mm at monitoring site ML-8 while the minimum displacement recorded was 0.00169 mm at survey site ML-7.
- The maximum acceleration values recorded were 0.091 mm/s2 at monitoring site ML-8 while the minimum acceleration recorded was 0.002 mm/s2 at survey site ML-7.
- The maximum velocity values recorded were 0.90 mm/s at monitoring site ML-8 while the minimum acceleration recorded was 0.12 mm/s at survey site ML-2.
- The maximum calculated average acceleration of 59.5 dB (A) was compared against the 60dB (A) limits and found to comply with the EMC excessive noise and Vibration regulation 2009 while the minimum calculated average acceleration of 44.56 m/s^2 also complied with EMC excessive noise and Vibration regulation 2009.

The average calculated acceleration against the EMC (noise and excessive vibration regulations) 2009 shown that all the ten survey locations complied with regulatory guidelines. A maximum calculated average acceleration of 59.5 dB (A) was obtained at monitoring site ML-8 whereas the minimum calculated average acceleration of 44.56 dB (A) was recorded at survey site ML-7. This acceleration level, recorded at the survey location ML-8, was as a result of regular movement of commercial vehicles, personal vehicles, tuk tuks and motorbikes.

The average measured displacement against the EMC (noise and excessive vibration regulations) 2009 indicated all the survey locations notably exceed the regulatory guidelines. The maximum displacement value recorded was 0.0094 mm at monitoring site ML-8 while the minimum displacement recorded was 0.00169 mm at survey site ML-7. Routine movement of commercial vehicles, personal vehicles and tuk tuks influenced the displacement levels.

The average measured velocity against the EMC (noise and excessive vibration regulations) 2009 implied that all the ten survey locations were conspicuously lower than the regulatory guidelines hence compliant. Movement of commercial vehicles, personal vehicles and tuk tuks influenced the velocity levels.

Table 6-12: Vibration Measurement Results

MONITORING LOCATIONS	Time (Hrs)	Acceleration (m/s^2)	Velocity (mm/s)	Displacement (mm)	Calculated minimum acceleration (db) =20*LOG(A/Ao)	Observations
					A0 = 10^-5	
ML-1	1130 -1145	0.024	0.20	0.00200	46.02	Movement of personal vehicles & motorbikes
ML-2	1230 - 1245	0.018	0.12	0.0019	45.7	Movement of personal vehicles & motorbikes
ML-3	1300 - 1315	0.011	0.26	0.00320	50.10	Movement of personal vehicles & motorbikes
ML-4	1335 -1350	0.024	0.25	0.00203	46.15	Movement of personal vehicles & motorbikes
ML-5	1430 - 1445	0.040	0.40	0.00418	52.42	Movement of personal vehicles & motorbikes
ML-6	1518 - 1533	0.040	0.47	0.00305	49.69	Movement of personal vehicles & motorbikes
ML-7	1115 - 1130	0.002	0.14	0.00169	44.56	Movement of personal vehicles & motorbikes
ML-8	1241 - 1256	0.091	0.90	0.0094	59.5	Movement of commercial vehicles, personal vehicles, tuk tuks & motorbikes
ML-9	1346 - 1401	0.020	0.32	0.0028	48.8	Movement of personal vehicles & motorbikes
ML-10	1429 - 1444	0.030	0.31	0.0036	51.2	Movement of personal vehicles & motorbikes

This baseline vibration emissions measurement study documented the current vibration levels for the proposed project. The average calculated acceleration was compared to the EMC (noise and excessive vibration regulations) 2009 and results depicted that the ten survey locations complied with regulatory guidelines. The calculated acceleration was within the maximum permissible levels at each survey location.

Also, the average measured displacement was compared to the EMC (noise and excessive vibration regulations) 2009 and results showed that the ten survey locations exceeded the regulatory guidelines before commencement of any proposed project activities. The displacement values exceeded the maximum permissible levels at each survey location. Lastly, the average measured velocities were compared with EMC (noise and excessive vibration regulations) 2009 and results revealed that the ten survey locations complied with regulatory guidelines. The measured velocities were within the maximum permissible levels at each survey location. The existing identifiable sources of vibration before commencement of the proposed projects included commercial vehicles, personal vehicles, tuk tuks and motorbikes accessing the residences through the respective marram feeder roads.

Mitigation

- Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable;
- Where practicable noisy equipment will be orientated to face away from the nearest human settlement and other receptors;
- Working hours for significant noise generating construction work (including works required to upgrade existing access roads), will be daytime only;
- Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable;
- Where practicable, stationary equipment will be located in an acoustically treated enclosure;
- For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;
- Throttle settings will be reduced and equipment and plant turned off, when not being used;
- Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.

6.4.2 Impact on Biological Resources and Receptors

Flora and Fauna

Baseline

Flora of the Water Treatment Plant (WTP) Site is influenced by the Mwache Forest which is adjacent to the site. However, specific site exhibits Arid and Semi-Arid (ASAL) characteristics. In terms of Agro-ecological zone classification, the site is located within Agro Ecological Zones (AEZ) three. Vegetation cover observed include various species of *acacia Sp. Acacia ssp, Diospyros ssp, Cynometra-Manilkara type and Euphorbia bushland,* other exotic trees include *Tamarind tree, Neem tree, Flame Tree.*

Impact

The Project activities will not directly interphase with the above discussed Flora and Fauna and therefore the impact is assessed to be minimal, occasionally triggered by invasion by non-native plant species. Loss of plant communities may also result in soil erosion or compaction. The loose soil material may also be washed down into the lower areas (streams and valleys).

Mitigation

The following standard mitigation measures will be employed

- Ensure proper demarcation and delineation of the project area to be affected by construction works;
- It is recommended that indigenous trees or other fast-growing trees be planted in strategic locations where the vegetation cover will be cleared as part of landscaping initiatives;
- Compensatory planting of trees i.e. plant at least twice the number of affected trees
- The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc. shall be encouraged.
- Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.
- Reinstatement of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants

6.4.3 Impact on Social Resources and Receptors

Workers and Community Health Safety

Baseline

The settlements adjacent to Mwache Dam have been compensated and relocated away from the Project area. Therefore not settlement is anticipated to be impacted by air quality pollution associated with dust and particulate matter. However, construction workers and Community members living in adjacent villages (Mwatate, Mataa, Gandini, Mwavumbo, Fulugani and Mazeras) during Project construction phase might be impacted by risks related to Health and Safety

Impact Assessment

During construction there will be an increase in traffic movements of heavy machinery and light vehicles on roads within the project area. This will include, pipe delivery trucks, cement trucks, transport of construction material, excavation machinery, etc. which is expected to increase the risk of road traffic accidents and potential injuries or fatalities to other road users. Also, open un-barricaded trenches or without warning tapes could fill up with water during rainy seasons and expose the community to the risk of drowning as well as trip and fall.

Mitigation

The following mitigation measures will be implemented during the construction phase to reduce any impacts on community health and safety.

- To reduce on the workers accidents and hazards, Contractor will develop and monitor implementation of a Community Health and Safety Management Plan (CHSMP) which will include the following measures:
- Workers will be provided with suitable PPEs to avoid cuts on the feet, hands and head during the course of duty. These include helmets, gloves, safety boots overalls, face masks and ear plugs in dusty and noise activities;
- Provision of adequate sanitary facilities to workers, separate for either gender.
- Train all workers on Safety Health and Environment (SHE) with an aim of improving awareness;
- The workers or their representatives will be trained on first aid and provided with first aid kits
- Trenches as provided by design will be vary depending on the elevation of work section, therefore any trench over 1.5m deep will be secured against accidental entry by workers and the public using barriers and warning tapes. Additionally, the contractor will put in place measures that will contain trench collapse risk such as battering or benching
- The contractor will install appropriate safety signage along the work areas;
- Emergencies: the workers should be provided with emergency telephone numbers to request for assistance at any time of accident
- Where construction activities interfere with the movement of traffic, appropriate signage will be installed and controlled by trained flagmen/flag women and lit by night.
- Public awareness/Training for first aid providers/divers

Gender Based violence and Sexual Harassment

GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. All forms of GBV including grooming are unacceptable be it on the work site, the work site surroundings, or at workers' camps. Prosecution of those who commit the offence to be pursued.

This impact triggered during Project Construction Phase is likely to occur. Therefore, below listed provisions are provided will be in cooperated in the Code of Conduct (CoC) to be signed by all project workers in order to mitigate against such GBV related Project induced impacts.

Mitigation Measures

- The contractor will mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule.
- The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability and VMGs.
- Treat women and children (persons under the age of 18) with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
- Do not use language or behaviour towards women or children that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Sexual activity with children under 18—including through digital media is prohibited. Mistaken belief regarding the age of a child and consent from the child is not a defense.
- Exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behaviour is prohibited.
- Sexual interactions between contractor's and consultant's employees at any level and member of the communities surrounding the workplace that are not agreed to with full consent by all parties involved in the sexual act are prohibited. This includes relationships involving the withholding, promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex – such sexual activity is considered "non-consensual" within the scope of this Code.
- Where an employee develops concerns or suspicions regarding acts of GBV by a fellow worker, whether in the same contracting firm or not, he or she must report such concerns in accordance with Standard Reporting Procedures.
- All employees are required to attend an induction-training course prior to commencing work on site to ensure they are familiar with the GBV Code of Conduct.
- All employees must attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the institutional GBV Code of Conduct.

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 a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018).
- Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials;
- Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management;

- Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of Sexual Exploitation and Abuse (SEA) awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their SEA-related rights;
- Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.

6.5 OPERATION PHASE NEGATIVE IMPACTS

6.5.1 Permits and Licenses Required

The Plant Operator (CWWDA) will apply and secure below listed permits in **Table 6.13** before commissioning of the Water Treatment Plant

Table 6.13: Permits and Licenses Required

PERMIT	REQUIREMENT	RELEVANT REGULATION / RULE
Approval, Authorization and Permits	WTP Operator (CWWDA) will apply and renew water Abstraction permit for Mwache Water Treatment (WTP) Plant from Water Resources Authority (WRA), activities are listed under the Sixth Schedule of the Rules.	Water Rules 2007: Part II - Approval, Authorization and Permits
Control of Pollution and Water Quality Requirements	Mwache Water Treatment Plant PDR has provided for appropriate handling of sludge as summarized in sub section 5.5.3 below. Additionally, procurement of reagent will be done in batches with enough doses to eliminate the risk of some of the reagent expiring therefore requiring disposal.	Water Rules 2007: Part V Water Quality Monitoring and Effluent Discharge
Water Use Charges	A master meter will be installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA	PART VIII - Water Use Charges

6.5.2 Management of Backwash Water from the WTP

Filtration acts as the final step in the removal of suspended matter and protozoa in Water Treatment Plants. The accumulated residue is removed during the backwash process and any subsequent recycling of filter backwash water could potentially re-introduce these contaminants into the main treatment process.

By separating the filter backwash water from the main treatment process, factors that could interfere with the integrity of the primary treatment barriers, will be eliminated. Treatment and recovery of the filter backwash water would be beneficial in terms of water reuse, by replacing a proportion of the freshwater demand.

For Mwache Water Treatment Plant (WTP) the PDR provides for; filter backwash, Wash water pumps and air blowers and Wash Water Supply Tank. The PDR provides that this tank is part of the treated water tank, separated from it by a wall. The UV disinfected water goes first to the wash water supply tank and when it is full, the overflow goes to the rest of the tank. The injection of chlorine occurs after this tank. In this way the water used for the filter washing is disinfected only by UV.

6.5.3 Erosion Control at Washouts

The Project design provides for construction of a concrete chamber filled with stone at the washout chambers that reduces that corrosion effected of water before that water drains into the storm water channels , this measure will control erosion of soils at the outfalls of the washout valves along the raw water transmission pipeline from the dam outlet to the WTP . . This measure will significantly reduce back wash water pressure ultimately eliminating corrosion impact of the back wash outfall that would have otherwise eroded soil.

6.5.4 Sludge Management

Surface water treatment for potable supplies typically involves coagulation, flocculation, sedimentation, and filtration processes for removing colloidal as well as suspended solids from raw water. All Water Treatment Plants (WTPs) produce waste/residue known as Water Treatment Sludge (WTS) during the purification of raw water.

Sludge if not properly managed can result to below listed impacts

- Sludge can contain pollutants that accumulate in the environment and contaminate soil, water
- Disease: Open dumping of sludge can cause disease outbreaks.

The PDR provides that for Mwache Water Treatment Plant (WTP), sludge will be generated mainly from flotation and filters backwash. The PDR provides that sludge coming from fine screening has been considered as negligible.

The sludge from the clarifiers is sent to two conventional static thickeners. The extracted sludge, at the average concentration of 3 g/l of SS is thickened up to 15 g/l, using a polymer as flocculant. Thickeners are circular in shape, fitted with a rotary mechanism with scrapers in the bottom and a picket fence. The very slow rotation helps for the releasing of the interstitial water of the sludge and pushes the sludge down into the sludge hopper for the extraction pumping. The overflow is discharged to the dam.

The drying beds achieve the dewatering of the sludge, allowing an easy handling and evacuation. The drying beds are made of:

- ✓ A first layer of gravel including the drains, 15 cm.
- ✓ A second layer of sand for the filtration, 20 cm.

The operation comprises:

- ✓ A first phase of filling, about 20 days, meanwhile part of the volume is eliminated by overflow, after settling of the sludge. At this end of this period, the filling is stopped. Other beds are required to continue the treatment.
- ✓ A second phase, with a variable duration, depending on the weather conditions, for the atmospheric drying of the sludge. After the drying period, the dry solid content can reach 40% with good conditions.

The envisaged sludge accumulation rate will be approx. 1290 ton per year. The sludge will be sold off to fertilizer manufactures or disposed off into a sanitary landfill to be constructed on site

6.5.5 Management of Reagents at the WTP

Analysis of Reagent on Site During operation of the WTP is summarized in **Table 6.14** below.

Table 6.14: Management of Reagents on Site

Reagent	Details
Aluminium sulphate[3]	Aluminium sulphate is used to remove organic compounds from wastewater and potable water, the chemical encourages small particles to cling to larger particles in water. When the large particles are filtered out, much of the aluminium sulphate goes with them. While aluminium sulphate can't remove pathogens or bacteria, the coagulation process reduces the presence of dissolved substances in water, which means less chlorine is needed for disinfection. The product is used in its powder form and stored in big bags. The product is dissolved in a tank by stirring. The tank is made of High-density polyethylene (HDPE) and polypropylene PP because of the acidity of the solution. All injection pipes will be double-skinned.
Sulphuric Acid[4]	The product is used in its liquid form and delivered by tanker on site. The acid is stored in a tank made of HDPE or PP because of the acidity of the solution. All injection pipes will be double-skinned.
Polyelectrolyte or Polymer[5]	Polymer is required for sludge thickening. The product is used in its powdered form and stored with bags. The preparation is done by automatic unit. The preparation will be made in continuous manner controlled by the plant operator . The injection will be at the entrance of flocculators.
Calcium hypochlorite[6]	The calcium hypochlorite is stored in the form of powder. It is prepared when needed by dissolution in a tank with agitator
Hydrated Lime[7]	Hydrated lime will be stored in the form of powder. It is prepared when needed by dissolution in a tank with agitator

All the reagent listed above can be harmful to humans, causing severe burns if it touches bare skin and irritation and coughing if inhaled

For Mwache Water Treatment Plant, PDR has provided for a well ventilated and proper lighting chemical storage house. Further, personnel handling the reagents will be trained on the properties of each reagent and the handling requirements, and will be provided with appropriate PPEs such as gloves, nose masks and googles to protect them from the chemicals. Also, procurement of reagent will be done in batches with enough doses to eliminate the risk of some of the reagent expiring before use therefore requiring to be disposed off .

3 Aluminum sulfate is also known as filter alum or dialuminium trisulphate. It is noncombustible and nontoxic, but it can be irritating to the skin and eyes, and mildly dangerous if swallowed. It can also be harmful to the respiratory tract and gastrointestinal trac

4 Sulfuric acid is acolorless oily liquid. It is soluble in water with release of heat. It is corrosive to metals and tissue. It will char wood and most other organic matter on contact, but is unlikely to cause a fire

[5] Polyelectrolyte is a type of polymer with positive or negative charges on its repeating units, and may dissociate in water or lower alcohol, forming a charged polyion surrounded by an atmosphere of small, mobile counter ions

[6] Calcium hypochlorite is generally available as a white powder, pellets, or flat plates. It decomposes readily in water or when heated, releasing oxygen and chlorine. It has a strong chlorine odor, but odor may not provide an adequate warning of hazardous concentrations

[7] **Lime** is an inorganic material composed primarily of calcium oxides and hydroxides. It is also the name for calcium oxide which occurs as a product of coal-seam

Reagents Handling Arrangements

- Wear protective equipment: Wear approved personal protective equipment (PPE), including impervious clothing, gloves, goggles, and footwear. Do not wear contact lenses.
- Use in well-ventilated areas: Only use aluminum sulfate outdoors or in a well-ventilated area.
- Avoid inhalation: Do not breathe dust, fumes, mist, or vapors. If using a respirator, only use one that is NIOSH approved and has a P95 filter.
- Take precautions against static discharge: Ground or bond the container and receiving equipment.
- Wash hands: Wash your hands after use.
- Avoid food and drink: Do not eat, drink, or smoke in work areas. Keep food and drink away from chemicals.
- Store properly: Store chemical containers with closed lids when not in use.
- Clean up spills: If aluminum sulfate is spilled, sweep or shovel up dry spills and place in a covered container. Wash down residue with large amounts of water.
- Dispose of properly: Collect and seal in properly labelled containers or drums for disposal

6.5.6 Sewerage Management on Site

The Environment License issued for the Project provided that the Proponent shall ensure that all wastewater is disposed as provided by Water Quality Regulation of 2006. The PDR has provided construction of a septic tank which will collect sewage from toilet facilities at staff houses and toilets within the water treatment plant for treatment and safe disposal.

6.5.7 Fencing of the Water Treatment Plant

Securing the Water Treatment Plant is an important measure of ensuring safety of the water supplied to the community and elimination of incidences related to livestock and human drowning in the sedimentation tanks. For Mwache Water Treatment Plant, fencing of the facilities is among the site Auxiliary activities of the Project provided in the PDR.

6.5.8 Aesthetic and Hygiene

The assessment provides that the WTP shall be well maintained, the lawns will be well moored and foot path within the Treatment Plant kept free from dead plant biomass. Further, the Plant Operator (CWWDA) will contract a cleaning firm that ensures that the Water Treatment Facilities are well maintained in terms of Aesthetics and Hygiene

6.5.9 Afforestation Program

The Water Rules 2007, Part (ix) on Conservation of Riparian and Catchment Areas regulation 120.(1) provides that for the purposes of conserving the catchments and riparian areas, the authority may by order or state as a condition on an authorization or permit, require a person to prepare and conform to a Soil and Water Conservation Plan (SWCP). In compliance with this regulation, a forestation program in liaison with Kenya Forest Services (KFS) will be initiated within the WTP and dam peripheries.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMP)

7.1 PURPOSE AND OBJECTIVES OF ESMP

The specific objectives of the ESMP are to:

- Serve as a commitment and reference for the Contractor to implement the ESMP including conditions of approval by NEMA.
- Serve as a guiding document for the environmental and social monitoring activities during construction and operation of the Water Treatment Plant (WTP).
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment, health and safety of workers and community.
- Provide instructions to relevant project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the operator's goal of minimal or zero incidents.
- Document environmental concerns and appropriate protection measures while ensuring that appropriate actions are completed promptly.

7.2 ESMP DURING CONSTRUCTION OF THE WTP

The Environmental, Social Management and Monitoring Plan (ESMP) prepared for proposed Mwache Water Treatment Plant (WTP) is presented in **Table 7.1**.

Table 7.1: Environment and Social Management Monitoring Plan during Construction of WTP

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
Impacts on Water Resource	• Site activities such as excavations and levelling could result to loosening of soils that could result to sedimentation and siltation of storm water drainage channels and eventually into seasonal Streams the drain runoff from the WTP • Un-serviced plant and equipment on site could result to oils and fuels leaks that could contaminate water resources rising the BoD and adversely affecting aquatic organism in seasonal Streams.	• Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable • Potential pollutants of any kind and form shall be kept, stored and used in such a manner that any escape can be contained • In case of any form of pollution the contractor should notify the Resident Engineer (RE) • Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas including groundwater are not polluted • No grey water runoff or uncontrolled discharges from the site or working areas to any adjacent Storm water channels .	Contractor	• State of natural storm water drainage channels, parameters to be checked include. BoDm TSS, TDS, colour, pH conductivity among others • Quality of water flowing within seasonal Streams that drain runoff from the WTP the monitoring frequency shall be quarterly for a period of 2years	Preliminary Sum of Ksh 500,000 to be allowed for water pollution control
Impacts on Soil Resource	• Soil include erosion resulting from activities such as excavation and levelling, clearing of vegetation for infrastructure such as access roads, laydown areas and construction zones • Soil contamination as a result of possible oil and fuel leaks from un serviced plant and equipment on site.	• Vegetation clearing and topsoil disturbance will be minimized. • Contour temporary and permanent access roads / laydown areas so as to minimize surface water runoff and erosion. • Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means. • Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. • Wherever possible construction work will take place during the dry season. • Topsoil shall be evenly spread across the cleared areas when reinstated.	Contractor	• State of natural storm water drainage channels • Quality of water flowing within seasonal Streams	Preliminary Sum of Ksh 500,000 to be allowed for soil erosion control

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). ● Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. ● Spread mulch generated from indigenous cleared vegetation across exposed soils after construction ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which will include among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.			
Impacts on Air Quality	● Emissions of oxides of nitrogen (NO2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and ● Dust and particulate matter (as PM10) created by construction-related vehicle traffic on unpaved roads.	**As general measures for all locations:** ● Develop a Dust Management Plan (DMP); ● Record all dust and air quality complaints, identify cause(s), take appropriate measures; ● Liaise with local communities to forewarn of potentially dusty activities; ● Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter ● Undertake inspections to ensure compliance with the Dust Management Plan; ● Plan potentially dusty activities so that these are located as far from receptors as feasible; ● Erect solid screens if feasible around stockpiles and concrete batching; ● Avoid run off of mud and water and maintain drains in a clean state; ● Remove dusty materials from site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; ● Impose speed limits on haul routes and in construction	Contractor	● Compliance level against the Dust Management Plan ● Services and inspection reports of plant and equipment ● Air quality monitoring report findings that detail levels of PM10 and 2.5, Sox, NO, and O_3 from vehicles and machinery on site, motoring will be done quarterly for period of 2 years ● Number of complaints from community related to dust menace	Preliminary Sum of Ksh 500,000 to be allowed for air pollution control

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		compounds to reduce dust generation; ● Minimize drop heights when loading stockpiles or transferring materials; and ● Avoid waste or vegetation burning. **For traffic on unpaved roads:** ● Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and ● On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity. **For excavations and levelling** ● Revegetate exposed areas as soon as feasible; ● Revegetate or cover stockpiles if feasible; ● Expose the minimum area required for the works, and undertake; and exposure on a staged basis to minimize dust blow.			
Noise and Vibrations Impacts	Construction activities and equipment are not expected to result in significant levels of vibration. Equipment that might cause high levels of vibration (such as impact piling or vibratory compaction) will not be used	● Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable; ● Where practicable noisy equipment will be orientated to face away from the nearest Human settlement and other receptors; ● Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only; ● Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable; ● Where practicable, stationary equipment will be located	Contractor	Noise and excessive vibrations at identified locations around the WTP on a quarterly basis for a period of 2 years	Preliminary Sum of Ksh 250,000 to be allowed for noise and excessive vibrations control

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		in an acoustically treated enclosure; ● For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals; ● Throttle settings will be reduced and equipment and plant turned off, when not being used; ● Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.			
Impacts on vegetation cover	Stripping of vegetation cover will be on isolated cases only limited the trees and will have minimal impact to soil structure.	● Avoidance of impacts should be prioritized. However, if not possible then compensatory planting of trees that will be cut by the contractor during works will be undertaken. ● Vegetation shall only be within the affected Project site if the vegetation will not interfere with Project construction and/or present a hazard. ● Areas to be cleared shall be agreed and demarcated before the start of the clearing operations to minimize exposure. ● The use of existing cleared or disturbed areas for the Contractor's office, stockpiling of materials etc. shall be encouraged. ● Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible. ● Rehabilitation of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants	Contractor in liaison with KFS	● Number of trees replanted as compensatory trees ● Status of reinstatement of completed sites	Preliminary Sum of Ksh 200,000 to allowed for procurement and planting of compensatory tree seedling
Community Health Safety	Increased Project-related traffic, civil works for site preparation including site	● Contractor will develop and monitor the implementation of a Community Health and Safety	Contractor	● Number of incidences recorded on site and	Preliminary Sum of Ksh

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
and Security Impacts	clearance and excavation and levelling, change to the environment due to increased noise, decreased air quality, inappropriate waste handling or disposal, and accidental leaks and spills, and the presence of the Project workforce all present potential hazards for the health and safety of local communities	Management Plan (CHSMP) as summarized below ✓ DOSH Licenses – Displayed at Contactors and Engineers Offices ✓ Health and Safety Personnel on Site including Ing their CVs ✓ Traffic Marshalls on site ✓ List of the First Aiders and their Certificates ✓ Health and Safety Committee – 14 members – evidence of Health and Safety Committee meetings ✓ Training undertaken by Contractor – Basic First Aid, OHS training, let's have records ✓ Labour Register- segregated by Gender and PLWD signed by RE and Site agent ✓ Copy of Signed Code of Conduct with attached ID of all workers ✓ PPE Register, signed by Site agent and RE ✓ Signages, Barricaded and Warning tapes registers and fully installed on sites where we have active works ✓ Evidence of Sanitation facilities on site (active worksites) separate for male and female workers ✓ MoU / receipts for the Hospitals that the contractor has arrangements to handle emergency at the site ✓ Contracted Service provider for Waste Handling (Copy of license or Payment receipt), ✓ Up to date GRM Logs, ✓ Up to date Accident Logs including all minor first aid administered ✓ Emergency Notice board / contact numbers ✓ PPE register / Record of issuance by the contractors, PPE Policy ✓ Tool Box Induction Records,		within communities ● Community satisfactory reports with regards to health and safety ● Reported and addressed grievances on site and from communities	1,000,000 to allowed for addressing Community health and security impacts

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		✓ Health and Safety, GBVA / Child Labor Policies displayed at Campsite and RE office, ✓ Due diligence - Licenses and permits acquired for the materials supply sites. ✓ HIV AIDS Awareness Training Plan and Records, and ✓ Status of Fire Preparedness at sites ● Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals as summarized below ✓ MoU / receipts for the Hospitals that the contractor has arrangements to handle emergency at the site ✓ Emergency Notice board / contact numbers ✓ Status of Fire Preparedness at sites ● Contractor will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the induction process. ● Contractor will provide primary health care and first aid at construction office sites to avoid pressure on local healthcare infrastructures. ● Contractor will implement a Community Grievance Mechanism. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as ✓ vehicle safety to be documented in the inspection reports by National Transport and Safety Authority (NTSA), ✓ Driver and passenger behaviour to be included in the CoC for all drivers ✓ Use of drugs and alcohol to be included in the			

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		ESHS trainings ✓ operating hours as per the Environment license 8am to 5pm ✓ rest periods between 1p, to 2pm ✓ community education on traffic safety and a ✓ Accident reporting and investigations as provided by ESIRT.			
Worker Health and Safety and Workers Management impacts	Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. These issues should be considered not only for those who are directly employed on the Project. The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice.	● Contractor will develop a Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime, holidays etc. contractor will require its subcontractors to put in place policies in line with national legislation and applicable international legislation and contractor Code of Conduct and Policies. ● Contractor will establish contractual clauses (signed code of conduct) to be embedded in the contracts of the workers and sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights. ● Contractor will prohibit the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment. ● Contractor sub contractors contractors will assess the H&S risks related with the tasks to be performed during the construction phase. ● Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting pre-employment medical assessments include a safer working environment, reduction in	Contractor	● Number of incidences recorded on site and within workers ● Workers satisfactory reports with regards to health and safety ● Reported and addressed grievances on site and from workers ● Signed code of conduct ● Number of H&S trainings; ● Number and frequency of toolbox talks; ● Number and adequacy of PPE; ● Number of audits and inspections undertaken; ● permits obtained	Preliminary Sum of Ksh 1,500,000 to allowed for addressing Worker's health and security impacts

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		workplace injuries, minimized downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. ● Contractor will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. ● Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. ● Contractor will develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors. ● Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. ● Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. ● Contractor will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations ● Contractor will ensure that IFC/World Bank Health and Safety guidelines regarding the construction and management of worker accommodation and the provisions of medical facilities at worker accommodation are followed.			

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● Contractor will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations. ● Contractor will develop a Waste Management Plan for the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.			
	Gender-based violence and Sexual Harassment	● Ensure clear human resources policy against sexual harassment that is aligned with national law ● Integrate provisions related to sexual harassment in the employee COC ● Ensure appointed human resources personnel to manage reports of sexual harassment according to policy ● The Contractor shall require his employees, sub-contractors, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse ● The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: - effective and on-going community engagement and consultation, particularly with women and girls; - Review of specific project components that are known to heighten GBV risk at the community level, e.g., compensation schemes; employment schemes for women; etc.	Contractor	● Mitigation plan for GBV occurring at the community level as a result of project implementation ● Number of GBV cases happening at the community level that receive survivor-centered referral and care	1,000,000 for SEAH

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● the contractor shall develop specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment; etc. ● The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level ● Procure the services of an expert to prepare the GBV / SEAH Prevention Plan			
	Sexual Exploitation and Abuse by project workers against community members	● Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). ● The SEA action plan will include how the project will ensure necessary steps are in place for: - Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; - Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to		● SEA Action Plan ● Code of Conduct ● Number of staff trainings ● SEA FP ● Community Liaison trained in PSEA ● IEC materials for workers sites and community ● Discrete SEA reporting pathway ● Relevant policies, e.g., investigations and discipline and whistle blower protection ● Monthly minutes from SEA coordination meetings	Ksh 500,000

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		women and girls about social risks and their PSEA-related rights; ● Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.			
HIV/AIDs	Spread of communicable diseases and HIV/AIDS	● Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS and sexual health and rights through staff training, awareness campaigns, multimedia and workshops or during community Barazas. ● Use existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members ● Ensure safety of women and girls in provision of VCT services. ●	Contractor and CWWDA	● Number of cases of diseases reported ● Rate of absenteeism due to diseases ● No of workers trained on HIV/ AIDS ●	Preliminary and General Sum of Ksh 500,000 for awareness and purchase of condoms
				Sub Total ESMP	**6,950,000.00**

7.3 STATUTORY REQUIREMENTS PRE-COMMISSIONING OF THE WTP

Occupational health and Safety Ach (OSHA 2007) provides below detailed statutory provisions before commission operation of the WTP. The measures are listed below.

(i) Register the Mwache Water Treatment Plant (WTP) as a Workplace with DOSHS as required by OSHA 2007
(ii) Undertake risk assessment, safety and health audit and fire safety audit for the WTP
(iii) Prepare safety & health policy, fire safety policy and environment policy for the WTP
(iv) Establish Health and Safety Committee (HSC) for WTP and train members of the committee on;

- *Statutory fire marshal training*
- *Statutory first aid training*
- *Statutory safety and health committee training on Occupational Health and Safety (OSH)*
- *Regular provision of personnel at the Treatment Works with Appropriate Personal Protective Equipment's (PPEs)*

The plan presented under **Table 7.2** will guide the Plant Operator to conform to the provisions of OSHA pre- commissioning of the WTP.

Table 7.2: OSHA 2007 Statutory Provisions Pre-Commissioning of the WTP.

Activity	Requirement	Conformity Measure	Monitoring Indicator	Responsibility	Timelines	Budget (Ksh)
Registration of the Water Treatment Plant as Works Place with DOSH	OSHA 2007 requires that any workplace with more than 7 employees should be registered as a workplace	*Register the Proposed Mwache Water Treatment Plant as Workplace with DOSH*	Availability of Valid Registration Certificate from DOSH	*WTP Operator (CWWDA)*	Immediate	*50,000*
Duties Of Occupiers (Legal Requirements)	• Risk Assessment • Safety and Health Audit • Fire Safety Audit • Initial Environment Audit	*Undertake Risk Assessment, Safety and Health Audit and Fire Safety Audit for Mwache Water Treatment Plant.*	*Risk assessment, Health and Safety and Fire Safety Reports*	*WTP Operator ((CWWDA)) Management*	Immediate	*100,000*
Management of Polices required at the Water Works	Policies Required: • Safety & Health Policy • Fire Safety Policy • Environment Policy	*Prepare Safety & Health Policy, Fire Safety Policy and Environment Policy Mwache Water Treatment Plant.*	*Safety & Health Policy, Fire Safety Policy and Environment Policy displayed at the T/Works*	*WTP Operator ((CWWDA)) Management*	Immediate	*Can be done internally*
Water Works Personnel Trainings Required	Training required: • Statutory: Fire marshal training Training required: • Statutory: First Aid Training Training required: • Statutory: Safety and Health Committee	*Establish of Health and Safety Committee for Mwache Water Treatment Plant and train them on;* • *Statutory Fire marshal training* • *Statutory First Aid Training* • *Statutory Safety and Health Committee training on Occupational Health and Safety (OSH)* • *Regular provision of personnel at the T/Works with Appropriate (PPEs)*	*Existing and Trained Health and Safety Committee*	*WTP Operator((CWWDA)) Management*	Immediate	*100,000*

7.4 STATUTORY COMPLAINCE MEASURES DURING OPERATION OF THE WTP

At operation stage, the WTP Operator (*(CWWDA)*) will ensure the following measures are implemented during operation of the WTP.

(i) Ensure at any given time that the Water Use Rights Permits required by Water Resources Authority (WRA) for such facilities are annually renewed and valid.
(ii) The Water Treatment Operator (CWWDA) will continuously maintain the sludge drying beds and back wash water system and ensure no blockages
(iii) The Water Treatment Operator (CWWDA) will ensure the master meter is functioning and flow measurements are collected on a daily basis.
(iv) WTP Operator (CWWDA) Management will continuously promote reforestation programs with company operations
(v) WTP Operator (CWWDA) Management will regular inspection of the Water Pipeline wayleave, WTP and Dam peripheries and ensure the way leave is free from encroachment.

Table 7.3 presents the statutory compliance measures proposed during operation phase of the WTP.

Table 7.3: Statutory Compliance Measures during Operation of the WTP

Activity Fields	Requirement	Relevant Act (Clauses)	Continuous Improvement Measure	Responsibility	Timelines	Budget (Ksh)
Approval, Authorization and Permits	WTP Operator (CWWDA) should apply and renew water Abstraction permit for Mwache Water Treatment Plant from WRA,	Water Rules 2007: Part II - Approval, Authorization and Permits	Ensure at any given time that the Water Use Rights Permits from WRA are valid	*WTP Operator* (CWWDA)Management	Annually	Operation funds
Control of Pollution and Water Quality Requirements	**Management of Reagents** For Mwache Water Treatment Plant, PDR has provided for a well ventilated and proper lighting chemical storage house. Further, personnel handling the reagents will be provided with appropriate PPEs such as gloves, nose masks and googles to protect them from the chemical. Also, procurement of reagent will be done in batches with enough doses to eliminate the risk of some of the reagent expiring therefore requiring disposal.	Water Rules 2007: Part V Water Quality Monitoring and Effluent Discharge	Continuously maintain the sludge drying beds and back was lagoons / continuously unblock blockages	*WTP Operator* (CWWDA) Management	Weekly	Operation funds
	Management of Sludge PDR provides for sludge drying beds, the beds provide allow for sludge dewatering and allow for easy handling and evacuation	Water Rules 2007: Part V Water Quality Monitoring and Effluent Discharge	Continuously maintain the sludge drying beds and back was lagoons / continuously unblock blockages	*WTP Operator*(CWWDA) Management	Weekly	Operation funds
Water Use Charges	A master meter has been installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA)	PART VIII - Water Use Charges	Ensure the master meter is functioning and flow measurements are collected	*WTP Operator* (CWWDA)Management	Daily	Operation funds
Conservation of Riparian	The Water Rules 2007, Part ix on Conservation of Riparian and Catchment Areas regulation 120.(1) provides that for the purposes of conserving the catchments and riparian areas, the authority may by order or state as a condition on an authorization or permit, require a person to prepare and conform to a Soil and Water Conservation Plan (SWCP). In compliance with this regulation, a forestation program in liaison with Kenya Forest Services (KFS) will be initiated within the WTP and dam peripheries. WTP Operator will upscale this initiative after commissioning of the Plant.	PART IX - Conservation of Riparian And Catchment Areas	Continuously promote reforestation programs with company operations	*WTP Operator* (CWWDA) Management	Annually	Operation funds

8. FINDINGS AND PROVISIONS

8.1 FINDINGS

A summary of ESIA Addendum conclusion is presented below.

- The Ministry of Water and Sanitation and Irrigation through the Kenya Water Security and Climate Resilience Project (KWSCRP) (2016) commissioned an Environmental and Social Impact Assessment (ESIA).
- The assessment main focus was on environment and social impacts associated with the Dam and the Lower Check dam.
- Further an Environment License NEMA/EIA/PSL/5204 on 18th September 2018 with a validly of 24 months from date of issuance.
- CWWDA has secured funds from AFD towards the cost of constructing Proposed Mwache Water Treatment Plant (WTP) designed to have an output of 186,000 m^3/d. The Environment License NEMA/EIA/PSL/5204 secured for Mwache Dam did not include a component of the WTP
- CWWDA has therefore instructed M/S Artelia/MIBP to prepare and Addendum to the ESIA that was done for proposed Mwache Dam and further apply for variation of Environment License to include the WTP Component
- The addendum seeks discuses environment and social impacts related to the proposed Water Treatment Plant (WTP) and associated components .
- Therefore, this addendum will be used to apply for variation of Mwache Dam Environment License **NEMA/EIA/PSL/5204** to include additional scope of the WTP and extend license validity for an additional 24 months.
- The proposed Water Treatment Plant (WTP) is located within Kasemeni Location of Kinango Sub-County in Kwale County. The site is located within Land acquired under Mwache Dam at GPS Coordinates -3.970346^0 and 39.508029^0 within Land already acquired under ongoing Mwache Dam Resettlement Program undertaken by National Lands Commission (NLC) on behalf of Project Management Unit (PMU) of the Kenya Water Security and Climate Resilient Project (KWSCRP)
- This implies that Land Acquisition as an impact will not be triggered by proposed Water Treatment Plant (WTP)
- Through government resettlement program under Mache Dam Project, all Project Affected Persons (PAPs) have been relocated from the site, this implies that no direct socio-economic negative impacts will be triggered to community as a result of construction of the WTP. However, indirect and cumulative impacts to villages outside the WTP site will be triggered as discussed in Chapter 5 of this addendum, such villages include; Mwatate, Mataa, Gandini, Mwavumbo, Fulugani and Mazeras
- The addendum has discussed WTP construction impacts on Physical Resources and Receptors including, impacts on water resources, Impacts on Soil Resources, Impacts on Air Quality, Impacts related to noise and excessive vibrations. Further the addendum has discussed impacts on biological resources including fauna and Flora and finally discussed impacts on health and safety to workers and community members including; SEA/SH, GBV and spread of communicable diseases such as HIV and Covid 19.
- At operation phase the addendum has discussed pre commissioning statutory requirements to be complied with by Plant Operator ((CWWDA)) including; Approval, Authorization and Permits by WRA, need for Control of Pollution and Water Quality Requirements, Water Use Charges and Conservation of Riparian, Registration of the Water Treatment Plant as Works Place with DOSH, Duties Of Occupiers (Legal Requirements), Management of Polices required at the Water Works and Water Works Personnel Trainings Required

- Finally, operation impacts and mitigation measures have been discussed in relation to management of Backwash Water, Reagents and Sludge from the WTP, management of and domestic sewerage, Erosion Control at Washouts, fencing of the WTP, maintaining Aesthetic and Hygiene and commissioning Afforestation Program

8.2 INSTITUTIONAL RESPONSIBILITY

The responsibility for ensuring that all Environment and Social Provisions of the Project are implemented is provided in **Table 8-1** below.

Table 8.1: Institutional Responsibility

No.	Institution	Role	Capacity
1	AFD	The bank will be responsible for the final review and clearance of environmental and social assessment instruments Conduct regular supervision missions to check on the performance of project and assess its compliance to agreed commitments in the financing agreement	The Bank has fully Environment and Social Safeguards specialist who assist in review of Environment and Social safeguards
2	Ministry of Water and Sanitation (MWS)	This is the primary government body responsible for the overall policy, regulation, and management of water resources in Kenya. It oversees the development and implementation of water policies, strategies, and regulations. .	The Ministry will provide technical guidance on Policy matters throughout project implementation stage
3	Ministry of Interior and Coordination of National Government	To create an enabling environment by ensuring peace and security to the people and property, maintain a credible national integrated information management system, promotion of national cohesion, facilitate administration of justice and provision of correctional services for Kenya's economic development	The ministry has local administrative structures that facilitate public consultation pre and after Project
4	Coast Water Works Development Agency (CWWDA)	Under the Water Act of 2016 the mandate of the Agency is to develop and maintain sustainable water and sanitation infrastructure within the Coast region.	CWWDA has a functional Environment and Social development office that will oversee implementation of Environment and Social Provisions of the Project
5	Water Resources Authority	it is mandated through delegated Authority on behalf of the National government to safeguard the right to clean water by ensuring that there is proper regulation of the management and use of water resources, in order to ensure sufficient water for everyone-now and in the future	The organization will issue water use permits to MOWASCO on an annual basis
6	MOWASCO	The company has the mandate to providing cost effective and affordable quality water and sanitation services to the residents of Mombasa County	The WSP will be in charge of operation and maintenance of the WTP after commissioning

No.	Institution	Role	Capacity
7	National Environment Management Authority (NEMA)	is established under the Environmental Management and Co-ordination Act No. 8 of 1999 (EMCA) as the principal instrument of Government for the implementation of all policies relating to environment EMCA 1999	NEMA will review and approve the ESIA and undertake regular monitoring and enforcement of environment provisions

8.3 ADDENDUM PROVISIONS

The ESIA addendum makes below listed provisions:

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment recommends provision of a budget of **Kenya Shillings Six Million, Nine Hundred and Fifty Thousand (Kshs 6,950,000.00)**for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporates the Environment, Social provisions discussed herein (Environment and Social Impact Assessment and Mitigation Measures).
- Project Contract Document to include provisions for the Contractor for preparing and implementing Construction Environment and Social Management Plan (C-EMSP), annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/Aid Prevention Strategy. The contractors will be required to engage services of a qualified Environment, Health and Safety Officers and Social Safeguards Officer at the time of Project implementation.
- At Project implementation stage, the contractor with approval of the supervising engineer will prepare periodic Environmental and Social Implementation Report. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an occupational Health and Safety approach, the contractors will ensure they undergo the following; OSH risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment.
- At Project completion stage, within the Defects Liability Period, Coast Water Works Development Agency (CWWDA) will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Project implementation stage.

8.4 GRIEVANCE REDRESS MECHANISM

The grievance redress mechanism will be a 3-tier arrangement as indicated below:

- The First Tier will allow for amicable review and settlement of the grievance at the village level with assistance of the village elders and the 'Nyumba Kumi' representative members who will discuss and agree on amicable resolutions. This level is called the Village Grievance Redress Committee (VGRC).
- The Second Tier will involve the Project Team from CWWDA and Local Administration in case the grievance cannot be solved at the first level.
- The Third Tier will be the option of allowing the grieved party to seek redress at the court of law.

Levels I and II are costs free. The legal redress option, however, may incur some costs for the parties involved.

Grievance Redress Steps

The procedure of receiving and resolution of complaints is summarized in **Table 8.2**

Table 8.2: Grievance Redress Steps

STEPS	GRIEVANCE REDRESS STEPS DETAILS
Step 1: Receipt of complaint/grievance	A verbal or written complaint from a PAP or community member will be received by the Grievance Officer (GO) on behalf of the First Tier
Step 2: Determination of Corrective Action	If in their judgment, the grievance can be solved at this stage, the GO and VGRC will determine a corrective action in consultation with the aggrieved person. A description of the action, the time frame within which the action is to take place, and the party charged with implementing the action will be recorded in the grievance register
Step 3: Meeting with the complainant	The proposed corrective action and the time frame in which it is to be implemented will be discussed with the complainant within 14 days of receipt of the grievance. Acceptance of the agreement and corrective action will be documented
Step 4: Implementation of Corrective Action	Agreed corrective actions will be undertaken by the party agreed by SGRC within the agreed time frame. The date of the completed action will be recorded in the grievance register.
Step 5: Verification of corrective action	To verify satisfaction, the aggrieved person will be approached by the GO and SGRC to verify that the corrective action has been implemented. A signature of the complainant will be obtained and recorded in the grievance register

Grievance Redress Mechanism

The Project Team at CWWDA will establish a Village Grievance Redress Committee (VGRC) as detailed through the Three-Tier Grievance Redress Mechanism GRM. **Figure 8-1** gives a presentation of the Grievance Redress Mechanism.

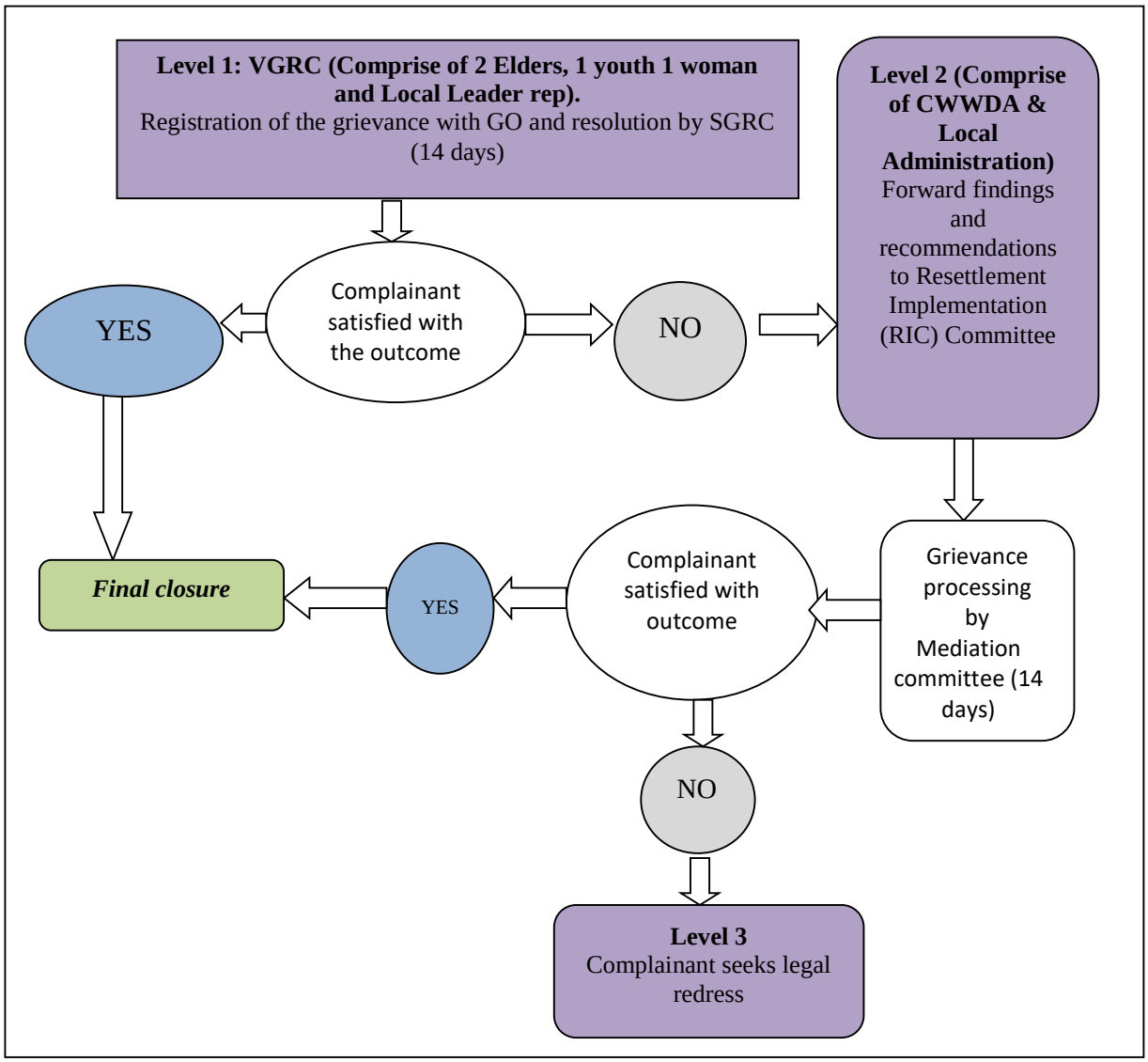


Figure 8.1. Grievance Redress Procedure

APPENDICES

APPENDIX 1 -
MWACHE DAM ENVIRONMENT LICENSE NEMA/EIA/PSL/5204

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESMENT LICENSE

License No: NEMA/EIA/PSL/5204
Application Reference No: NEMA/EIA/SR/760

This is to certify that the Environmental Impact Assessment Study Report received from

Ministry of Water and Irrigation.

P.O. Box 49720, Nairobi.

submitted to the National Environment Management Authority in accordance with the Environmental Impact Assessment & Audit Regulations, 2003 regarding the:

Proposed Construction of Mwache Dam.

whose objective is to carry on

Consruction of Mwache Dam comprising pilot irrigation component, water supply and sanitation infrastructure, associated facilities and amenities.

located at

Kwale and Mombasa Counties.

has been reviewed and a license is hereby issued for the implementation of the project, subject to attached conditions.

Issue Date : **18 September, 2018**

Signature

(Seal)

Director-General
The National Environment Management Authority.

P.T.O.

1.0 General Conditions

1.1 This project is for the construction of Mwache Dam comprising pilot irrigation component, water supply and Sanitation infrastructure associated facilities and amenities located in Kwale and Mombasa Counties at an estimated project cost of Kshs.17 billion.

1.2 The license shall be valid for 24 months (time within which the project shall commence from the date hereof.

1.3 The Director General shall be notified of any transfer, variation or surrender of this license.

1.4 Without prejudice to the other conditions of this license, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of this license.

1.5 The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Coordination Act, Cap 387 and regulations therein.

1.6 This license shall not be taken as statutory defence against charges of environmental degradation or pollution in respect of any manner of degradation/pollution not specified herein.

1.7 The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

1.8 The proponent shall submit an Environmental Audit report in the first year of occupation/operations/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.9 The proponent shall provide the final project accounts (final project costs) on completion of construction phase. This should be done prior to project commissioning/operation/occupation.

1.10 The proponent shall comply with NEMA's improvement orders throughout the project cycle.

2.0 Construction Conditions

2.1 The proponent shall obtain the requisite approvals from the County Government of Kwale, County Government of Mombasa and all other relevant Authorities prior to commencement of works.

2.2 The proponent shall put up a project signboard as per the Ministry of Transport and Infrastructure standards showing the NEMA EIA license number among other details.

2.3 The proponent shall seek authorization from the Water Resources Authority for the proposed in-water works and for water abstraction, prior to commencement of works.

2.4 The proponent shall periodically monitor the structural integrity and reliability of the Dam to avoid any damage or risks associated with a collapsing dam.

2.5 The proponent shall ensure strict adherence to the provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulations of 2009.

2.6 The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.

2.7 The proponent shall ensure relocation, compensation and restoration of livelihoods for any project affected persons (PAPs) and develop a consultative plan for emerging issues and grievance redress mechanisms (GRM) as shall be prescribed in the Resettlement Action Plan (RAP).

2.8 The proponent shall continually consult with the County Government of Kwale and Mombasa to ensure that pertinent issues relating to equitable sharing of the abstracted water are resolved amicably to ensure project sustainability.

2.9 The proponent shall ensure that workers are provided with adequate personal protection equipment (PPE), sanitary facilities as well as adequate training.

2.10 The Proponent shall ensure strict adherence to International guidelines on Dam Safety such as World Bank Policy on Dam Safety (OP 4.37). throughout the project life cycle

2.11 The proponent shall ensure strict adherence to the provisions of the National Construction Act of 2011.

2.12 The proponent shall ensure that no excavated debris or other forms of wastes are disposed off or deposited in the rivers.

2.13 The proponent shall ensure that all excavated material and debris is collected, re-used and where need be, disposed off as per the Environmental Management and Coordination (Waste Management) Regulations of 2006.

2.14 The proponent shall in consultation with Kenya Wildlife Service (KWS) put in place measures that mitigate human wildlife conflict and shall avoid encroachment to sensitive wildlife areas such as migratory corridors or breeding areas.

2.15 The proponent shall in consultation with the National Museums of Kenya, undertake a Heritage Impact Assessment to ensure the protection and conservation of any archaeological and cultural sites within the project area.

2.16 The proponent shall ensure that construction activities are undertaken during the day (and not at night) - between 0800 hrs and 1800 hrs; and on Saturdays between 0800 hrs to 1300 hrs. No work shall be undertaken on Sundays; and that transportation of construction materials to and from site is undertaken during weekdays and Saturdays only during the hours specified herein.

2.17 The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of the County of Kwale and Mombasa with emphasis on approved land use for the area.

2.18 The proponent shall ensure strict adherence to the Environmental Management Plan (EMP) developed throughout the project cycle.

3.0 Operational Conditions

3.1 The proponent shall adhere to the conditions issued by the Water Resource Authority for in-water works and water use permits.

3.2 The proponent shall ensure that sanitary facilities are constructed at suitable places so as to avoid contamination of water bodies and the subsequent water-borne diseases/vectors.

3.3 The proponent shall periodically monitor the structural integrity and reliability of the Dam to avoid any damage or risks associated with a collapsing dam.

3.4 The proponent shall ensure that the chemicals used for water treatment (such as Alum) are appropriately handled and disposed off as provided for in their respective Material Safety Data Sheets.

3.5 The proponent shall ensure that all waste water is disposed as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations of 2006.

3.6 The proponent shall ensure strict adherence to the provisions of the Environmental Management and Coordination (Air Quality) Regulations of 2014.

3.7 The proponent shall ensure that appropriate and functional efficient air pollution control mechanisms are installed to control all air emissions.

3.8 The proponent shall ensure that all drainage facilities are fitted with adequate functional oil water separators and silt traps.

3.9 The proponent shall ensure that rain water harvesting facilities are provided to supplement surface and ground water.

3.10 The proponent shall develop a consultative plan for emerging issues and grievance redress mechanisms (GRM) as shall be prescribed with the project affected persons

3.11 The proponent shall ensure that all equipment used are well maintained in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009.

3.12 The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations of 2006.

3.13 The proponent shall ensure that all workers are well protected and trained as per the Occupational Safety and Health Act (OSHA) of 2007.

3.14 The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of the County Government of Kwale and Mombasa, Kenya Forest Service, Ministry of Health, Kenya Rural Roads Authority, Ministry of Land, Housing and Urban Development, Water Resources Authority, and other relevant Authorities.

3.15 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as soil erosion control, functional storm drainage, catchment protection, river pollution prevention, and equitable water supply mechanisms are designed, constructed and employed simultaneously with the proposed project.

4.0 Notification Conditions

4.1 The proponent shall seek written approval from the Authority for any operational changes under this license.

4.2 The proponent shall ensure that the Authority is notified of any malfunction of any system within 12 hours on the NEMA hotline No. **0786101100** and mitigation measures put in place.

4.3 The proponent shall keep records of all pollution incidences and notify the Authority within 24 hours.

4.4 The proponent shall notify the Authority in writing of its intent to decommission the facility **three (3) months** in advance.

5.0 Decommissioning Conditions

5.1 The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning.

5.2 The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

The above conditions will ensure environmentally sustainable development and must be complied with.

APPENDIX 2 -
APPLICATION FOR VARIATION OF MWACHE DAM ENVIRONMENT LICENSE NEMA/EIA/PSL/5204

FORM 9 (r. 25)

Application reference No .

Licence No .

FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT
APPLICATION FOR VARIATION OF ENVIRONMENTAL IMPACT ASSESSMENT LICENCE

PART A: PREVIOUS APPLICATIONS

No previous application for variation of an environmental impact assessment licence. *
The environmental impact assessment licence was previously amended.*

PART B: DETAILS OF APPLICANT

B I. Name (Individual or Firm) MINISTRY OF WATER & SANITATION & IRRIGATION ON BEHALF OF KENYA WATER SECURITY & CLIMATE RESILLENCE PROJECT (KWSCRP)

B2. Business Registration No.....

B3. Address: P.O. BOX 49720 NAIROBI

B4. Name of contact person: ENG SIMON MWANGI

B5. Position of contact person PROJECT MANAGER

B6. Address of contact person P.O BOX 49720 NAIROBI

Telephone No: +254 20 2716103 Fax No.....

E-mail: info@kwscrp.org

PART C: DETAILS OF CURRENT ENVIRONMENTAL IMPACT ASSESSEMENT LICENCE

C I. Name of the current Environmental Impact Assessment licence holder:

MINISTY OF WATER SANITATION AND IRRIGATION

C2. Application No. of the current Environmental Impact Assessment Licence

NEMA/EIA/SR/760

C3. Date of issue of the current Environmental Impact Assessment Licence

18TH September 2018

PART D: PROPOSED VARIATIONS TO THE CONDITIONS IN CURRENT ENVIRONMENTAL IMPACT ASSESSMENT LICENCE

D1: Conditions in the current Environmental Impact Assessment licence

CONDITION 1.1 AND 1.2

D2: Proposed variation(s)

① VARY SCOPE TO INCLUDE MWACHE WATER TREATMENT PLANT (WTP)

② VARY LICENCE TO RENEW VALIDITY

D3: Reason for variation(s)

① PREVIOUS LICENCE DID NOT INCLUDE WATER TREATMENT COMPONENT

② CURRENT LICENCE IS EXPIRED.

D4: Describe the environmental changes arising from the proposed variations

DETAILED IN ATTACHED ADDENDUM

D5: Describe how the environment and the community might be affected by the proposed variations

DETAILED IN ATTACHED ADDENDUM

D6: Describe how and to what extent the environmental performance requirements set out in the EIA report previously approved or project profile previously submitted for this project may be affected

DETAILED IN ATTACHED ADDENDUM

D7: Describe any additional measures proposed to eliminate, reduce or control any adverse environmental impact arising from the proposed variation(s) and to meet the requirements in the Technical Memorandum on Environmental Impact Assessment Process

DETAILED IN ATTACHED ADDENDUM

PART D: PROPOSED VARIATIONS TO THE CONDITIONS IN CURRENT ENVIRONMENTAL IMPACT ASSESSMENT LICENCE

D1: Conditions in the current Environmental Impact Assessment licence

CONDITION 1.1 AND 1.2

D2: Proposed variation(s)

① VARY SCOPE TO INCLUDE MWACHE WATER TREATMENT PLANT (WTP)

② VARY LICENCE TO RENEW VALIDITY

D3: Reason for variation(s)

① PREVIOUS LICENCE DID NOT INCLUDE WATER TREATMENT COMPONENT

② CURRENT LICENCE IS EXPIRED.

D4: Describe the environmental changes arising from the proposed variations

DETAILED IN ATTACHED ADDENDUM

D5: Describe how the environment and the community might be affected by the proposed variations

DETAILED IN ATTACHED ADDENDUM

D6: Describe how and to what extent the environmental performance requirements set out in the EIA report previously approved or project profile previously submitted for this project may be affected

DETAILED IN ATTACHED ADDENDUM

D7: Describe any additional measures proposed to eliminate, reduce or control any adverse environmental impact arising from the proposed variation(s) and to meet the requirements in the Technical Memorandum on Environmental Impact Assessment Process

DETAILED IN ATTACHED ADDENDUM

PART E: DECLARATION BY APPLICANT

I hereby certify that the particulars given above are correct and true to the best of my knowledge and belief. I understand the environmental impact assessment licence may be suspended, varied or cancelled if any information given above is false, misleading, wrong or incomplete.

....

Name Position Signature
on behalf of .
Company name and seal Date

PART F: OFFICIAL USE

Approved/ Not approved.....

.....

Comments.....

.....

.....

Officer..... Signature..... Date.....

Important Notes
Please submit-
(a) 3 copies of this completed Form; and
(b) The prescribed fee, to:
Director-General,
The National Environment Management Authority,
Kapiti Road, South C,
P.O. Box 47146,
NAIROBI.
Tel254-02-609013/27/79 or 608999 Fax 254-02-608997
E-mail.....

APPENDIX 3 -
LEAD EXPERT'S YEAR 2024

EAE 23060419

FORM 7 (r.15(2))

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/20255
Application Reference No: NEMA/EIA/EL/26924

M/S **Godwin Lidahuli Sakwa**
(individual or firm) of address
P.O. Box 18075 - 00500 NAIROBI

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
General
registration number **2492**

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

Issued Date: **12/21/2023** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

APPENDIX 4 -
MINUTES OF MEETINGS HELD

Meeting 1:

Gandini Public Participation Meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR MWACHE WATER TRANSMISSION PIPELINE AND TERMINAL RESERVOIRS

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 21ST OCTOBER 2021 AT GANDINI CHIEF'S OFFICE.

PRESENT:

Local Administration

Chief — Gandini Location.

Village Elders – see attached list

Mangat, I. B. Patel– Consultant

Obra Mmaitsi — MIBP Consultant

Resident of Gandini Location - see attached list

KEY PROJECT DATA

Client/Employer	Coast Water Works Development Agency (CWWDA)
Financing Agency	AFD

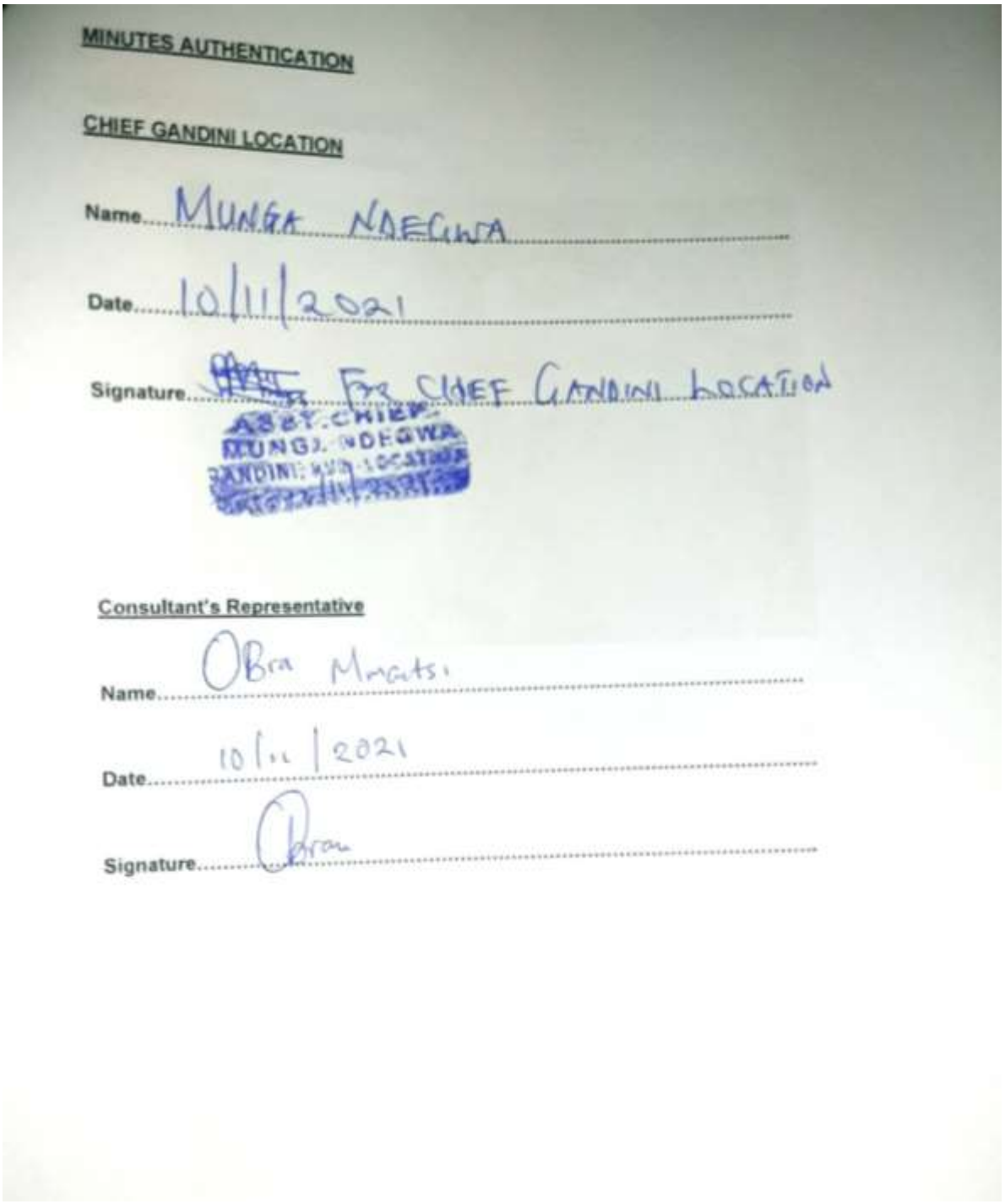
MINUTES

Item	Minutes	Action By
1.	**Introduction** The meeting was called to order by the Chief Gandini location at 10 am, she invited one Villager to start off the forum with a word of prayer. In her opening remarks, the area chief thanked those that had created time to attend the meeting. Village elders were encouraged to always make sure they reach each and every homestead when mobilizing for such forums. She informed residents that the meeting was organised to discuss issues regarding the proposed Mwache pipeline project which is a government project, those with questions and concerns were encouraged to raise them for deliberation. Finally, she invited the consultant representative Mr. Obra Mmaitsi to proceed with the remaining agenda.	Chief Gandini Location
2.	**Project Information** The Consultant representative Obra Mmaitsi thanked stakeholders for creating time to come and participate in the ESIA and RAP public participation forum. He gave a brief of the proposed Project scope which include; Construction of Mwache Dam on Mwache River, Water Treatment Plant (WTP), 4Nr. Terminal Reservoirs; one for each of the target supply areas (NML, WML, SML and Island); namely - Nguu Tatu terminal reservoir, Changamwe Reservoir, Dongo Kundu Reservoir, proposed to be constructed within Dongo Kundu area in Mtongwe, serving the South Mainland, West Mainland reservoir and A system of Treated Water Transmission Pipelines, transmitting treated water from the Mwache WTP to the proposed Reservoirs The Consultant representative informed the meeting that MWSI has secured funds from the Word Bank (WB) and the Agence Francaise de Développement (AFD), for financing implementation of the various component of the Mwache Dam Water Supply Project.	MIBP Obra Mmaitsi

Item	Minutes	Action By
	The WB component is scheduled to finance the Dam and possibly the Nguu Tatu and Changamwe transmission pipelines and their corresponding reservoirs. The AFD component will finance the WTP & associated facilities, the West Mainland and Dongo Kundu reservoirs, the trunk transmission pipeline.	
3.	**Environment and Social Safeguard Report** The Consultant representative informed the meeting that they were going to prepare *Environmental and Social Impact Assessment Report* (ESIA) that will capture all the environmental and social impacts of the project and provide mitigation measures. They were assured that all their opinions and concerns will be captured in the report so as to ensure the Project is acceptable by the community and also sustainable development is achieved. Residents were also informed that the consultant will prepare a Resettlement Action Plan (RAP) that will ensure that all assets affected by the project are documented for purposes of Compensation.	MIBP Obra Mmaitsi
4.	**Project Positive Impacts** The Consultant representative pointed out to the meeting that the water supply project has enormous benefits as summarized below. a) Improvement of sanitation within the targeted supply area by providing clean reliable domestic water this will go a long way in reducing water borne ailments such as cholera Typhoid and Diarrhoea. Respiratory ailments like COVID 19 can also be controlled through regular hand wash with soap and water. b) Reduced time taken for residents while fetching water. This valuable time can be used to do other economical activities like farming and small-scale businesses. c) Availability of clean reliable domestic water will also reduce cases of gender-based Violence towards women and children in their quest to search for water in far flanked areas. d) Improve the value of land through provision of sanitation infrastructure, better housing will be developed in the area. e) The Project will provide employment opportunities, at construction stage, opportunities will be direct employment for both skilled and unskilled labour while during operation phase, and employment opportunities will be available for water operators.	MIBP Obra Mmaitsi
5.	**Impacts to Environment (Natural and Social)** The consultant representative informed the meeting that this being a water supply project, it will have minimal negative impacts likely to be triggered. Some of the impacts are as indicated below. • Cutting down of trees especially the Neem tree, Mangroves around Bonje Creek and Coconuts which are predominant in the area. • Dust generated during construction that is likely to affect air quality within the project area. • Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the Project.	MIBP Obra Mmaitsi

<table>
<tr><th>Item</th><th>Minutes</th><th>Action By</th></tr>
<tr><td></td><td>He further added that all these impacts would be addressed comprehensively by the ESIA study report and appropriate mitigation measure provided.</td><td></td></tr>
<tr><td>6.</td><td><u>Question and Answer Session</u>
After discussion summarized above, the community were invited to a question-and-answer session. Detailed questions and suggestion of the plenary session are presented in Table 1 below
Table 1: Plenary Session
<table>
<tr><th>Suggestion / Question</th><th>Response</th><th></th></tr>
<tr><td>Mr. Katsudzi Dziro wanted to know how cases of disputed land will be handled.</td><td>The meeting was informed that the consultant will establish a grievance Redress Committee that will look into disputes locally. Residents were encouraged to use the GRC to solves disputes instead of court process that might be lengthy and expensive.</td><td>MIBP
Obra Mmaitsi</td></tr>
<tr><td>Underson Beja Wanted to be informed on how damages to private property outside the acquired project wayleave will be handled.</td><td>The meeting was informed that the wayleave will include extra working space. Any property that falls within the wayleave corridor will be compensated. In the event that the contractor damages property outside the wayleave, they will have to be reinstated on fresh compensation done by the contractor.</td><td>MIBP
Obra Mmaitsi</td></tr>
<tr><td>Harrison Chiwala wanted to be informed on when the project will commence.</td><td>The meeting was informed that funding for the project which include construction of Mwache dam and the transmission line is available. The project will commence immediately after all the pre requisite reports including ESIA report and NEMA licence has been issued and also a resettlement action plan has been prepared for the affected persons.</td><td>MIBP
Obra Mmaitsi</td></tr>
<tr><td>Mr. Mbodze wanted to know what will happen in the event that the pipeline passes were graves are.</td><td>Residents were informed that the contractor will try as much as possible to avoid graves, in areas where it is not possible to avoid, the community will be allowed to their cultural procedures of relocating graves. The project client will facilitate the process.</td><td>MIBP
Obra Mmaitsi</td></tr>
<tr><td>Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.</td><td>Residents were informed that both unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.</td><td>MIBP
Obra Mmaitsi</td></tr>
</table></td><td></td></tr>
<tr><td>7.</td><td><u>Closing Remarks</u>
The area Village elder urged those in attendance to accept the project since it was meant to improve their quality of life, he requested them to be good will ambassadors for the project and spread information to those who could not make it to the meeting. Finally, the elder adjourned the meeting at 11.30AM, a closing prayer was conducted by a village elder in attendance.</td><td>Village Elder</td></tr>
</table>

MINUTES AUTHENTICATION



MINUTES AUTHENTICATION

CHIEF GANDINI LOCATION

Name MUNGA NDEGWA

Date 10/11/2021

Signature FOR CHIEF GANDINI LOCATION

ASST. CHIEF
MUNGA NDEGWA
GANDINI SUB-LOCATION

Consultant's Representative

Name OBra Mwatsi

Date 10/11/2021

Signature

SAMPLE PHOTOS OF THE MEETING

The area chief starting off the meeting

Residents following proccedings of the meeting

ATTENDANCE LIST – GANDINI LOCATION MEETING

MIBP
CONSULTING ENGINEERS

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 21/10/2021 Venue: GANDINI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
1	ALI KASHANGA KASIMBI	DZIVANI 'B'	0727542373	
2	MWANAMWANGA CHIGAMBA	DZIVANI 'A'	0721928661	
3	MANGALE MUNGA	DZIVANI 'A'	0725568080	
4	GWARI BEGARI AMESAH	DZIVANI -A	0708809507	
5	JOSEPH KOMBO	DZIVANI B	0724103369	
6	RAJAB BEJA CHILELE	BODO	0707934442	
7	CHOGA GODHOLO KUFASA	MITANGANI A	0799484457	
8	HAWISI M. BEKANGA	DZIVANI A	0703461983	
9	CHAI LUNGANZI	MITANGANI 'A'	0741442401	
10	MAZERA BEJA MWATEMO	LUTSANGANI C	0706457225	
11	BAHATI DZERI KATIMBI	BODO	07	
12	MGAZA ZUMA TSUMA	BODO	0707269392	
13	KWAKA MWALUNGO GODUFU	MITANGANI 'A'	0704407090	
14	BATI NGAO BATI	MITANGANI 'A'	0713912607	

MIBP

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 21/10/2021 Venue: GANDINI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
15	FATUMA GOVI MWAGOMBA	MITANGANI (A)	0714460368	[illegible]
16	MWAGOMBA GOVI MWAGOMBA	MITANGANI (A)	0746378185	[illegible]
17	LUNG'ANZI NGOME LUNG'ANZI	MITANGANI (A)	0720857668	[illegible]
18	MWAMWE KABWERE MWAMWE	L/MIKANJUNI	0724815757	[illegible]
19	ROBOTI LUNG'ANZI MWACHIPITU	MITANGANI (A)	—	[illegible]
20	SALIM KOMBO	L/MIKANJUNI	0767800025	[illegible]
21	ANDERSON BEJA BARAZA	MWAKALELA	0726506[illegible]	[illegible]
23	DZUMBO DZUHA MWAMBAWE	DZIVANI 'B'	07[illegible]	[illegible]
24	CHONDO MWACHONDO	DZIVANI 'B'	0707221733	[illegible]
25	MANGALE ISUMA MZIRIGA	LUTSANGANI (A)	—	[illegible]
26	HARRISON JIMA CHIWALA	MITANGANI A)	07[illegible]	[illegible]
27	JAJI MANGALE MWANDO	LUTSANGANI (MIKANJUNI)	—	ISA U
28	CHIWALA GUBE CHARO	L/MIKANJUNI	0725003616	[illegible]
29	KABENGE CHARO MWAMBO	L/MIKANJUNI	—	KABENGE

MIBP
CONSULTING ENGINEERS

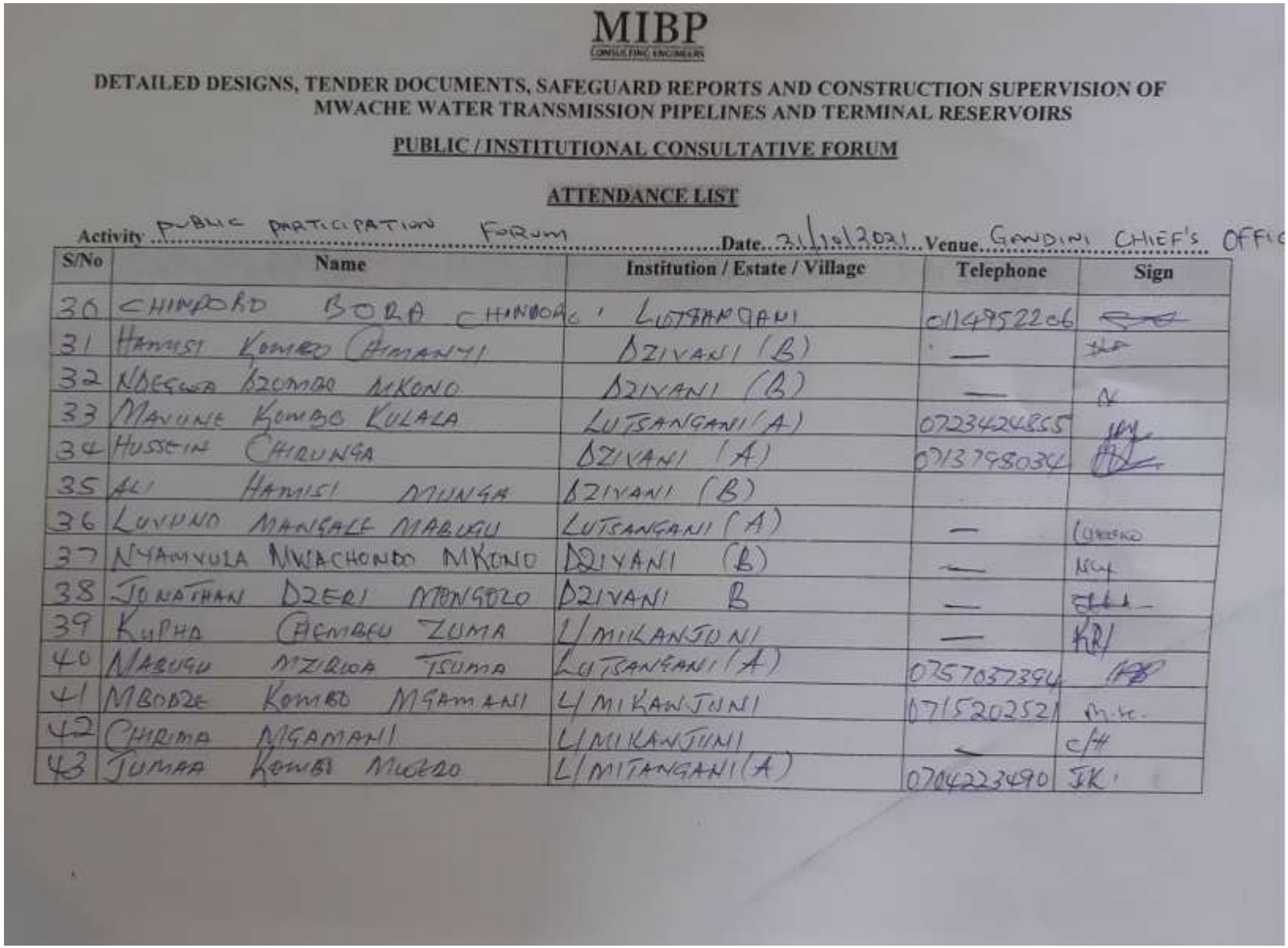
DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 21/10/2021 Venue: GANDINI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
44	TAWA MUNGA MANGALE	DZIVANI A	0799642806	[illegible]
45	DZOMBO KUVINA MNDALU	DZIVANI B	0713245658	[illegible]
46	HASSAN CHAKAYA SIMBA	TAKAWA	0726536954	[illegible]
47	MBEYU DZOMBO MKONO	DZIVANI (B)	0724576/776	ND.
48	MLONGO CHIPHOGO KAJIMBI	DZIVANI (B)	0715005288	[illegible]
49	MBODZE MNDALU KUVINA	DZIVANI (B)	0799557529	NB
50	MOTA MNDALU KUVINA	DZIVANI (B)	0745173231	[illegible]
51	TAWA MANGALE NZUKI	MAGWAGWARU	—	[illegible]
52	ABDALLA NYAMBEJ DZUWAMBENA	DZIYANI (A)	0713077264	[illegible]
53	CHIRUNGA DZOMBO MKONO	DZIVANI (B)	0729021269	[illegible]
54	MASHAKA NDARU MWAYAWE	DZIVANI B	0702030346	[illegible]
55	MKONO DZOMBO MKO	DZIVANI B	0711653047	[illegible]
56	MWAYAYA NDUKE SHAMAKAMBE	CHIDUNGUNI	0714910484	[illegible]
57	DZUMA DZOMBO MKONO	DZIVANI (B)	—	[illegible]



MIBP
CONSULTING ENGINEERS

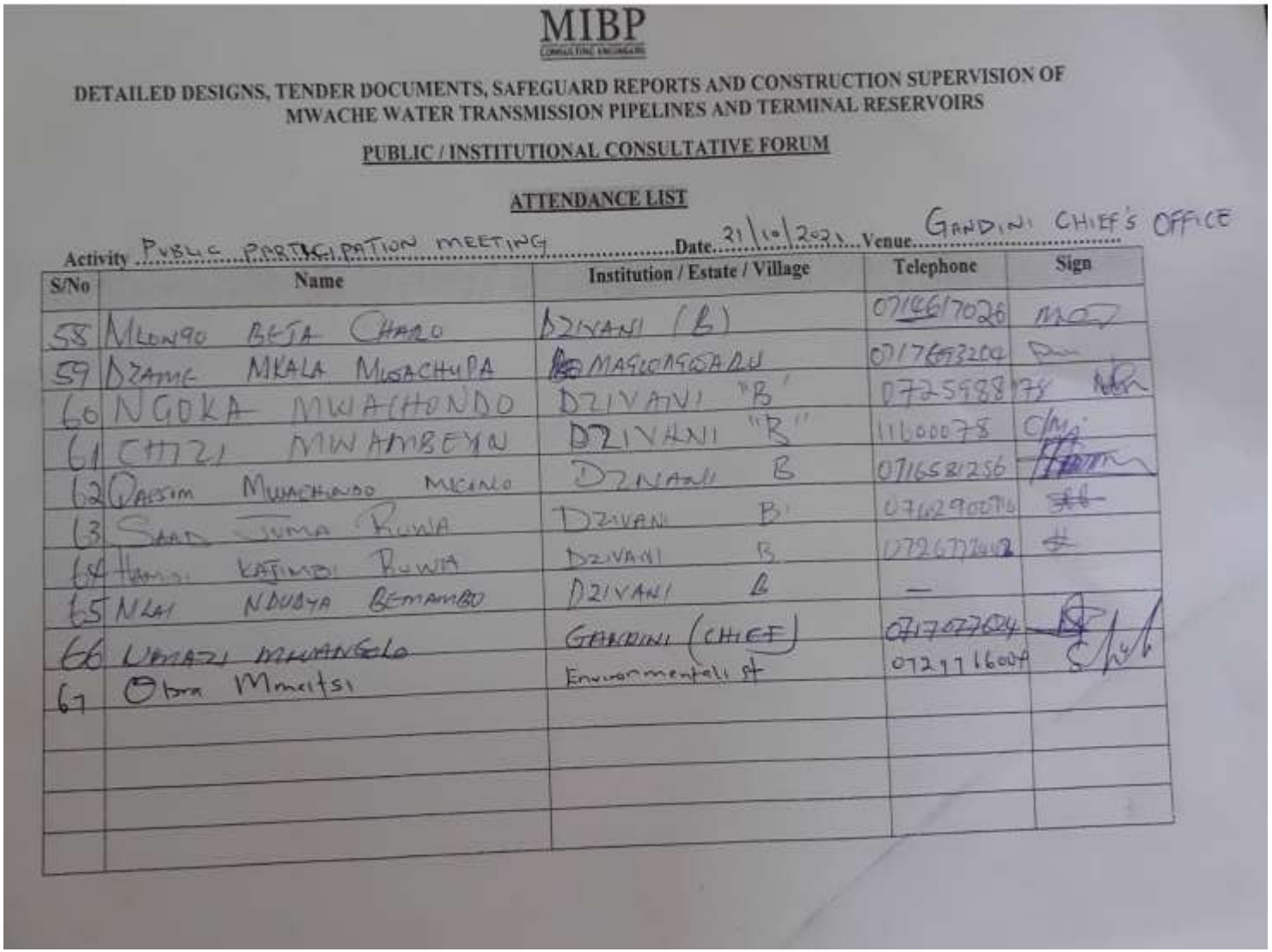
DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity PUBLIC PARTICIPATION FORUM Date 31/10/2021 Venue GANDINI CHIEF'S OFFIC

S/No	Name	Institution / Estate / Village	Telephone	Sign
30	CHINDORO BORA CHINDORO	LUTSANGANI	0114952206	
31	HAMISI KOMBO CHIMANYI	DZIVANI (B)	—	
32	NDEGWA DZOMBO MKONO	DZIVANI (B)	—	
33	MAVUNE KOMBO KULALA	LUTSANGANI (A)	0723424855	
34	HUSSEIN CHIRUNGA	DZIVANI (A)	0713798034	
35	ALI HAMISI MUNGA	DZIVANI (B)		
36	LUVUNO MANGALE MABUGU	LUTSANGANI (A)	—	
37	NYAMVULA NYACHONDO MKONO	DZIVANI (B)	—	
38	JONATHAN DZERI MONGOLO	DZIVANI B	—	
39	KUPHA CHEMBEU ZUMA	L/MIKANJONI	—	
40	MABUGU MZIRUA TSUMA	LUTSANGANI (A)	0757037394	
41	MBODZE KOMBO MGAMANI	L/MIKANJONI	0715202521	
42	CHIRMA MGAMANI	L/MIKANJONI	—	
43	JUMAA KOMBO MUGOO	L/MITANGANI (A)	0704223490	



MIBP
CONSULTING ENGINEERS

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity PUBLIC PARTICIPATION MEETING Date 21/10/2021 Venue GANDINI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
58	MLONGO BEJA CHARO	DZIVANI (B)	0716617026	
59	DZAME MKALA MGACHUPA	MAGONGONI	0717693200	
60	NGOKA MWACHONDO	DZIVANI "B"	0725988	
61	CHIZI MWAMBEYA	DZIVANI "B"	1160078	
62	QASIM MWACHANDO MCINO	DZIVANI B	0716581256	
63	SAAD JUMA RUWA	DZIVANI B	0762900716	
64	HAMISI KAJINDI RUWA	DZIVANI B	0726772612	
65	NZAI NDUBYA BEMAMBO	DZIVANI B	—	
66	UMAZI MWANGALO	GANDINI (CHIEF)	0717077604	
67	Obra Mmeitsi	Environmentalist	0727716004	

Meeting 2:
Mbuguni Location Meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR MWACHE WATER TRANSMISSION PIPELINE AND TERMINAL RESERVOIRS

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 22ND OCTOBER 2021 AT MBUGUNI CHIEF'S OFFICE.

PRESENT:

Local Administration

Chief — Mbuguni Location.

Village Elders – see attached list

Mangat, I. B. Patel– Consultant

Obra Mmaitsi — MIBP Consultant

Resident of Mbuguni Location - see attached list

KEY PROJECT DATA

Client/Employer	Coast Water Works Development Agency (CWWDA)
Financing Agency	AFD

MINUTES

Item	Minutes	Action By
8.	**Introduction** The meeting was called to order by the Chief Mbuguni location at 10 am, he invited one Villager to start off the forum with a word of prayer. In his opening remarks, the area chief thanked those that had created time to attend the meeting. He thanked the consultant for arriving on time, this he said will allow the meeting to end early enough so that most of the residents can go to attend Friday prayers. He informed residents that the meeting was organised to discuss issues regarding the proposed Mwache pipeline project which is a government project, those with questions and concerns were encouraged to raise them for deliberation. Finally, he invited the consultant representative Mr. Obra Mmaitsi to proceed with the remaining agenda.	Chief Mbuguni Location
9.	**Project Information** The Consultant representative Obra Mmaitsi thanked stakeholders for creating time to come and participate in the ESIA and RAP public participation forum. He gave a brief of the proposed Project scope which include; Construction of Mwache Dam on Mwache River, Water Treatment Plant (WTP), 4Nr. Terminal Reservoirs; one for each of the target supply areas (NML, WML, SML and Island); namely - Nguu Tatu terminal reservoir, Changamwe Reservoir, Dongo Kundu Reservoir, proposed to be constructed within Dongo Kundu area in Mtongwe, serving the South Mainland, West Mainland reservoir and A system of Treated Water Transmission Pipelines, transmitting treated water from the Mwache WTP to the proposed Reservoirs	MIBP Obra Mmaitsi

Item	Minutes	Action By
	The consultant representative informed the meeting that the WSI has secured funds from the Word Bank (WB) and the Agence Francaise de Développement (AFD), for financing implementation of the various component of the Mwache Dam Water Supply Project. The WB component is scheduled to finance the Dam and possibly the Nguu Tatu and Changamwe transmission pipelines and their corresponding reservoirs. The AFD component will finance the WTP & associated facilities, the West Mainland and Dongo Kundu reservoirs, the trunk transmission pipeline.	
10.	**Environment and Social Safeguard Report** The consultant representative informed the meeting that they were going to prepare *Environmental and Social Impact Assessment Report* (ESIA) that will capture all the environmental and social impacts of the project and provide mitigation measures. They were assured that all their opinions and concerns will be captured in the report so as to ensure the Project is acceptable by the community and also sustainable development is achieved. Residents were also informed that the consultant will prepare a Resettlement Action Plan (RAP) that will ensure that all assets affected by the project are documented for purposes of Compensation.	MIBP Obra Mmaitsi
11.	**Project Positive Impacts** The consultant representative pointed out to the meeting that the water supply project has enormous benefits as summarized below. f) Improvement of sanitation within the targeted supply area by providing clean reliable domestic water this will go a long way in reducing water borne ailments such as cholera Typhoid and Diarrhoea. Respiratory ailments like COVID 19 can also be controlled through regular hand wash with soap and water. g) Reduced time taken for residents while fetching water. This valuable time can be used to do other economical activities like farming and small-scale businesses. h) Availability of clean reliable domestic water will also reduce cases of gender-based Violence towards women and children in their quest to search for water in far flanked areas. i) Improve the value of land through provision of sanitation infrastructure, better housing will be developed in the area. j) The Project will provide employment opportunities, at construction stage, opportunities will be direct employment for both skilled and unskilled labour while during operation phase, employment opportunities will be available for water operators.	MIBP Obra Mmaitsi
12.	**Impacts to Environment (Natural and Social)** The consultant representative informed the meeting that this being a water supply project, it will have minimal negative impacts likely to be triggered. Some of the impacts are as indicated below. • Cutting down of trees especially the Neem tree, Mangroves around Bonje Creek and Coconuts which are predominant in the area. • Dust generated during construction that is likely to affect air quality within the project area. • Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the Project.	MIBP Obra Mmaitsi

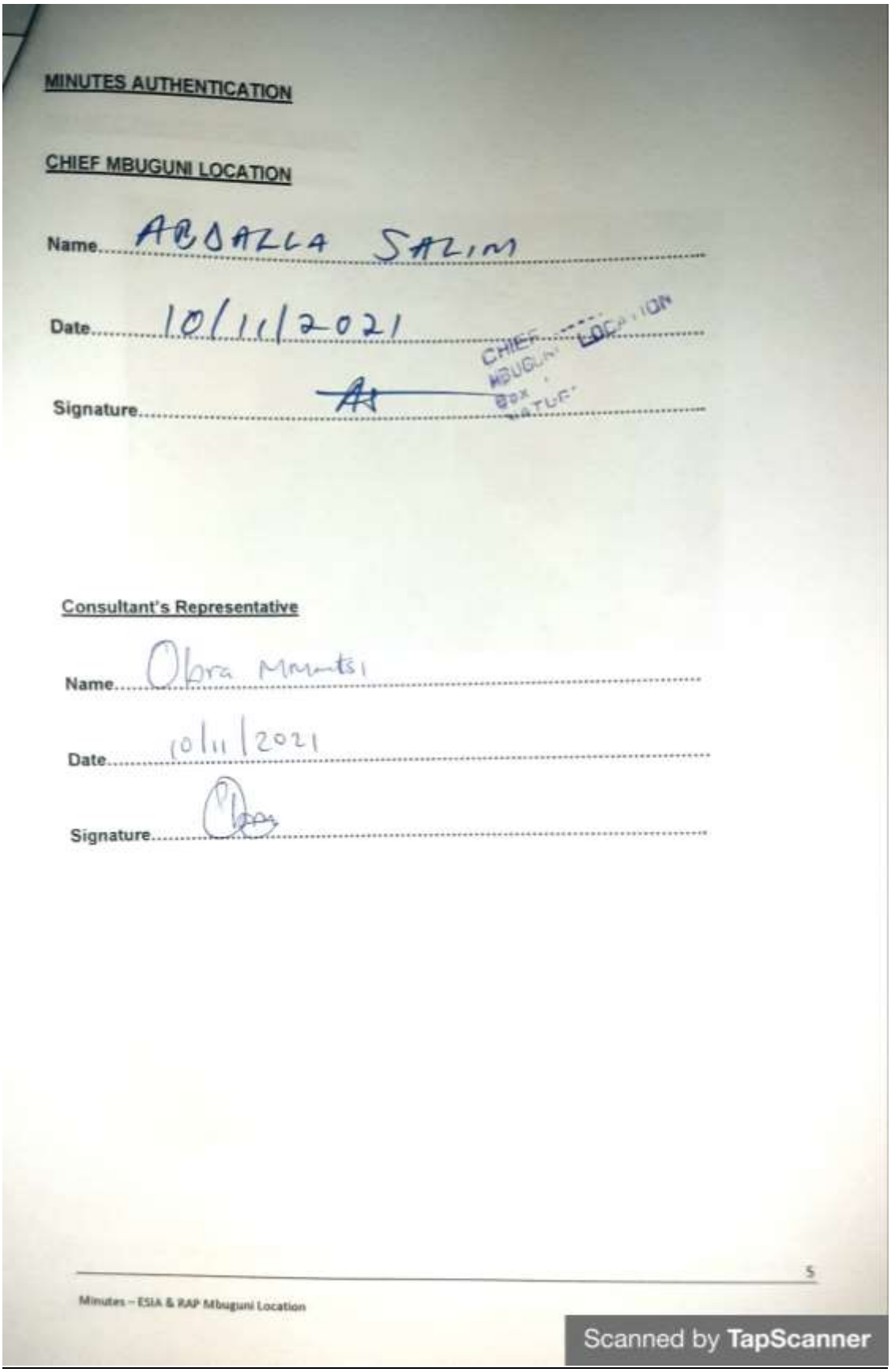
<table>
<tr><th>Item</th><th>Minutes</th><th>Action By</th></tr>
<tr><td></td><td>He further added that all these impacts would be addressed comprehensively by the ESIA study report and appropriate mitigation measure provided.</td><td></td></tr>
<tr><td>13.</td><td><u>Question and Answer Session</u>
After discussion summarized above, the community were invited to a question-and-answer session. Detailed questions and suggestion of the plenary session are presented in Table 1 below
Table 1: Plenary Session
<table>
<tr><th>Suggestion / Question</th><th>Response</th></tr>
<tr><td>Mr. Sale Ali wanted to know if the water will benefit residents of Mbuguni</td><td>The meeting was informed that the pipeline is a transmission line and not for household connection, however residents can request to be given water kiosks within shopping centres for them to access water easily.</td></tr>
<tr><td>Mr. Juma Omar wanted to know what will happen to those property owners who not be available during enumeration.</td><td>The meeting was informed that the consultant will be walking along the proposed pipeline route accompanied by village elders, details of those that will not be on ground during enumeration will be captured and follow up done to ensure any missing information about them is captured.</td></tr>
<tr><td>Residents wanted to be informed on when the project will commence.</td><td>The meeting was informed that funding for the project which include construction of Mwache dam and the transmission line is available. The project will commence immediately after all the pre requisite reports including ESIA report and NEMA licence has been issued and also a resettlement action plan has been prepared for the affected persons.</td></tr>
<tr><td>Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.</td><td>Residents were informed that both unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.</td></tr>
</table></td><td>MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi</td></tr>
<tr><td>14.</td><td><u>Closing Remarks</u>
The area Chief urged those in attendance to accept the project since it was meant to improve their quality of life, he requested them to be good will ambassadors for the project and spread information to those who could not make it to the meeting. Finally, the Chief adjourned the meeting at 11.30AM, a closing prayer was conducted by a village elder in attendance.</td><td>Chief Mbuguni Location</td></tr>
</table>

MINUTES AUTHENTICATION



MINUTES AUTHENTICATION

CHIEF MBUGUNI LOCATION

Name ABDALLA SALIM

Date 10/11/2021

Signature

CHIEF MBUGUNI LOCATION
BOX MATUF

Consultant's Representative

Name Obra Mwantsi

Date 10/11/2021

Signature

5

Minutes – ESIA & RAP Mbuguni Location

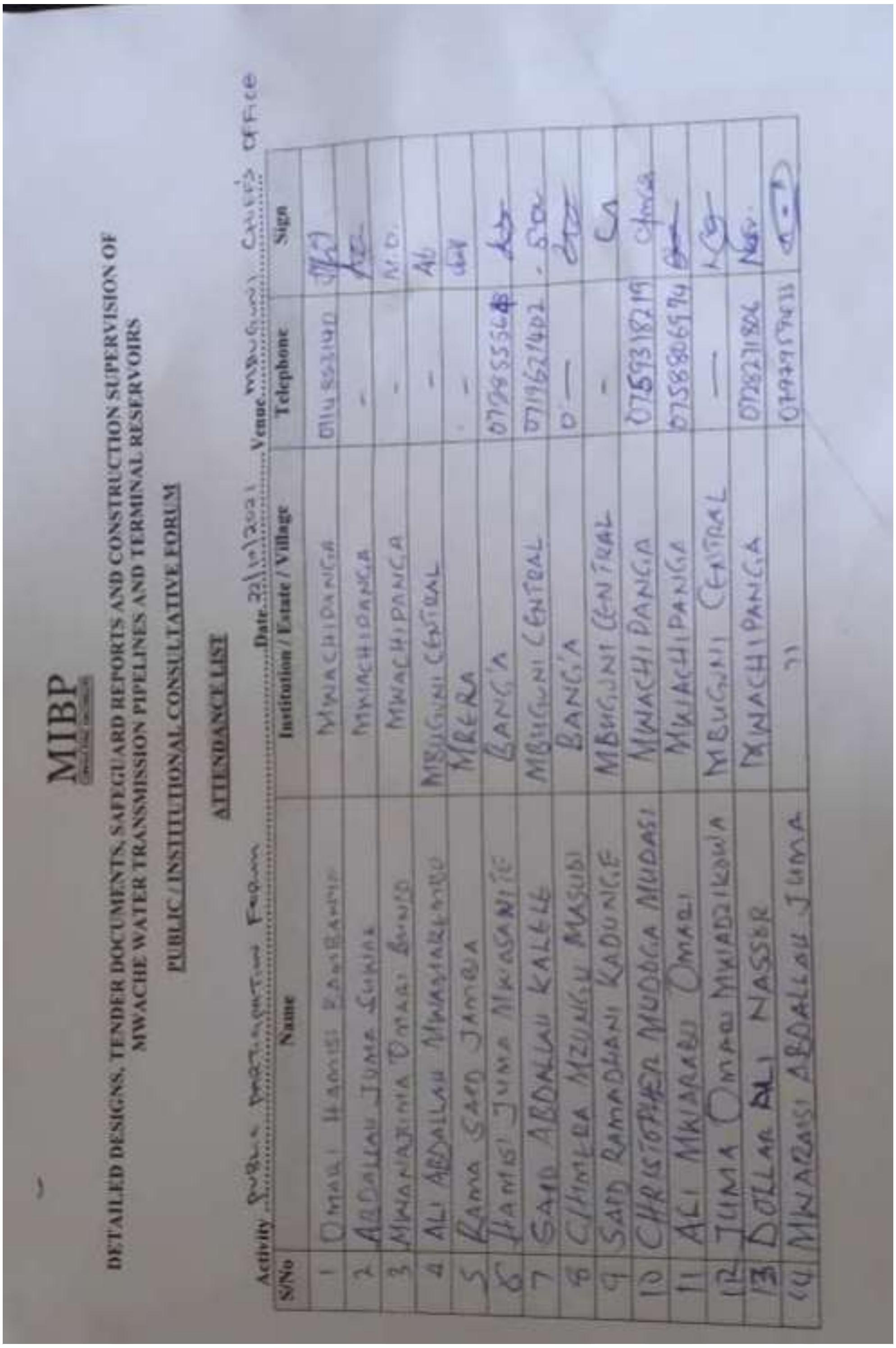
Scanned by TapScanner

SAMPLE PHOTOS OF THE MEETING

The area chief starting off the meeting

A resident asking Questions.

ATTENDANCE LIST – MBUGUNI LOCATION MEETING



MIBP

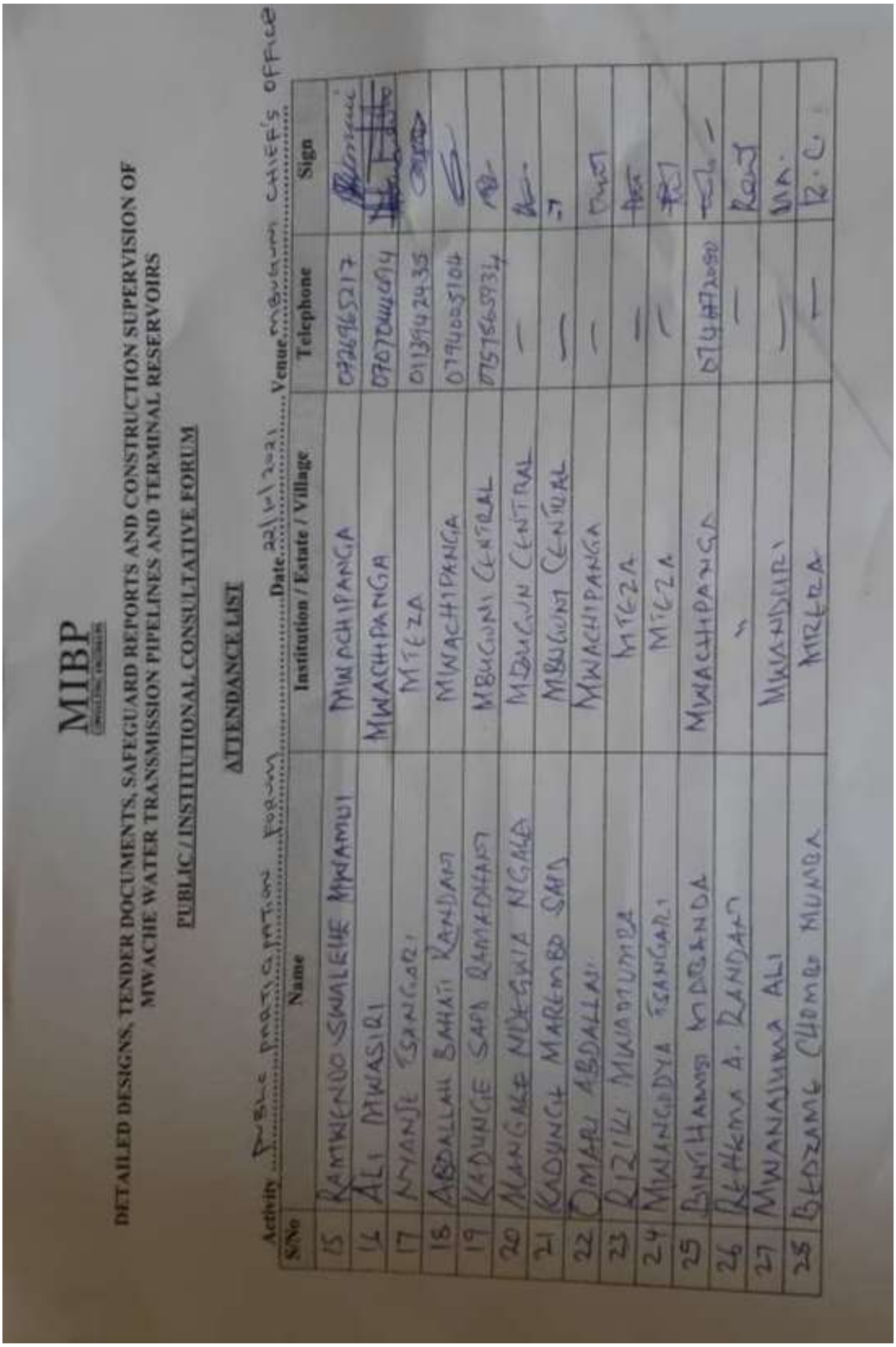
DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 22/10/2021 Venue: MBUGUNI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
1	OMARI HAMISI BAMBAMIE	MWACHIPANGA	0114853190	[signature]
2	ABDALLAH JUMA SUKIAS	MWACHIPANGA	-	[signature]
3	MWANAJUMA OMARI BWISO	MWACHIPANGA	-	N.D.
4	ALI ABDALLAH MWASHARIMBO	MBUGUNI CENTRAL	-	Ab
5	RAMA SAID JAMBIA	MRERA	-	[signature]
6	HAMISI JUMA MWASANITE	BANG'A	0798555648	[signature]
7	SAID ABDALLAH KALELE	MBUGUNI CENTRAL	0719621402	[signature]
8	CHIMERA MZUNGU MASUDI	BANG'A	0—	[signature]
9	SAID RAMADHANI KADUNGE	MBUGUNI CENTRAL	-	[signature]
10	CHRISTOPHER MUDOGA MUDASI	MWACHIPANGA	0759318219	[signature]
11	ALI MWARABU OMARI	MWACHIPANGA	0758806994	[signature]
12	JUMA OMARI MWADZIKOWA	MBUGUNI CENTRAL	—	[signature]
13	DOLLAR ALI NASSER	MWACHIPANGA	0728271806	[signature]
14	MWARAISI ABDALLAH JUMA	"	0797957433	[signature]



MIBP

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 22/11/2021 Venue: MBUGUNI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
15	RAMWENDO SWALEHE MWAMUI	MWACHIPANGA	0726965217	[illegible]
16	ALI MWASIRI	MWACHIPANGA	0707044694	[illegible]
17	NYANJE TSANGARI	MTEZA	0113942435	[illegible]
18	ABDALLAH BAHATI KANDANI	MWACHIPANGA	0794005104	[illegible]
19	KADUNGE SAPA RAMADHANI	MBUGUNI CENTRAL	0757565934	[illegible]
20	MANGALE NDEGWA NGALA	MBUGUN CENTRAL	—	[illegible]
21	KADUNGE MAREMBO SAPA	MBUGUNI CENTRAL	—	[illegible]
22	OMARI ABDALLAH	MWACHIPANGA	—	[illegible]
23	RIZIKI MWADZUMBA	MTEZA	—	[illegible]
24	MWANGODYA TSANGARI	MTEZA	—	[illegible]
25	BINTI HAMISI MDBANDA	MWACHIPANGA	0714872050	[illegible]
26	REHEMA A. KANDANI	"	—	[illegible]
27	MWANAJUMA ALI	MWANDURI	—	MA.
28	BEDZAMBE CHOMBO MUMBA	MTEZA	—	R.C.

MIBP
CONSULTING ENGINEERS

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 22/10/2021 Venue: MBUGUNI CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
29	OMARI MWATUA JUMA	MWACHIPANGA	—	[signature]
30	MWARO KALIMBO	BANGA	—	Mwero
31	JUMA MABANDA	MWACHIPANGA	0721209258	[signature]
32	BORA MTSOMA	MTEZA	—	Bora
33	MAVUNE KOMBO	MTEZA	—	Mavune
34	HAMISI OMAR	MBUGUNI Central	—	H.O.
35	VOYA MASHDI	MTEZA	—	V.M
36	ALI NDZIGE MASUDI	"	0723760139	[signature]
37	HAMAD ABD. MWANAZEMBO	"	0717677996	[signature]
38	MATEMBO BORA	"	0742895878	[signature]
39	RAMADHAN ABDALLAH	MBUGUNI	—	Rama
40	MWINYI HAMISI BAKARI	MBUGUNI	—	Bakari
41	MANGALE MWADIGA	MTEZA	0768605535	[signature]
42	MWAHANJE TSANGAR	MTEZA	0713260050	Tsangar

Meeting 3:
Kiteje Sub Location Meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR MWACHE WATER TRANSMISSION PIPELINE AND TERMINAL RESERVOIRS

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 23RD OCTOBER 2021 AT KITEJE ASSISTANT CHIEF'S OFFICE.

PRESENT:

Local Administration

Assistant Chief	Kiteje Sub Location.

Village Elders – see attached list

Mangat, I. B. Patel– Consultant

Obra Mmaitsi	MIBP Consultant

Resident of Kiteje Sub Location - see attached list

KEY PROJECT DATA

Client/Employer	Coast Water Works Development Agency (CWWDA)
Financing Agency	AFD

MINUTES

Item	Minutes	Action By
15.	**Introduction** The meeting was called to order by the Assistant Chief Kiteje Sub location at 10 am, she invited one Villager to start off the forum with a word of prayer. In her opening remarks, the area chief thanked those that had created time to attend the meeting. She informed residents that the meeting was organised to discuss issues regarding the proposed Mwache pipeline project which is a government project, those with questions and concerns were encouraged to raise them for deliberation. Finally, she invited the consultant representative Mr. Obra Mmaitsi to proceed with the remaining agenda.	Assistant Chief Sub Location
16.	**Project Information** The Consultant representative Obra Mmaitsi thanked stakeholders for creating time to come and participate in the ESIA and RAP public participation forum. He gave a brief of the proposed Project scope which include; Construction of Mwache Dam on Mwache River, Water Treatment Plant (WTP), 4Nr. Terminal Reservoirs; one for each of the target supply areas (NML, WML, SML and Island); namely - Nguu Tatu terminal reservoir, Changamwe Reservoir, Dongo Kundu Reservoir, proposed to be constructed within Dongo Kundu area in Mtongwe, serving the South Mainland, West Mainland reservoir and A system of Treated Water Transmission Pipelines, transmitting treated water from the Mwache WTP to the proposed Reservoirs The consultant representative informed the meeting that The MWSI has secured funds from the Word Bank (WB) and the Agence Francaise de Développement (AFD), for financing implementation of the various component of the Mwache Dam Water Supply Project. The WB component is scheduled to finance the Dam and possibly the Nguu Tatu and Changamwe transmission pipelines and their corresponding reservoirs. The AFD	MIBP Obra Mmaitsi

Item	Minutes	Action By
	component will finance the WTP & associated facilities, the West Mainland and Dongo Kundu reservoirs, the trunk transmission pipeline.	
17.	**Environment and Social Safeguard Report** The consultant representative informed the meeting that they were going to prepare *Environmental and Social Impact Assessment Report* (ESIA) that will capture all the environmental and social impacts of the project and provide mitigation measures. They were assured that all their opinions and concerns will be captured in the report so as to ensure the Project is acceptable by the community and also sustainable development is achieved. Residents were also informed that the consultant will prepare a Resettlement Action Plan (RAP) that will ensure that all assets affected by the project are documented for purposes of Compensation.	MIBP Obra Mmaitsi
18.	**Project Positive Impacts** The Consultant representative pointed out to the meeting that the water supply project has enormous benefits as summarized below. a) Improvement of sanitation within the targeted supply area by providing clean reliable domestic water this will go a long way in reducing water borne ailments such as cholera Typhoid and Diarrhoea. Respiratory ailments like COVID 19 can also be controlled through regular hand wash with soap and water. b) Reduced time taken for residents while fetching water. This valuable time can be used to do other economical activities like farming and small-scale businesses. c) Availability of clean reliable domestic water will also reduce cases of gender-based Violence towards women and children in their quest to search for water in far flanked areas. d) Improve the value of land through provision of sanitation infrastructure, better housing will be developed in the area. e) The Project will provide employment opportunities, at construction stage, opportunities will be direct employment for both skilled and unskilled labour while during operation phase, employment opportunities will be available for water operators.	MIBP Obra Mmaitsi
19.	**Impacts to Environment (Natural and Social)** The Consultant representative informed the meeting that this being a water supply project, it will have minimal negative impacts likely to be triggered. Some of the impacts are as indicated below. • Cutting down of trees especially the Neem tree, Mangroves around Bonje Creek and Coconuts which are predominant in the area. • Dust generated during construction that is likely to affect air quality within the project area. • Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the Project. He further added that all these impacts would be addressed comprehensively by the ESIA study report and appropriate mitigation measure provided.	MIBP Obra Mmaitsi
20.	**Question and Answer Session** After discussion summarized above, the community were invited to a question-and-answer session. Detailed questions and suggestion of the plenary session are presented in **Table 1**	

<table>
<tr><th>Item</th><th>Minutes</th><th>Action By</th></tr>
<tr><td></td><td>
Table 1: Plenary Session
<table>
<tr><th>Suggestion / Question</th><th>Response</th></tr>
<tr><td>Mr. Kasim Chame wanted to know what will happen to residents who have bought parcels of land but the subdivision process is yet to be completed.</td><td>The meeting was informed that the National lands will follow up and authenticate the land documents to ensure compensation is done to the right owner.</td></tr>
<tr><td>Mr. Abdul Kongoninga wanted to know if during compensation there will be any discussion between property owner and the client about the rates.</td><td>The meeting was informed that compensation rates will be provided by a registered government value to ensure accuracy. During RAP report disclosure, residents will be given a chance to make adjustments if need be.</td></tr>
<tr><td>Harrison Chiwala wanted to be informed on when the project will commence.</td><td>The meeting was informed that funding for the project which include construction of Mwache dam and the transmission line is available. The project will commence immediately after all the pre requisite reports including ESIA report and NEMA licence have been issued and Resettlement Action Plan has been prepared for the affected persons.</td></tr>
<tr><td>Mr. Jiti Abdalla wanted to know what will happen in the event that the pipeline passes were graves are.</td><td>Residents were informed that the contractor will try as much as possible to avoid graves, in areas where it is not possible to avoid, the community will be allowed to their cultural procedures of relocating graves. Client will facilitate the process.</td></tr>
<tr><td>Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.</td><td>Residents were informed that both unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.</td></tr>
<tr><td>Hadija Omar wanted to be informed if residents will be given sufficient notice before construction commences and also if they will be required to be at their premises throughout during construction.</td><td>Residents were informed that adequate time will be given to land owners before project commences, asset owners will be given sufficient time to salvage whatever they want along the pipeline corridor
She was also informed that once owners have agreed and allowed works to proceed, they will not be required to be physically present during implementation.</td></tr>
</table>
</td><td>MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi

MIBP
Obra Mmaitsi</td></tr>
<tr><td>21.</td><td><u>Closing Remarks</u>
The area Assistant Chief urged those in attendance to accept the project since it was meant to improve their quality of life, she requested them to be good will ambassadors for the project and spread information to those who could not make it to the meeting. Finally, the chief adjourned the meeting at 11.30 a.m, a closing prayer was conducted by a village elder in attendance.</td><td>Assistant Chief
Kiteje Sub Location</td></tr>
</table>

MINUTES AUTHENTICATION

Item	Minutes	Action By
7.	**Closing Remarks** The area Assistant Chief urged those in attendance to accept the project since it was meant to improve their quality of life, she requested them to be good will ambassadors for the project and spread information to those who could not make it to the meeting. Finally, the chief adjourned the meeting at 11.30AM, a closing prayer was conducted by a village elder in attendance.	Assistant Chief Kiteje Sub Location

MINUTES AUTHENTICATION

ASSISTANT CHIEF KITEJE LOCATION

Name..... ALI MOHAMMED SIBABU.....

Date..... 10-11-2021.....

Signature..... For ALII M. SIBABU ASST. CHIEF PUNGU Date: 10-11-2021.....

Consultant's Representative

Name..... Bra Mwakisi.....

Date..... 10-11-2021.....

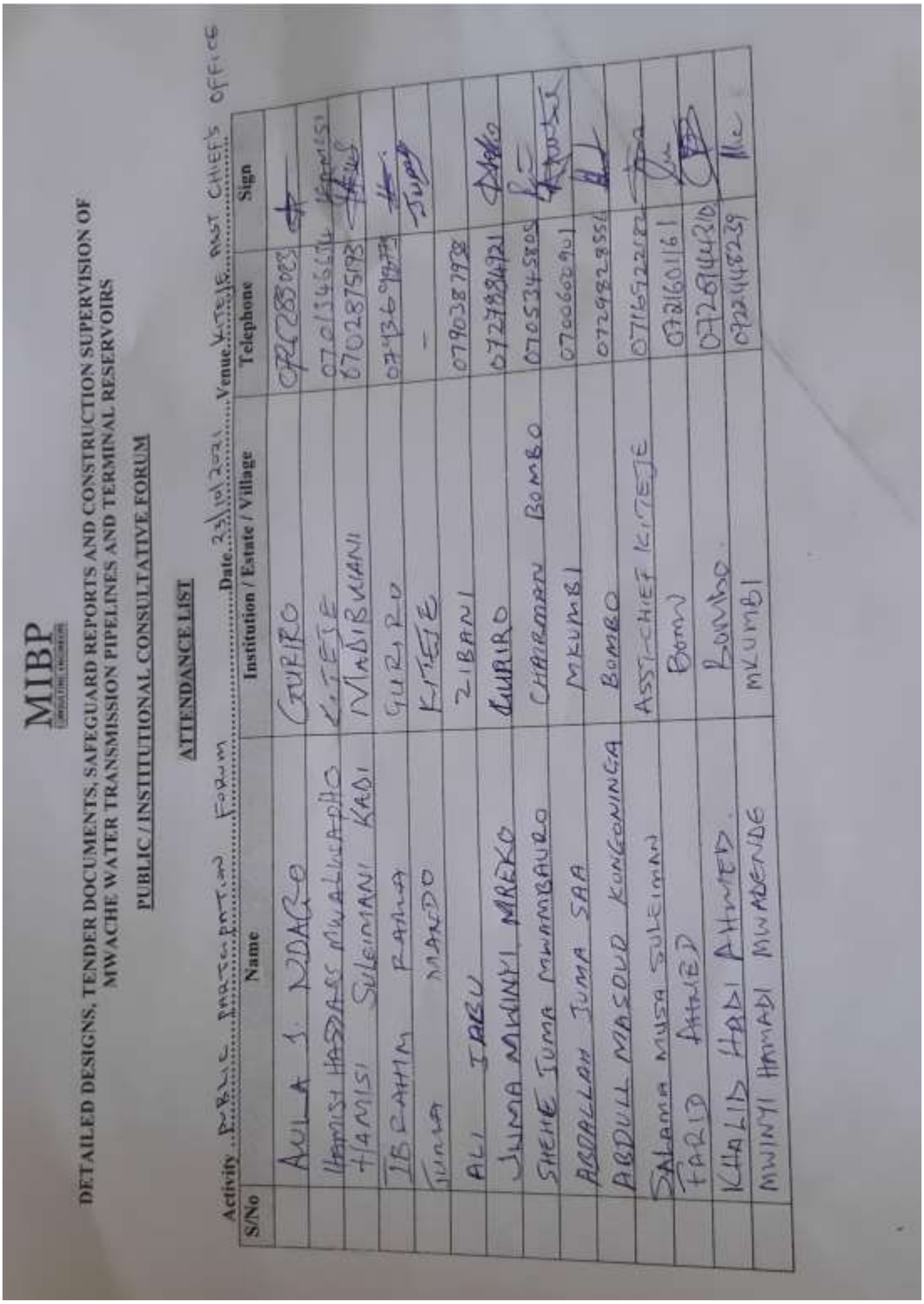
Signature.....

SAMPLE PHOTOS OF THE MEETING

Consultant representative addressing the meeting

A Resident asking questions

ATTENDANCE LIST – KITEJE SUB LOCATION MEETING



MIBP

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM Date: 23/10/2021 Venue: KITEJE ASST CHIEF'S OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
	AULA J. NDAGO	GURIRO	072C288083	
	HAMISI HASDARS MWALWADHO	KITEJE	0701346634	
	HAMISI SULEIMANI KADI	MADIBWANI	0702875193	
	IBRAHIM RAMA	GURIRO	0743699779	
	JUMA MANDO	KITEJE	–	
	ALI JABU	ZIBANI	0790387938	
	JUMA MWINYI MREKO	GURIRO	0727884921	
	SHEHE JUMA MWAMBAURO	CHAIRMAN BOMBO	0705345805	
	ABDALLAH JUMA SAA	MKUMBI	0700660901	
	ABDULL MASOUD KUNGONINGA	BOMBO	0729828551	
	SALAMA MUSA SULEIMAN	ASST-CHIEF KITEJE	0716922182	
	FARID AHMED	Bombo	0721601161	
	KHALID HADI AHMED.	Bombo.	0726944310	
	MWINYI HAMADI MWADENDE	MKUMBI	0722448239	

MIBP

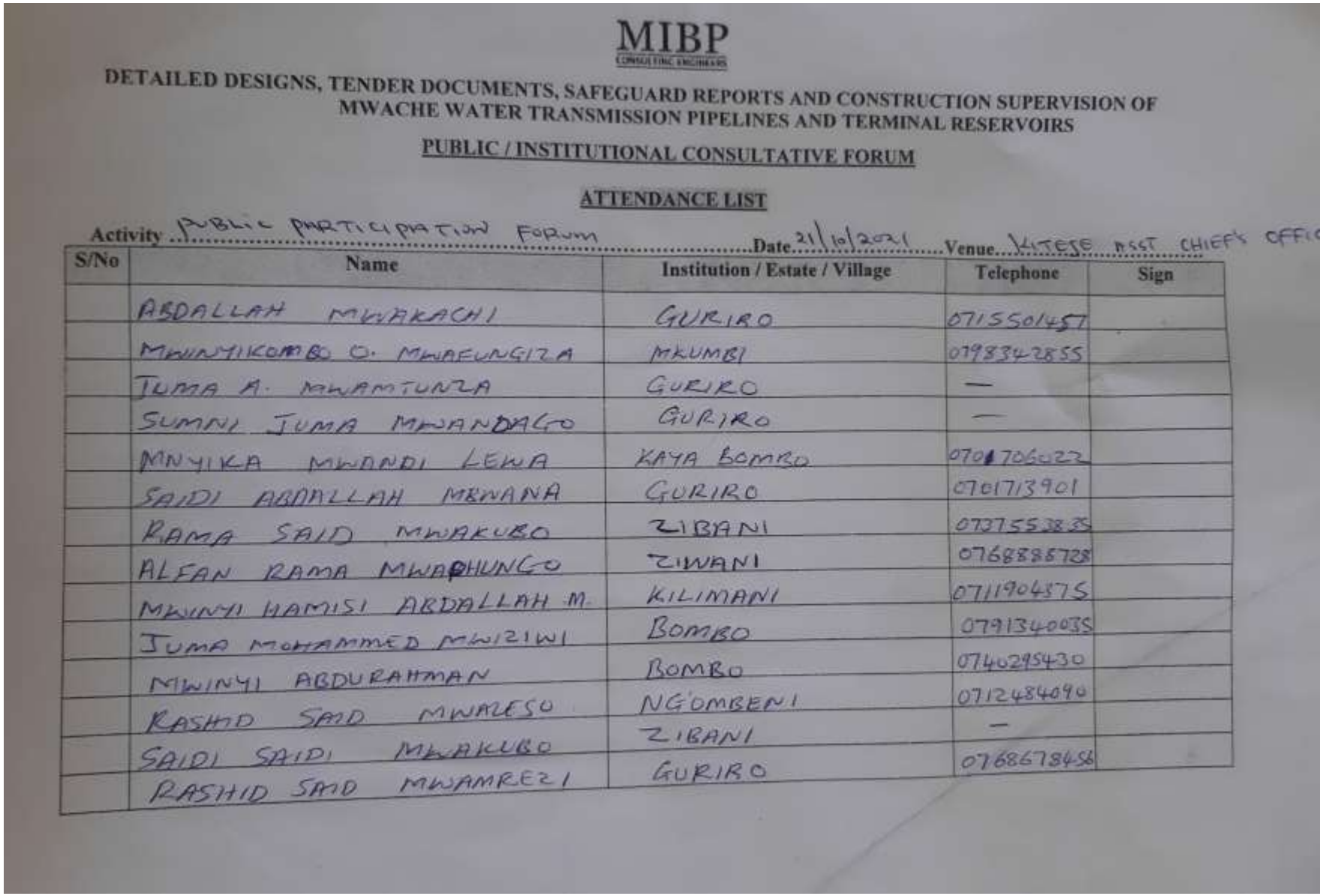
DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION FORUM   Date: 23/11/2021   Venue: KWESE ASST CHIEFS OFFICE

S/No	Name	Institution / Estate / Village	Telephone	Sign
	ATHMAN HAMISI CHIGULU	GURIRO	0701368308	
	IDD HASSAN DUNDU	BOMBO	0725356494	
	ABDALLAH SALIM	GURIRO	0794650311	
	MWANAARUBAINI SALIMU	BOMBO	—	
	MWANAKOMBO HAMISI	BOMBO	—	
	OBRA MWAITSI	Environmentalist	0720766404	



MIBP
CONSULTING ENGINEERS

DETAILED DESIGNS, TENDER DOCUMENTS, SAFEGUARD REPORTS AND CONSTRUCTION SUPERVISION OF MWACHE WATER TRANSMISSION PIPELINES AND TERMINAL RESERVOIRS

PUBLIC / INSTITUTIONAL CONSULTATIVE FORUM

ATTENDANCE LIST

Activity ..PUBLIC PARTICIPATION FORUM.....Date..21/10/2021.....Venue..KITESE ASST CHIEF'S OFFI

S/No	Name	Institution / Estate / Village	Telephone	Sign
	ABDALLAH MWAKACHI	GURIRO	0715501457	
	MWINYIKOMBO O. MWAFUNGIZA	MKUMBI	0798342855	
	JUMA A. MWAMTUNZA	GURIRO	—	
	SUMNI JUMA MWANDAGO	GURIRO	—	
	MNYIKA MWANDI LEWA	KAYA BOMBO	0701706022	
	SAIDI ABDALLAH MBWANA	GURIRO	0701713901	
	RAMA SAID MWAKUBO	ZIBANI	0737553835	
	ALFAN RAMA MWAPHUNGO	ZIWANI	0768886728	
	MWINYI HAMISI ABDALLAH M.	KILIMANI	0711904875	
	JUMA MOHAMMED MWIZIWI	BOMBO	0791340035	
	MWINYI ABDURAHMAN	BOMBO	0740295430	
	RASHID SAID MWALESO	NG'OMBENI	0712484090	
	SAIDI SAIDI MBAKUBO	ZIBANI	—	
	RASHID SAID MWAMREZI	GURIRO	0768678458	

Meeting 4:

NOTES OF MEETING HELD ON 14TH JUNE 2023 BETWEEN TSUNZA AND BONJE BEACH MANAGEMENT UNITS (BMU) AND COMMUNITY FOREST ASSOCIATION (CFA) AT ROYAL STAR RESORT MAZERAS AT 10 AM

REPUBLIC OF KENYA

NOTES OF MEETING HELD ON 14TH JUNE 2023 BETWEEN TSUNZA AND BONJE BEACH MANAGEMENT UNITS (BMU) AND COMMUNITY FOREST ASSOCIATION (CFA) AT ROYAL STAR RESORT MAZERAS AT 10 AM

PRESENT:

Kenya Water Security Climate Resilient Project – Client

1. Millicent Dzombo - Project Sociologist
2. Godwin Sakwa - Project Environmentalist

Sweco – Consultant

3. Dr James Kairo Mwakio - Project Ecologist

Bonje and Tsunza BMU

4. See attached attendance List -

AGENDA

1. What are the economic activities in your area
2. What is the value of mangrove (list and rank)
3. What are the threats facing mangroves
4. What Interventions should be adopted to address the threats

Discussions

TSUNZA BMU AND CFA

Importance of Creek / Mangroves

- Provide breeding ground for fish, crabs, prawns, oysters, snails, Mollusca,
- Mangrove provide timber to the local for construction sector (residential structures and boat making)
- Tourist attracting
- Creak help in control of storm and ocean wave surge

Threats to the Creeks / Mangroves

- Over fishing and bait collection
- Oil spills
- Sedimentation / erosion
- Human settlement
- Drought
- Plastic and other solid Wastes

Degradation Hot Spots

- Stoo- affected by Elnino
- Mteza Creek – Over harvesting of Fish and Marine Fauna
- Mkupe Tsunza - Over harvesting of Fish and Marine Fauna
- Gutu Tsunza - Over harvesting of Fish and Marine Fauna and El-nino
- Mwangani Dongo Kundu - Over harvesting of Fish and Marine Fauna
- Kwa Soa - Over harvesting of Fish and Marine Fauna
- Mwijela – Soil Erosion

Activities to be adopted in Specific Area

- Tree planting and re- afforestation Programs
- Stakeholder Sensitisation (Community) programs on conservation
- Stakeholder Sensitisation programs (Kenya Ports Authority KPA) on conservation
- Restoration Programs of Mangroves in Degraded areas
- Beach Clean-up and Waste Management Programs
- Bee Keeping Activities
- Fish Ponds and fishing sites including; Kwasoa, Toneza, Maguzoni, Dongo Kundu, Chuyu, Ngare, Mkupe, Mbagani, Gutu, Mwinjala, Mshame, Mwekerwe Nyanje, Chiweni, Manzazani, Mwangowa, Mwishomo, Fungu ya Kati, Chilomoni, Hodi
- Nursery Establishment within Kaya Chonyi, Kaya Mrera, Kaya Bombo, Kaya Mbuguni and Kaya Teleza

BONJE BMU AND CFA

Importance of Creek / Mangroves

- Mangroves provide traditional ropes used in fishing sector
- Vegetation within mangrove provide medicinal value
- Provide breeding ground for fish, crabs, prawns, oysters, snails, Mollusca,
- Mangrove provide timber to the local for construction sector (residential structures and boat making)
- Tourist attracting
- Creak help in control of storm and ocean wave surge
- Provision of clean air

Threats to the Creeks / Mangroves

- Charcoal burning
- Over collection of firewood
- Clearing for farming
- Over fishing and bait collection
- Oil spills
- Sedimentation / erosion
- Human settlement
- Drought
- Plastic and other solid Wastes

Degradation Hot Spots

- Mbele, Goro, Darajani, Difu, Mwanzenge, Maweni, Ngondi, Nianze, Mbagani, DOE all affected by charcoal burning and deforestation

Activities to be adopted in Specific Area

- Tree planting and re- afforestation Programs
- Stakeholder Sensitisation (Community) programs on conservation
- Stakeholder Sensitisation programs (Kenya Ports Authority KPA) on conservation
- Restoration Programs of Mangroves in Degraded areas
- Beach Clean-up and Waste Management Programs
- Bee Keeping Activities

Appendix 1: Attendance List

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

P. O. BOX 81651
MOMBASA

ATTENDANCE REGISTRATION FOR MANGROVE BASELINE SURVEYS IN MWACHE UNDER EcIA PROJECT

ATTENDANCE REGISTER

No.	Name	Sex (M/F)	Age Tick where applicable <35yrs	Age Tick where applicable >35yrs	Disability (Y/N)	Institution	Designation	Contact	Signature: June 2023 14th June
1	Millicent Asombo	F			N	KWSCRP	Sociologist	073605734	
2	Dr J G Kaka	M			N	KMFRI	CRO	0722795405	
3	EDWIN MISACHI	M	✓		N	KFS	FORESTER	0720484114	
4	Fredrick Munga	M	✓		N	KMFRI	R.S	0727802957	
5	Joseph Ogum	M	✓		N	KMFRI	R.S	0711744013	
6	Amy Mumo	F	✓		N	KMFRI	Intern	0712064572	
7	Godwin Salim	M	✓		N	KWSCRP	Environmentalist	0721686959	
8									
9									
10									

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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MOMBASA

ATTENDANCE REGISTRATION FOR MANGROVE BASELINE SURVEYS IN MWACHE UNDER EcIA PROJECT

ATTENDANCE REGISTER

No.	Name	Sex (M/F)	Age		Disability (Y/N)	Institution	Designation	Contact	Signature: June 2023
			Tick where applicable						13th June
			<35yrs	>35yrs					
1	STEPHEN NYAYO	M		✓		TSUNZA		0758443363	
2	JOYCE U. JANGA	F		✓		TSUNZA		0791891579	
3	RUMBA. M. M	M		✓		TSUNZA		0726675972	
4	NGOVI. S. M.	M		✓		TSUNZA		0743424873	
5	MUPO. M. ALI	F		✓		TSUNZA		0721201113	
6	EDWIN MISACHI	M	✓			KFS	FORESTER	0720484114	
7	MWACHIDZO HAMISI	M		✓	H	MWACHE	VC Chair	0706219198	
8	HAMISI RONGO	M		✓		RONJE	ENVIRONMENT	0700794444.8	
9	MWADZAME KUTA	M		✓		TSUNZA	fisherman	0742105902	
10									

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ATTENDANCE REGISTER

No.	Name	Sex (M/F)	Age (Tick where applicable) <35yrs	Age (Tick where applicable) >35yrs	Disability (Y/N)	Institution	Designation	Contact	Signature: June 2023 13th June
1	MARIAM KENDE	F	✓		N	BONJE BMU	SECRETARY	0705310262	
2	DENA MKALA	M		✓	N	BONJE BMU	MEMBER	0728779205	
3	TUNGWA KATEMBE	N		✓	N	BONJE BMU	MEMBER	0722899255	
4	HASSAN CHAKAYA	N	✓		N	BONJE BMU	MEMBER	0726566956	
5	MSAMBAKA MUMBA	M		✓	N	INTERIOR	ASST CHIEF	0717224816	
6	LWANDE KAJI	M		✓	N	BONJE BMU	MEMBER	0791557485	
7	MARIAM L. MAZERA	F	✓	✓	N	BONJE BMU	MEMBER	0707547646	
8	TSUMA YARO	M		✓	N	TSUNZA B	MEMBER	0702634062	
9	RAMA DZISWA	M		✓	N	T. B. M	MEMBER	0702634062	
10	GUBE MALAU	M		✓	N	BONJE FA	MEMBER	0714904409	

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ATTENDANCE REGISTER

No.	Name	Sex (M/F)	Age (Tick where applicable) <35yrs	Age (Tick where applicable) >35yrs	Disability (Y/N)	Institution	Designation	Contact	Signature: June 2023 13th June
1	EMMANUEL MUNGA	M	✓		NO	MWACHE CFA	CHAIRMAN	0791771134	
2	JUMAA KALLAH	M	✓		N	MWACHE CFA	SECRETARY	0716259275	
3	EDWARD MAMBO	M	✓		N	MWACHE CFA	MEMBER	0704321093	
4	JESSE MAMBO	M	✓		NO	MWACHE CFA	MEMBER	0700058123	
5	JULIANA MBUVI	F	✓		NO	MWACHE CFA	MEMBER	0723644163	
6	MBEYU MBUI	F	✓		NO	MWACHE CFA	MEMBER	0740224439	
7	ALI KIBWANA	M		✓	NO	MWACHE CFA	MEMBER	0705443432	
8	BAKARI MWATELA	M		✓	NO	" "	MEMBER	0713680308	
9	JUMA BAHATI	M		✓	NO.	KOMU TSUNZA	SECRETARY	0702727861	
10	JUMAA M. BAKARI	M	✓		N	MWACHE CFA	MEMBER	0792894709	

Appendix 2: FLIP Charts from Group Discussions- Tsunza

(1) TSUNZA.C. BMU.
QUES

SHUGLI ZA UCHUMI

Li – Fish, crabs, prawns, oysters shark and rays, etc. mkunga taa Sting-ray (taa sardines snails Mollusca

.ima – Maize, cereals, Muhogo, Mkilifi Mikasorina, Mbuyu, Mzungi, Migomba Miwa.

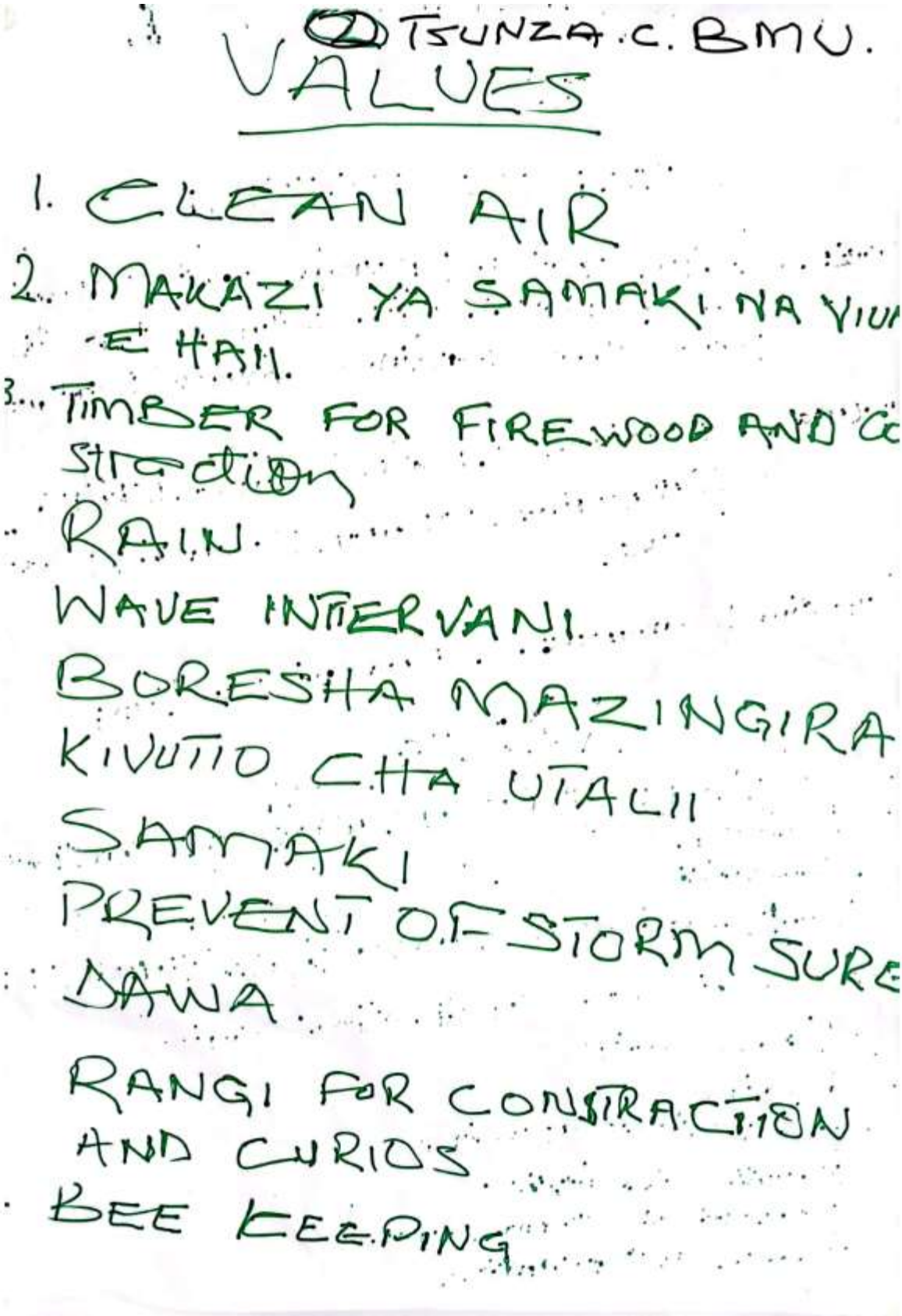
resting Mangroove – Ujenzi na Kuni

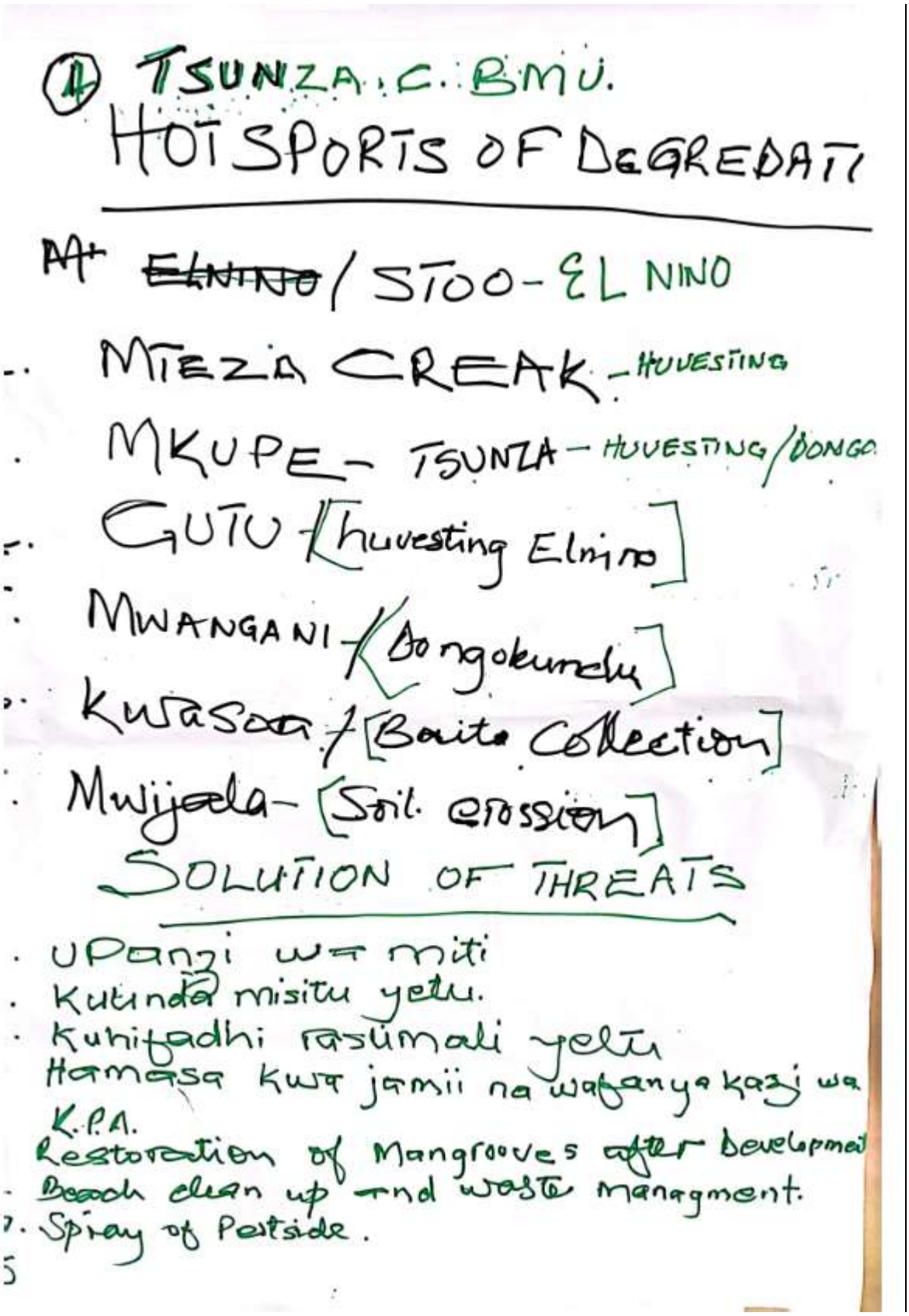
VE STOCK
ING

VALUE

Timber for fire wood on Constraction
Dawa.
Samaki
Makazi ya samaki na viumbe hii
Rangi for Constraction Curioes
Clean air
Rain
Borreshamazingira
Kivutio cha utalii
Prevent of Storm Surge
Save intervantion

(1) TSUNZA.C. BMU.


TSUNZA C. BMU.
VALUES
1. CLEAN AIR
2. MAKAZI YA SAMAKI NA VIU
-E HAII.
3. TIMBER FOR FIREWOOD AND C
STRCTION
RAIN.
WAVE INTIERVANI
BORESHA MAZINGIRA
KIVUTIO CHA UTALII
SAMAKI
PREVENT OF STORM SURE
DAWA
RANGI FOR CONSTRACTION
AND CURIOS
BEE KEEPING



④ TSUNZA. C. BMU.

HOTSPORTS OF DEGREDATI

AA+ ~~ELNINO~~ / STOO-EL NINO

.. MTEZA CREAK - HUVESTING

. MKUPE - TSUNZA - HUVESTING / DONGO

.. GUTU - [huvesting Elnino]

. MWANGANI - [Dongokuncha]

.. KWASOA - [Baito collection]

. Mwijaala - [Soil erossion]

SOLUTION OF THREATS

. Upanzi wa miti
. Kulinda misitu yetu.
. Kuhifadhi rasilimali yetu
Hamasa kwa jamii na wafanya kazi wa K.P.A.
Restoration of Mangrooves after developmai
. Beach clean up and waste managment.
. Spray of Pestside.

5

TSUNZA C.F.A.

TSUNZA BANDARINI

1. NURSERY ESTABLISHMENT / MICHEBARA /
2. FISH POUNDS
3. WASTE MANAGMENT AND PLASTIC RESICL
4. BEE KEEPING.
5. TREE PLANTING.

(SHUGHULI)

NURSERY ESTABLISMENT/UP

KUHIFADHI RASLIMALI

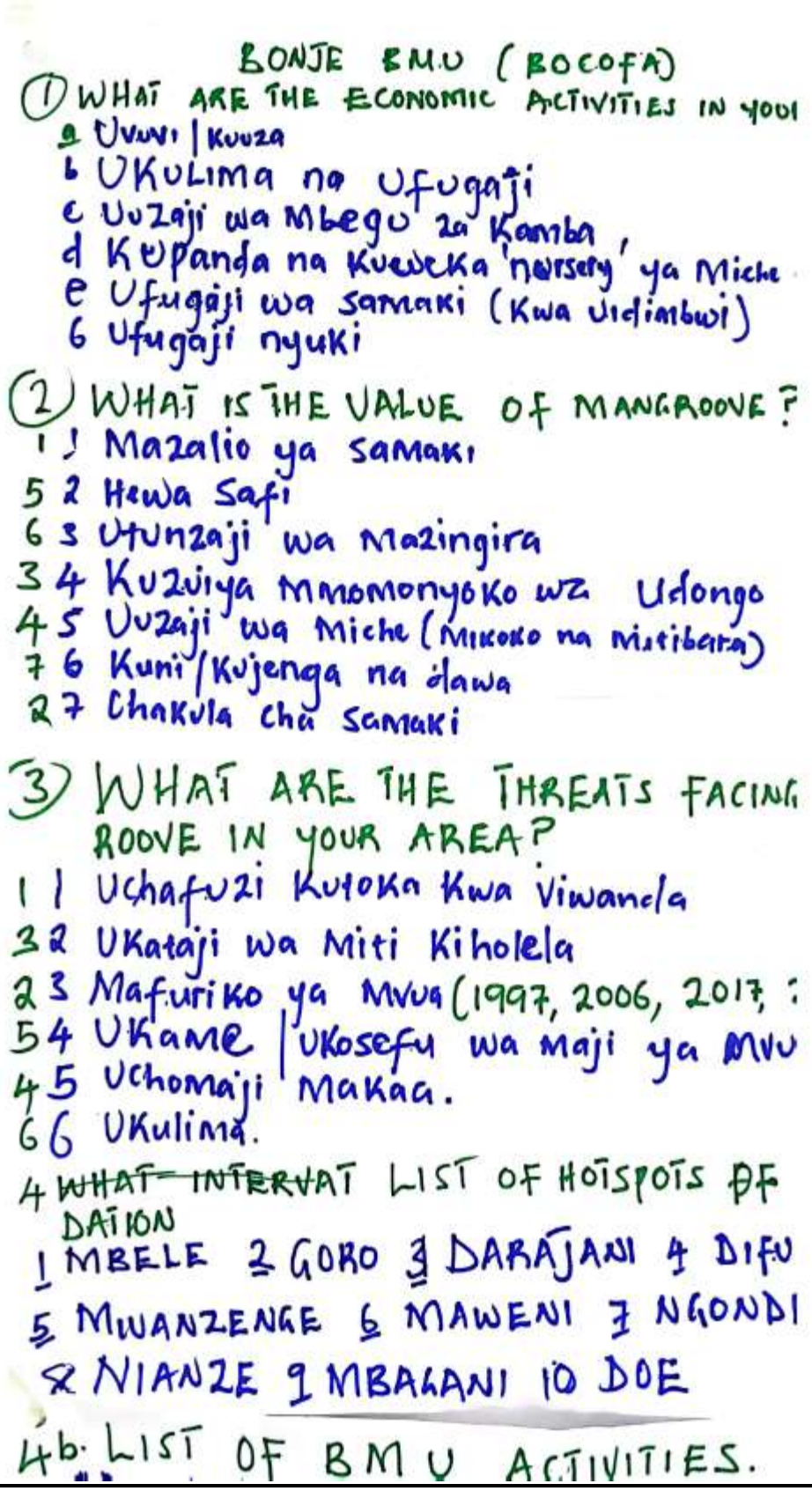
2) KAYA CHONYI
3 KAYA MRERA
4 KAYA BOMBO
5 KAYA MBUGUNI
6. KAYA TELEZA

TSUNZA. C. BMU.

SEHEMU ZA KUVUA

1. KWASODA
2. TONESA
3. MAGUZONI
4. DONGOKUNA
5. CHUYU
6. NGARE
7. MKUPE
8. MBAGANI
9. MAGOLO GUFU
10. MWIJALA
11. MSHAME
12. MEKWERWE NYANJA
13. CHIWENI
14. MATSAZANI
15. MWANGOWA
16. MWISHIMO
17. FUNGU YA KATI
18. FUNGU YA HAMANI
19. CHILAMONI
20. HODI
21.

Appendix 3: FLIP Charts from Group Discussions- Bonje



BONJE BMU (BOCOFA)

(1) WHAT ARE THE ECONOMIC ACTIVITIES IN YOUR

a Uvuvi | Kuuza
b Ukulima na Ufugaji
c Uuzaji wa Mbegu za Kamba
d Kupanda na Kuweka 'nursery' ya Miche
e Ufugaji wa samaki (Kwa Vidimbwi)
6 Ufugaji nyuki

(2) WHAT IS THE VALUE OF MANGROOVE?

1 1 Mazalio ya samaki
5 2 Hewa Safi
6 3 Utunzaji wa Mazingira
3 4 Kuzuiya Mmomonyoko wa Udongo
4 5 Uuzaji wa Miche (Mikoko na Mistibara)
7 6 Kuni/Kujenga na dawa
2 7 Chakula cha samaki

(3) WHAT ARE THE THREATS FACING ROOVE IN YOUR AREA?

1 1 Uchafuzi Kutoka Kwa Viwanda
3 2 Ukataji wa Miti Kiholela
2 3 Mafuriko ya Mvua (1997, 2006, 2017)
5 4 Ukame | Ukosefu wa Maji ya Mvu
4 5 Uchomaji Makaa.
6 6 Ukulima.

4 ~~WHAT INTERVAT~~ LIST OF HOTSPOTS OF DATION

1 MBELE 2 GORO 3 DARAJANI 4 DIFU
5 MWANZENGE 6 MAWENI 7 NGONDI
8 NIANZE 9 MBAGANI 10 DOE

4b. LIST OF BMU ACTIVITIES.


3b LIST OF HOTSPOTS OF DEG
TION.
1 MBELE
2 GORO
3 DARAJANI
4 DIFU
5 MWANZENGE
MAFURIK
6 MAWENI
7 NGONDE
8 NYANZE
9 MBAGANI
10 DOE
UKATAJI WA
MITI KIHOLELA
NA UCHOMAJ
MAKAA.

WHAT

4 INTERVATIONS SHOULD BE ADOPTED?

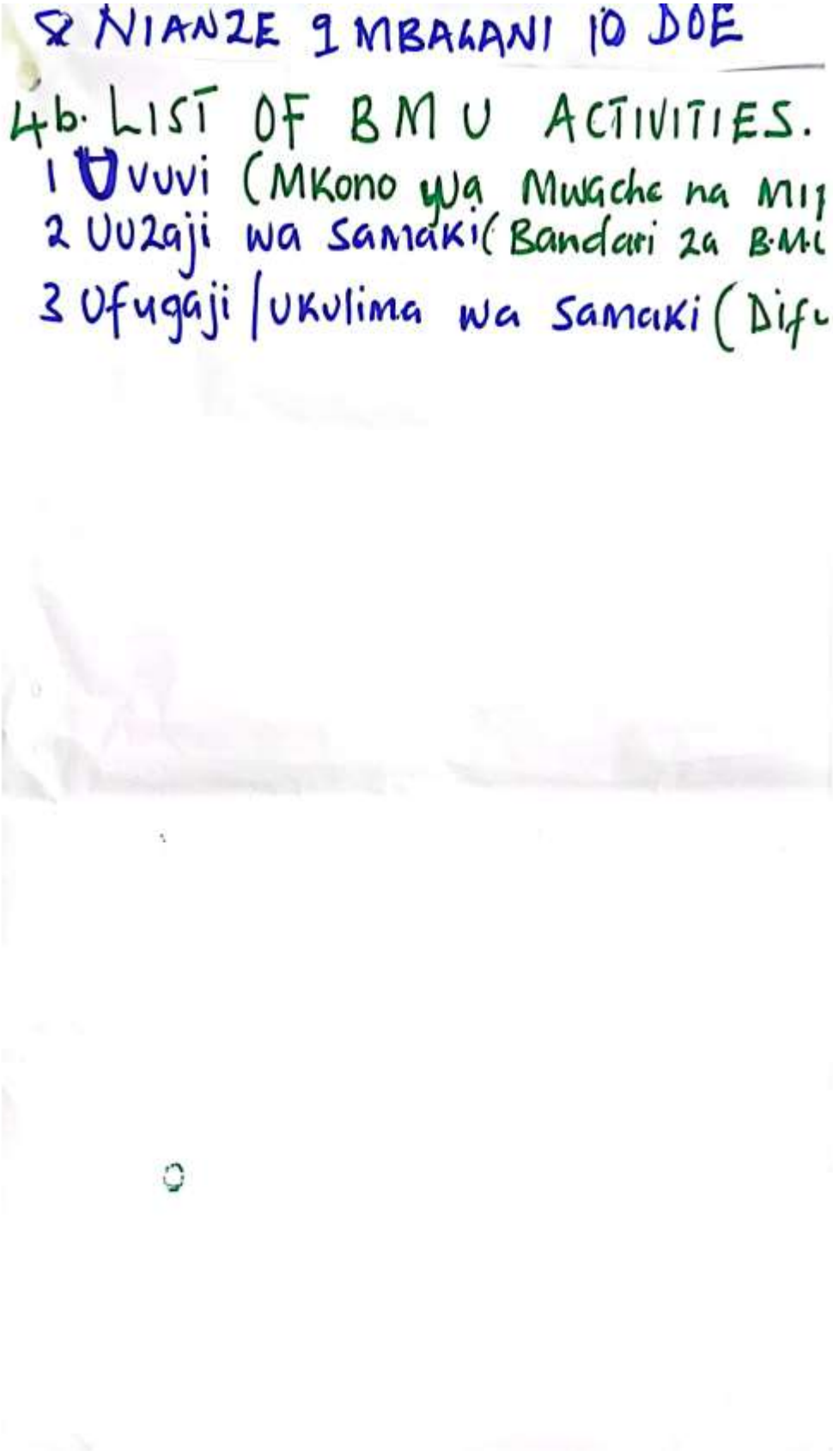
1 Kuhamasisha jamii
2 Tupate askari wa Kutosha
3 Kupata njia Mbadala za Kimapato Kwa jamii

4b. LIST OF CFA/BMU ACTIVITIES AND LOCATION OF THE ACTIVITIES

CFA ACTIVITIES

1 Kueka Miche ya Mwanzenge na Maweni
2 Kutunza na Kuhifadhi Mikoko Mikoko na Mitibara (Bonje BMU Landing site)
3 Ufugaji wa nyuki (Ndani ya Mipaka ya CF ya (BOROFA)
4 Utalii wa Kimazingira Mwanzenge (Goro & Difu)

(3)


8 NIANZE 9 MBAGANI 10 DOE
4b. LISTI OF BMU ACTIVITIES.
1 Uvuvi (Mkono wa Mwache na Mij
2 Uuzaji wa Samaki (Bandari za B.M.U
3 Ufugaji /ukulima wa Samaki (Difu

SABABU ZINAZOFANYA KUONGEZEKA KWA MIKOKO KISIWANI MWISHIMO?

Mbegu ~~Kwachoza~~ Kuachwa na maji wakat maji imejaa (Bamvua)

2 Kuchangiwa na maji kutoka kwa Mito ya maji baridi ifuatayo. Mteza, Mwache na Maji kutoka (Airport).

3. Hakuna ukataji wa miti

5

Appendix 4: Photographs of Consultative Session